ECONOMIC INSIGHTS ON HIGHER EDUCATION POLICY IN IRELAND

Evidence from a Public System

Edited by
John Cullinan and
Darragh Flannery

Economic Insights on Higher Education Policy in Ireland

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Editors

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Foreword

Globally higher education is in a state of considerable policy confusion. The dual policy motivation of equating highly educated populations with high levels of economic growth, and the desire to use education as a means to promote social equity, is appealing for policymakers. Organisation of the sector veers between the largely private higher education market (usually bringing to mind the USA—perhaps unfairly given the wide breadth of institutions there, ranging from the private 'Ivy League' to the great public universities and through to Community Colleges) and the wholly public systems (usually associated with the European system).

But even in this public structure—the core focus of this volume—eventually the costs of expanding education access leaves governments clambering for funding solutions. Despite the public funding, these solutions are often dressed up in the language of the market, such as encouraging private 'competitors' or imposing quality rules in return for state support. This model of funding institutions based on student participation, but also encouraging some market-style engagement, has been likened by the University of Melbourne's Vice Chancellor, Professor Glyn Davis, as being akin to having a fixed exchange rate and a floating exchange rate at the same time. It becomes confusing to know what to target and, moreover, the targets move as key drivers of policy positions, most notably exchequer funding, change.

The motivation for expansion within the sector was a sense of equity—that somehow the best institutions were off limits to lower socio-economic status students, or minority groups, due to how universities played with the capacity at their institutions. The problem is that old economics adage that supply will create its own demand—or the Hollywoodism of 'build it and they will come'. This is coupled with a pronounced sense that the vocational/apprenticeship system has become quite 'unloved'—not only by government policies but also by parents and prospective students who see the university degree as the desired result.

Despite the very sizeable investments in higher education, participation is still largely a middle-class outcome. Institutions pursue strategies for improving diversity, but ultimately the issue of under-participation by lower socio-economic background students in higher education has a fault-line firmly in the secondary school system and in the hard-wired nature of educational choice. This is, of course, closely aligned with the returns to education. If you don't know the value of education to you as an individual (because you have no reference points—no peers, no siblings, no parents who have experienced higher education), you will see other alternatives as better choices. These other choices may be jobs that do not allow you to realise your full potential but can also be other outcomes such as crime or welfare dependency. As a result, reviews, debates and policy papers abound in many countries. The fact that governments are engaging in substantive reviews of their higher education systems during a period of intense strain on the public purse is no coincidence.

Improvement in access to higher education is an important aim. But higher education in itself will not create opportunities in life. A demand-driven system will create a response in demand, but not necessarily where you want it, or from whom you want it. All evidence on access, for example, says start early, lock in a student mid-high school and raise their ambitions. King's College London, for example, runs its own secondary school with a particular focus on mathematics. This is an increasingly clear mantra from research which thankfully policymakers are listening to.

In this complex context, this volume is very much to be welcomed. The Irish experiences provide a very important lesson for many countries. A public system, in a country that quickly embraced the value of higher

education, effectively within a generation, which led to a massive expansion of participation, though perhaps in a socially uneven manner, and quickly had that expansion hit by a massive economic shock. Ireland has been on a rollercoaster of 'mass' higher education aspirations for the last 20 years of the twentieth century, to having that demand but no funds to pay for it in the first decades of the twenty-first century. Ireland is a very interesting laboratory for the study of how economics can interpret and influence higher education.

Spread across three key domains (participation, progression and financing), the volume examines how the returns to education is met with a persistent problem of low participation by some groups and, more importantly, examines the stresses of a public system trying to deliver a laudable aim of education-led growth and greater equity against the reality of a post 'great recession' public purse.

Professor Colm Harmon
Head of School of Economics
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Part I

Introduction

1

Economics and Higher Education Policy

Darragh Flannery and John Cullinan

1.1 Introduction

In common with many countries the demand for, and supply of, higher education in the Republic of Ireland has grown rapidly in recent times. This expansion is mainly driven at an individual level by the positive impact that higher educational attainment has on labour market outcomes and personal lifestyles. From society's viewpoint, enabling people to participate in higher education has broader economic and societal benefits, such as increased economic growth, higher levels of political stability and lower crime. Given this, Ireland continues to place higher education at the centre of strategies for future economic growth. This is

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emphasised in *Ireland's National Skills Strategy 2025*, which states that "having a workforce with high-quality relevant skills is key to productivity and innovation and well-skilled people are accordingly central to the success of the economy" (Department of Education and Skills 2016, p. 69). Such thinking has meant that government intervention in the higher education sector is the norm in most developed economies, with state subsidisation commonplace.

However, the demand for higher education is complicated by a variety of socioeconomic, spatial, cultural and other barriers, which may result in undesirable inequalities in 'accessibility'. This can lead to inequalities and inefficiencies in the composition of those in higher education and ultimately help perpetuate income and other socioeconomic disparities. At the same time, the quantity and quality of supply of higher education may be shaped by funding systems and labour market fluctuations. At a time of greater caution with regard to government and private spending, the burden of financing, as well as the role and value of higher education, is increasingly being questioned. Set in this complex context, this book presents research relating to higher education in order to provide evidence that helps support policy decision-making.[1] It aims to provide an analysis of a selection of prominent issues within the higher education sector in Ireland and does so from an economic viewpoint, describing the relevant theory and analysing these topics empirically. The 'economic way of thinking' is not central in the debate surrounding policymaking within the Irish higher education sector and it is hoped that the collection of research presented within this book, by providing economic insights on higher education policy, is a step towards bridging this divide.

1.2 The Higher Education Landscape

1.2.1 Institutional Background and Stylised Facts

Third-level (higher) education in Ireland is made up of three principal sectors: the university, technological and colleges of education sectors, all of which are substantially funded by the state. In addition, there are also a small number of independent private colleges. In total there are seven

universities, which are autonomous and self-governing, that offer degree programmes at bachelor, masters and doctorate level. The technological sector includes 14 institutes of technology (ITs) that provide programmes of education and training in areas such as business, science, engineering, linguistics and music, mainly to certificate, diploma and degree levels. Furthermore, there are four colleges of education that focus on training teachers, while there are also two other colleges, the National College of Art and Design (NCAD) and the Royal College of Surgeons in Ireland (RCSI), which offer specialist third-level degree qualifications. Higher education qualifications in Ireland follow the Bologna Process and European Qualifications Framework. The Higher Education Authority (HEA) is the statutory planning and policy development body for higher education and research in Ireland. The HEA has wide advisory powers throughout the whole of the third-level education sector. In addition, it is the funding authority for the universities, ITs and other non-private institutions. However, it is important to note that while the HEA distributes funds in the sector it is the Department of Education and Skills, in conjunction with the Department of Finance, which ultimately decides on the level of funding to be distributed. The specific HEA-affiliated institutions that are considered and referenced throughout this book are listed in the Appendix to this chapter.

In 2014, 51% of those in full-time undergraduate higher education in Ireland were in the university sector, 43% were in ITs, with the remaining 6% in other colleges (HEA 2015c). The same breakdown for full-time postgraduate students shows a distribution of 80%, 14% and 6% across the same three types of higher education institution (HEI). There is also considerable variation in the fields of study delivered across the different institutions, with 82% of undergraduates studying business, social sciences, humanities, science or health-related subjects in universities, compared to 57% studying these topics in ITs. The latter have more of a focus upon service, engineering and ICT-related courses, with these making up 39% of undergraduate students in ITs but only 13% in universities.

Entrance to HEIs in Ireland is *via* a competitive entry system based mainly on grades achieved in the Leaving Certificate examinations at the end of second-level schooling. These grades are converted into a points

score, generally referred to as Central Applications Office (CAO) points, with the number of points an individual receives helping to determine the type of course they can pursue—see Chap. 5 of this book and Denny (2014) for more details of the system. Applications for entry to undergraduate courses are processed by the CAO, with the participating institutions allocating places to students with the highest CAO points who wish to take that course, subject to HEI-imposed limits on course size. As the number of students applying for places generally exceeds the supply, the system is typified by excess demand. As Denny (2014) notes, this implies that there is no spare capacity in the system.

Participation in higher education has grown significantly over the past 20 years in Ireland with full-time student numbers in third-level education increasing from 115,696 in 1999/2000 to 173,649 in 2014/15 (Department of Education and Skills 2015), and these numbers are expected to reach over 200,000 by the year 2030 (Mc Guinness et al. 2012). This is reflected in Table 1.1, which shows the educational attainment of the Irish population in 2000, 2005 and 2014 relative to some selected countries within the Organisation for Economic Cooperation and Development (OECD).

Table 1.1 Percentage of adults aged 25–64 with tertiary education as the highest level attained for selected OECD countries over time

Country	2000	2005	2014
Australia	27	32	42
Belgium	27	31	37
Finland	33	35	42
France	22	25	32
Germany	23	25	27
Greece	18	21	28
Ireland	***22***	***29***	***41***
Korea	24	32	45
Mexico	15	15	19
Spain	23	29	35
Sweden	30	30	39
United Kingdom	26	30	42
United States	36	39	44
OECD average	22	26	34
EU21 average	20	24	32

Source: Created by authors using data from OECD (2015)

The data shows that from 2000 to 2014 the proportion of 25–64-year-olds with a third-level education qualification in Ireland increased from 22% to 41%. From having a proportion corresponding exactly to the OECD average and slightly above the EU21 average in the year 2000, Ireland is now well above both respective averages. Specifically, the scale of third-level educational attainment in Ireland is now close to the United Kingdom (UK), United States (US), Australia and Finland, while above countries such as France, Germany, Spain and Belgium. The changes in the distribution of educational attainment across the adult population in this time period are also reflected in the change in upper secondary graduation rates. This is measured by graduation numbers relative to the population of those at the typical graduation age, which increased in Ireland from 86% to over 98% from 2005 to 2013 (OECD 2015). This compares to 85% on average for the OECD countries in 2013.

However, behind these striking participation numbers are persistent inequalities in the social class or socioeconomic composition of those in higher education. OECD (2014) shows that in Ireland, a person whose parents have upper secondary education as their highest level of education is twice as likely to participate in tertiary education[2] as someone whose parents have a below upper secondary education. Furthermore, a person whose parents have tertiary education is 3.3 times more likely to participate in tertiary education as someone whose parents have below upper secondary education. The latter figure compares somewhat favourably to the OECD average of 4.5 but still demonstrates a steep socioeconomic gradient in higher education participation. The recent *National Plan for Equity of Access to Higher Education 2015–2019* (HEA 2015a) also highlights this issue, noting that participation of those from the semi-skilled and unskilled socioeconomic groups is at 26%, while there is practically full participation by those from the higher professional socioeconomic group.

The Irish State provides financial aid and assistance to help alleviate potential inequalities in accessing higher education related to income or geographic factors. Students who meet certain criteria based on parental income levels and geographic distance from their chosen HEI may receive a student maintenance grant throughout their time in higher education. The student contribution fee of the student may also be

subsidised, either fully or partially, again dependent on parental income. The geographic component of these grants is that students who satisfy an income-related means test receive a full or partial maintenance grant, depending on whether they live more or less than 45 kilometres (kms) from the HEI they wish to attend. It is notable that this distance threshold was 24 kms until the 2011/12 academic year. In 2013, 46% of new entrants to higher education in Ireland received some manner of financial assistance (HEA 2015b). In fact, 42% received complete subsidisation of the student contribution fee, while 32% of new entrants received a combination of full maintenance grant and complete subsidisation of the student contribution fee (HEA 2015c).

Ireland also has a number of so-called access programmes that explicitly target socioeconomically disadvantaged and other individuals with a view to increasing participation in higher education for those from certain groups. For example, the Higher Education Access Route (HEAR) is a national scheme that offers places on reduced CAO points and extra college support to school leavers from socioeconomically disadvantaged backgrounds. A range of financial, social and cultural indicators such as family income are considered in selecting those that qualify for this scheme (HEAR 2014).[3] The Disability Access Route to Education (DARE) is a similar scheme but aimed specifically at school leavers who have been educationally impacted as a result of a disability. Specifically, DARE offers reduced points places to school leavers who as a result of having a disability have experienced additional educational challenges in second-level education (DARE 2014). There is also a Delivery of Equality of Opportunity In Schools (DEIS) system where certain second-level schools that are deemed to be disadvantaged may access additional resources such as extra learning support for teachers and a home-to-community liaison programme (Department of Education and Science 2005).

1.2.2 Higher Education Financing

The funding of higher education in Ireland combines state support with upfront student fees without any student loan option. This system has evolved considerably in the last 20 years, and arguably the most significant change in higher education policy in Ireland was the abolition

of undergraduate tuition fees in 1996. This policy was introduced following the recommendation of the De Buitléir (1993) report. Students were, and still are, required to pay a 'student contribution fee' which was levied at €190 per annum in 1996 and increased to €900 by 2008. This 'fee' is set by the government and does not vary by HEI or programme of study. Any individual living in a European Economic Area (EEA) member state or Switzerland for at least three of the five years before the start of their progression to higher education is eligible to avail of this subsidy, with students of other nationalities facing higher tuition fees. Full tuition fees still exist for postgraduate study.

The resulting shortfall in revenue for HEIs from the abolition of fees was initially filled by government finances and so a substantial shift towards reliance on state funding was created. However, as the economic crisis progressed in Ireland from 2008, the worsening fiscal situation led to both a decrease in state transfers to higher education and increases in the student contribution towards the cost of higher education. Indeed, the student contribution increased by 233% from €900 in 2008 to €3000 in 2015 and, as shown in Table 1.1, this occurred in the context of increased participation in higher education in Ireland.

The overall impact of these changes from a financial viewpoint is shown in Table 1.2. It highlights that while the numbers have been growing in third-level education, total HEI income has actually fallen, a combination that has resulted in a significant decrease in expenditure per student across the period 2007–15. It also shows a decline in the level of state involvement in higher education financing; the proportion of HEI income that comes from the state has fallen from 78% to 63%. In other words, there has been a considerable shift in the burden of financing towards the student, but due to the scale of the decrease in state funding this has not been enough to prevent an overall decline.

Table 1.2 Summary of income and expenditures for Irish HEIs for 2007/08 and 2015/16

Year	Total recurrent income of HEIs (€m)	State contribution as a % of total	Full-time equivalent students	Expenditure per student (€)
2007/08	1,850	78	157,012	11,783
2015/16	1,700	63	188,943	8,997

Source: Created by authors using data from HEA (2014)

Table 1.3 Index of number of students, expenditure on educational institutions, and expenditure per student in 2012 for selected OECD countries

Country	Number of students	Expenditure	Expenditure per student
Australia	122.9	119.1	97.0
Belgium	115.5	111.6	96.6
Finland	101.9	109.2	107.2
France	105.6	105.1	99.5
Ireland	***112.7***	***93.4***	***82.9***
Korea	100.3	112.0	111.6
Mexico	121.0	118.3	97.8
Netherlands	111.4	114.0	102.4
Spain	111.6	98.1	87.8
Sweden	108.5	115.4	106.3
United States	122.1	111.3	91.1
OECD average	109.1	112.6	103.6

Note: The base year is 2008 for which the indices equal 100. Expenditures were measured in 2012 constant prices

Source: Created by authors using data from OECD (2015)

Table 1.3 provides an international context to these changes, presenting indices indicating how student numbers, overall expenditure and ultimately expenditure per student changed from 2008 to 2012 for a selection of OECD countries (2008 is the base year). It shows that while on average OECD countries have seen modest growth in expenditure per student, Ireland has experienced a significant decrease. In fact, relative to all other OECD countries shown, Ireland has experienced the worst decline in expenditure per student. It is also worth noting that expenditure per student has declined by a further 5% from 2012 to 2015, highlighting that the financial situation within higher education in Ireland has continued to deteriorate.

1.3 Policy Context

From a policy perspective, the focus on the higher education sector in Ireland has increased significantly in recent years. A notable example of this is the HEA's *Higher Education System Performance Framework 2014–2016* (HEA 2014), which outlined seven key objectives for the higher education system in Ireland. These included the typical broad policy

objective of increasing the human capital stock to aid economic growth, as well as tackling socioeconomic and other disparities in accessibility, issues that are directly addressed in this book. They also included objectives relating to high-quality teaching and learning, research excellence, global competitiveness, system restructuring and accountability, some of which are also covered here. Indeed, there are a number of specific issues within higher education, many related to the framework, that have become the focus of policy interest. Below we outline the most prominent of these, paying particular attention to the issues that bear direct relevance for what is analysed in subsequent chapters.

Increased participation for those from disadvantaged backgrounds is an on-going concern and was again highlighted in the performance framework. While the aforementioned 'free fees' scheme was seen as a key step in addressing this issue, studies conducted both before and after the introduction of free fees have highlighted social inequality in higher education participation in Ireland—see Denny (2014). Both the *National Plan for Equity of Access to Higher Education 2008–2013* (HEA 2008) and the *National Strategy for Higher Education to 2030* (Department of Education and Skills 2011), also known as the '*Hunt Report*', highlighted reforms of the student grant scheme as ways to address this issue. While some reforms have occurred (e.g. the administration of the grant system is now handled by a single entity named Student Universal Support Ireland [SUSI]), no significant changes have been made to the financial aspects of the system.

The more recent *National Plan for Equity of Access to Higher Education 2015–2019* (HEA 2015a) outlines eight principles in relation to higher education access and participation. One such principle is to restructure student financial supports to improve access for underrepresented groups in higher education. While no detail on suggested changes are provided within the plan, it does emphasise the need for accurate data and evidence on access and participation to help inform policy. The plan also acknowledges the potential role that geographic factors may play in higher education accessibility. It highlights the variation in participation across counties and districts of Dublin and specifies an objective of reviewing data to better understand the relationship between location and participation.

The *Hunt Report* and aforementioned system performance framework (HEA 2014) have both indicated that the successful progression of

students in higher education is now seen as a key component of analysing the effectiveness of institutions. The concept of 'successful participation' is now also a central component of Ireland's National Framework of Qualifications, which aims to ensure that learners can successfully participate in a programme, or series of programmes, leading to an award, or series of awards, in pursuit of their learning objectives (Government of Ireland 2012). A HEA report also noted that in the context of growing accountability and efficiency, "minimising students' non-completion of courses is an important part of ensuring that the resources available to the HE sector are utilised with maximum efficiency" (HEA 2010, p. 10). This, and a more recent report, *A Study of Progression in Irish Higher Education 2012/2013 to 2013/2014* (HEA 2016), have both shown that the proportion of new entrants to higher education not present one year later lies between 15% and 16%. They also show significant variation in these proportions across institution type, discipline studied, gender and prior educational attainment. Specifically, both reports emphasise the association between CAO points and non-completion in higher education.

Recent higher education policy has also placed a greater focus on the structure of higher education provision. Specifically, the Irish Government plans to re-organise the higher education sector and to create a number of new technological universities through the consolidation of a number of ITs (HEA 2013a; Department of Education and Skills 2011). It is envisaged that these technological universities will offer undergraduate and postgraduate degree programmes from higher certificate to doctoral degree and the programmes offered will have a vocational/professional orientation, with a focus on science and technology. They will also be cognisant of the social and economic needs of the region in which they are located and will engage in problem-orientated research (HEA 2013a). There are also other proposed changes outlined in the policy reforms relating to increased collaboration amongst HEIs and changes in governance (HEA 2013b); however, the most significant is perhaps the proposed consolidation of ITs into technological universities. There has been resistance to these changes and it remains to be seen if, how and when they are fully implemented. Figure 1.1 illustrates these consolidations and also provides a spatial perspective on the current distribution of universities and ITs in Ireland.

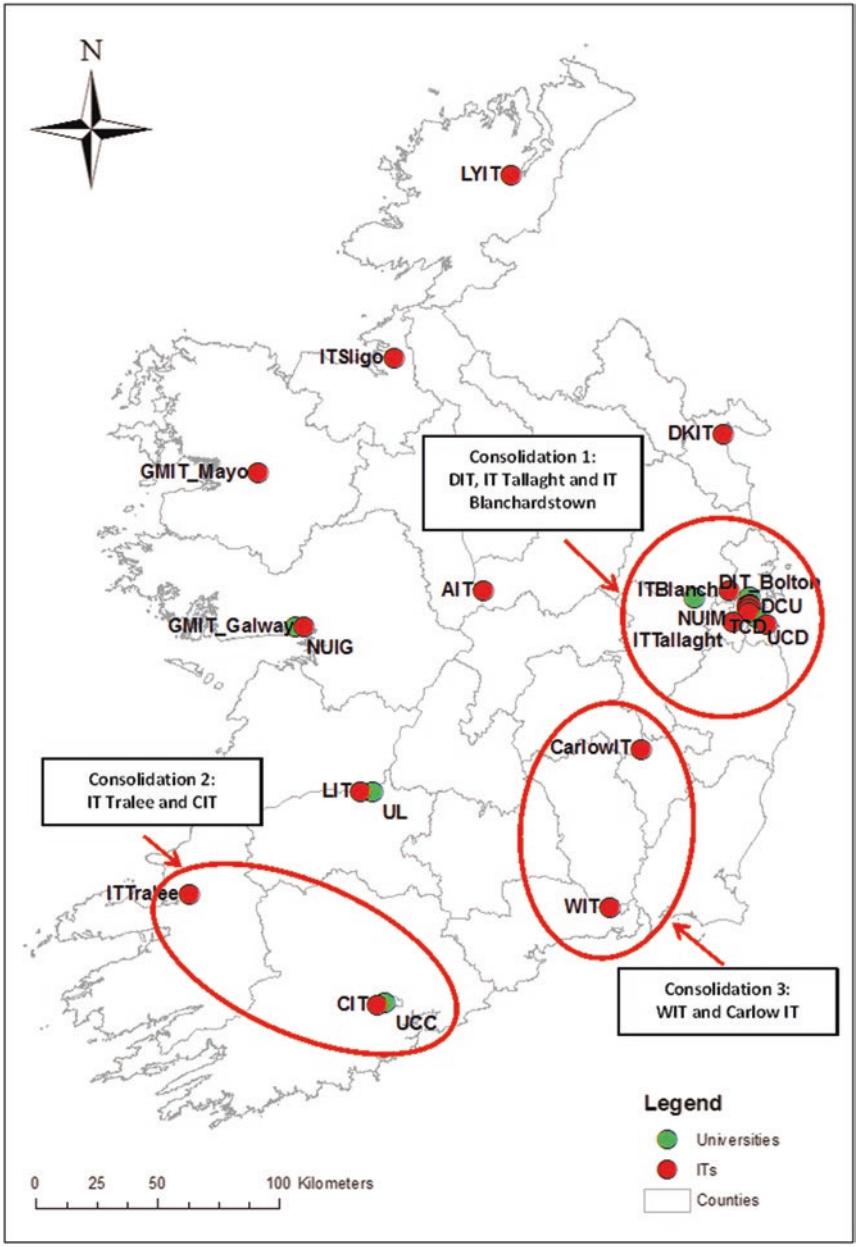

Fig. 1.1 Spatial distribution of universities and ITs and proposed consolidations. *Source*: Adapted from Walsh et al. (2016)

There is also increased attention being paid to greater accountability for the still sizeable public funding (in absolute terms) within the sector. This focus has seen the publication of *Higher Education System Performance: Institutional and Sectoral Profiles 2012/2013* (HEA 2015d) and also the enhancement of the detail within the regular *What do Graduates do?* reports produced by the HEA. The former is the third in a series of reports from the HEA developed in partnership with the Department of Education and Skills and the HEIs themselves. These profiles provide a summary of various statistics related to participation numbers, fields of study, research performance, level of internationalisation, as well as the human resource and financial base for each publically funded HEI in Ireland. These reports have been introduced with the aim of developing "a more comprehensive approach to performance evaluation" and to "provide an initial basis for evaluating institutional performance" (HEA 2013b, p. 5).

The *What do Graduates do?* series has been produced by the HEA for 10 years—see, for example, HEA (2013c) and HEA (2015e). This provides an analysis of the first destination of graduates of the Irish higher education system, be it in work, pursuing further study or looking for employment. These have shown that the employment prospects for graduates during the recent economic crisis remained relatively stable, with unemployment for graduates ranging from 7% to 8% across the period 2009–12 and remaining at 7% for 2014 (HEA 2013c, 2015e). This compares well to the national youth unemployment rate, which peaked at 31.3% in 2012 and was 21.4% by the end of 2014. Evidence from OECD (2015) would seem to support this labour market benefit for graduates in Ireland. It shows that both males and females with an undergraduate degree in Ireland earn considerably more than someone with upper secondary as their highest level of education achieved—see Table 9.1 later in this book for further details.

However, despite these benefits, there is still some debate as to the relevance of higher education to the labour market. For instance, more recent publications in the *What do Graduates do?* series have included an analysis of the relevance of the qualifications graduates have to their area of employment. This has shown that 63% of bachelor degree-level graduates rated the relevance of their qualification as *relevant* or *most relevant* to their area of employment. The corresponding figure for masters/PhD level graduates was 75%. These data also highlighted variation across field

of study pursed; those that studied health-related subjects were the most likely to find their studies relevant to their employment, while humanities graduates were the least likely. This may be indicative of a potential imbalance between the supply of university graduates and the number of relevant jobs available. Given the objective of having a higher education system that is serving "areas in demand by employers" (HEA 2014, p. 14), greater scrutiny is now being placed upon the skills and competences graduates learn while in higher education.

The funding structure of higher education has arguably attracted the most attention from a policy viewpoint in recent years. Numerous reports such as OECD (2006) and the *Hunt Report* have recommended that Ireland consider the implementation of alternative funding structures for undergraduate higher education. Bekhradnia (2015) and the then Department of Education and Science (2009) have detailed the advantages and disadvantages of a wide range of potential funding options. In 2014 an *Expert Group on the Future Funding of Higher Education* (Expert Group) was established. In their final report *Investing in National Ambition: A Strategy for Funding Higher Education* (Expert Group 2016) they describe the current funding arrangements for higher education as insufficient and stressed that further efficiencies, use of information technology or a cap on numbers would alone not be enough to address the problems faced. They have estimated that an extra €600 million per year is needed in funding to meet the current demographic and quality challenges, a figure that rises to €1 billion per year by 2030 (Expert Group 2016). They also question whether the current manner in which the state distributes funds to HEIs in Ireland is appropriately structured to support issues such as quality and access and the need to increase the level of funding derived from students and the state is identified as key. Three alternative funding options were outlined for consideration. The first two involve increased state funding combined with either the scrapping of the student contribution fee or maintaining it at current levels, with the third option being the introduction of an income contingent loan (ICL) system. The introduction of a financial contribution from employers was also recommended. They also stress the need to improve maintenance supports and manage individual private contributions to the cost of higher education to ensure that affordability and access are equitable.

1.4 Economics and Higher Education

Economics concerns itself with analysing how individuals, households, firms and governments make decisions about consumption and production within an environment of scare resources. This may typically take the form of a theoretical and/or empirical analysis, with the basic objective of helping to inform choices of efficiency and equity; choices that may often conflict with one another. Given the substantial interaction of various agents such as the state and individuals within the higher education system, this sector is therefore well-suited to an analysis from an economic viewpoint.[4] While there is a wide range of important theoretical contributions from economics to higher education, much of the research to date in the area has been empirical in nature.

Economics is also a particularly useful lens from which to consider these issues as it offers a rigorous theoretical perspective, as well as a range of informative and insightful empirical methods that are not regularly used in other disciplines. For example, formal economic models provide a means of examining patterns of preferences, decisions and outcomes in a systematic and theoretically consistent way, based on testable underlying assumptions. This is particularly relevant when considering the choices facing school leavers in terms of if, and where, they go to higher education. Furthermore, since a key focus of economics is on the efficient allocation of scarce resources, economic models are particularly well-suited to considering issues such as where the burden of higher education funding should fall. This is an issue of particular importance in an era of constrained public finances.

Economic tools are also very useful for studying higher education issues and topics at an empirical level. This is because applied economics is built on causal analysis and provides a range of identification tools and strategies to this end, including a number of quasi-experimental approaches. In the absence of experimental designs and data, which is generally the case for higher education policy issues, such approaches can be used to evaluate the impact of access programmes, say, on a range of higher education outcomes. Applied economic methods are also particularly well-suited to identifying and analysing disparities in higher education participation decisions and other outcomes, while decomposition techniques can be used to identify the drivers or causes of a range of outcomes.

Thus, a key advantage of applied economics research, such as presented in the various contributions in this book, is that it helps to identify and quantify the key relationships involved in higher education policy issues and to answer a number of specific questions. For example, does the socioeconomic background of a young person determine whether they participate in higher education? Does this vary by other factors such as where the individual lives or goes to school? What factors impact on non-progression in third-level education? What are the regional impacts of HEIs? To whom do the greatest benefits accrue from higher education? Helping to answer such questions is one way in which economics can contribute towards public policy on higher education.

Internationally, the study of the economics of education, and higher education specifically, has expanded considerably in the past 25 years. Some notable works in the field include Blaug (1970), Cohn and Geske (1990), Belfield and Levin (2003), Johnes and Johnes (2004) and Toutkoushain and Paulsen (2016). The five volumes of the *Handbook of Economics of Education* also provide good insights into some key studies related to higher education from an economics perspective (Hanushek and Welch 2006a, b; Hanushek et al. 2011a, b, 2016). The key role that economics plays in higher education policy is further reflected by the fact that the National Bureau of Economic Research (NBER) in the US has an active programme of research on the economics of higher education. In the UK, the economic-minded Institute for Fiscal Studies (IFS) has a specific higher education research area, while the Centre for the Economics of Education (CEE), based at the London School of Economics (LSE), also regularly conducts economics studies related to higher education.

In an Irish context, there are two dedicated higher education research centres within HEIs (Dublin City University's *Higher Education Research Centre* and Dublin Institute of Technology's *Higher Education Policy Research Unit*), while *The Economic and Social Research Institute* (ESRI) also has an education-themed research programme. However, to date, research relating to higher education from an economic viewpoint has been relatively rare, with the main focus being on estimating the private return to education. There have also been a small number of economic studies that have considered socioeconomic disparities in participation, and others that have looked at the issue of higher education funding.

Other important issues have, however, remained largely ignored in Ireland. Indeed, Hazelkorn (2014) notes that the dearth of research, from the fields of economics and others, accounts for large gaps in our understanding of developments affecting Irish higher education. This book looks to address some of these gaps from an economics perspective.

1.5 About This Book

Within this setting, this book brings together a number of economic studies relevant to the higher education sector with the aim of providing evidence that supports policy decision-making. As stated earlier, it aims to provide an analysis of a selection of prominent issues within the sector in Ireland both from a theoretical and empirical viewpoint. We do so under the three broad headings of '*Participation & Preferences*', '*Progression & Outcomes*', and '*Benefits & Financing*', with a focus predominately on issues related to undergraduate rather than postgraduate education. Each chapter within these broad headings presents a relatively non-technical analysis of the specific topic of interest, making it accessible to a wider audience. In doing so, it aims to provide an important addition to our knowledge and understanding of the economics of higher education in Ireland and will serve as a useful and up-to-date resource for policymakers, researchers, academics and students, across a range of disciplines, both in Ireland and internationally.

It should be noted, however, that there are a number of issues that are not specifically examined in this book but that are also important for higher education policy in Ireland. These include, but are not limited to, the internationalisation of higher education, participation and outcomes in postgraduate (masters and PhD) education, as well as the performance and efficiency of Irish HEIs in an international context. Other potentially interesting topics include analysing the interplay between higher education and mental health, the potential role of behavioural economics for higher education policy, the economic spillover effects of higher education and the contribution of higher education to the knowledge economy. Furthermore, the exploration of parental and student attitudes to higher education financing and the application of economic methodologies to

explore pedagogical issues within higher education would be valuable from a policy and practitioner viewpoint. The post-secondary vocational education sector in Ireland is also an area that would likely benefit from greater economic analysis. The reasons for not including analyses of such topics here include space constraints, data constraints,[5] as well as a lack of robust economic studies on most of these issues. Indeed, they are likely to prove to be fruitful areas for economics research in the future. Nonetheless, despite these omissions, this book represents the first time that a broad range of economics studies of relevance to higher education policy in Ireland have been brought together in a single resource.

While each of the chapters is a relatively independent piece and can therefore be read separately, they are also unified by their common relevance to higher education policy in Ireland. Following this introductory chapter, the next three chapters examine issues relating to *Participation & Preferences*. Within the context of a strong socioeconomic gradient in higher education participation, in Chap. 2 Kevin Denny and Darragh Flannery investigate the impact of socioeconomic factors on both the decision to participate in higher education and on the type of higher education an individual pursues. They also present estimates of the main determinants of upper secondary exam performance in Ireland. In Chap. 3, John Cullinan and Brendan Halpin consider the spatial economics of higher education participation, focussing on a range of spatial factors that impact the choices of school leavers. They illustrate important school-to-higher-education-transition patterns and also utilise geographic information systems (GIS) techniques to identify the extent of inequalities in geographic accessibility to higher education. The implications of these inequalities for higher education participation decisions are also discussed. Placing an emphasis on the student perspective in Chap. 4, Sharon Walsh and John Cullinan focus specifically on student preferences for HEIs and what factors influence them in their choice of HEI. The approach is two-fold with the importance and correlates of peer, sibling and parental influences on choices first examined. Findings from a discrete choice experiment examining student preferences for HEIs are then discussed.

The next three chapters, constituting the *Progression & Outcomes* section, are motivated by an aim to examine the factors that impact performance

within higher education and to also explore potential mismatch between the sector and the needs of the labour market. Accordingly, in Chap. 5 Selina McCoy and Delma Byrne investigate how Irish HEIs compare in their student retention patterns when controlling for a range of student characteristics such as prior academic performance. Patricia McMullin focuses specifically on those from lower socioeconomic backgrounds in Chap. 6 and presents an overview of the importance of access programmes in Irish higher education. This includes an evaluation of how the 'New ERA' access programme at University College Dublin impacted upon the first-year and final-year academic outcomes of participants in the programme. Chapter 7 moves away from outcomes within higher education itself, where Seamus McGuinness, Ruth O'Shaughnessy and Konstantinos Pouliakas explore the topic of overeducation in the Irish labour market. The chapter specifically considers the impact of overeducation on earnings within the Irish labour market, as well as the extent to which overeducation can be explained in terms of factors such as human capital effects, job conditions/requirements, preferences, or the information held at the time of recruitment.

The final three chapters of the book fall under the *Benefits & Financing* heading and aim to provide insights into the economic benefits of investing in higher education, as well as the economics of higher education financing. Chapter 8 concentrates on the former with Qiantao Zhang, Charles Larkin and Brian Lucey adopting a Keynesian multiplier approach in estimating the broad economic impact of Irish HEIs. This also involves a close examination of the economic impact of HEIs at a regional level. Chapter 9 by Darragh Flannery and Cathal O'Donoghue uses a micro-based approach to present estimates of the net private, public and non-pecuniary returns to third-level education in Ireland. While the private returns to higher education have featured heavily in previous literature in the area, this study contributes to the literature by incorporating the influence of the tax/benefit system and by exploring how happiness and health indicators vary by level of education. Finally in Chap. 10, Darragh Flannery, Aedín Doris and Bruce Chapman analyse the much debated topic of higher education financing. This chapter first discusses the main arguments around state and student funding systems and the results of two separate ex-ante empirical

analyses that examine the introduction of several alternative student financing systems are then presented. The focus is on the repayment patterns of graduates within these systems, but distributional outcomes are also considered.

1.6 Appendix: Higher Education Institutions in Ireland (with Abbreviations)

Universities	Institutes of technology	Other colleges
Dublin City University (DCU)	Athlone Institute of Technology (AIT)	Mater Dei Institute of Education (MaterDei)
Maynooth University (MU)	Cork Institute of Technology (CIT)	Mary Immaculate College Limerick (MIC)
National University of Ireland, Galway (NUIG)	Dublin Institute of Technology (DIT)	National College of Art and Design (NCAD)
Trinity College Dublin (TCD)	Dun Laoghaire Institute of Art, Design and Technology (IADT)	Royal College of Surgeons in Ireland (RCSI)
University College Cork (UCC)	Dundalk Institute of Technology (DKIT)	St. Angela's College, Sligo (St. Angela's)
University College Dublin (UCD)	Galway-Mayo Institute of Technology (GMIT)	St. Patrick's College, Drumcondra (SPD)
University of Limerick (UL)	Institute of Technology, Blanchardstown (IT Blanch)	
	Institute of Technology, Carlow (Carlow IT)	
	Institute of Technology, Sligo (IT Sligo)	
	Institute of Technology, Tallaght (IT Tallaght)	
	Institute of Technology, Tralee (IT Tralee)	
	Letterkenny Institute of Technology (LYIT)	
	Limerick Institute of Technology (LIT)	
	Waterford Institute of Technology (WIT)	

Source: Created by authors using information in HEA (2014)

Notes

1. While the focus in this book is on modern policy developments, Walsh (2014) provides a description of the historical development of the higher education sector in Ireland.
2. Tertiary education here is defined as the equivalent of an International Standard Classification of Education (ISCED) of level 5 or above, that is, from a higher certificate to PhD level education.
3. There are also institution-specific access programmes that aim to widen access for underrepresented groups. These are discussed in detail in Chap. 6 of this book.
4. While we focus on the economics of higher education, Burgess (2016) provides a summary of the economics of education as a whole.
5. The *Hunt Report* mentioned the need to further develop the collection and analysis of data within higher education to better inform policymakers.

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Part II

Participation & Preferences

2

The Economics of Higher Education Participation

Kevin Denny and Darragh Flannery

2.1 Introduction

The recognition of education having a positive role in economic development is established through the macroeconomic growth models of Solow (1956), Lucas (1988) and Romer (1990), and in a microeconomic framework with the human capital models of Mincer (1958), Schultz (1961) and Becker (1964). The basic tenet of both fields is that increased education leads to higher productivity, which in turn leads to higher outputs and incomes. Economic studies in relation to education have mainly focused upon estimating this relationship, both at a macro and micro level (Stevens and Weale 2004).

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There are two main channels through which this association is seen to manifest itself: in a direct manner at the individual level and in an indirect way at the level of society. At the individual level, education and economic growth are linked positively through education's ability to improve an individual's productive capacity by increasing their human capital. The latter term refers to the stock of competences and knowledge an individual possesses that enables him/her to produce some economic value, with higher levels of education generally associated with having a higher amount of human capital. Improvements in an individual's productive capacity feed into output growth, which then leads to economic growth. Individuals may also derive many non-pecuniary benefits to extra education. Those with higher levels of education have been shown to have higher levels of self-reported health measures, job satisfaction and general happiness (Hartog and Oosterbeek 1998; Oreopoulos and Salvanes 2011).

There are also social returns to education from both a monetary and non-monetary perspective. The former relate to the indirect contribution of education to increased economic growth. These may stem specifically from externalities such as increased political and social stability that results from a population with higher educational levels and/or spillover effects leading to increased co-worker productivity (McMahon 2004). The non-monetary societal benefits to higher levels of education include reduced income inequality and lower crime rates (McMahon 2009). Therefore, given its significance at an economic, individual and social level, the encouragement of participation in higher education is a key policy objective for most governments of developed economies around the world.

In this context, participation in third-level education has grown significantly over the past 20 years in the majority of developed economies (OECD 2015). As outlined in Chap. 1, Ireland is no exception to this trend with the number of full-time new entrants to undergraduate higher education now exceeding 41,400, a figure that is 7% higher compared to 2011 (Higher Education Authority [HEA] 2016). The expansion of opportunities for higher education in Ireland is further manifested in the attainment levels of young adults (aged 25–34 years), 49% of whom now have a higher education qualification, well above the OECD aver-

age of 39% (HEA 2016). This expansion has been further encouraged by the recent *National Strategy for Higher Education to 2030* to enable Ireland "to achieve its ambitions for recovery and development within an innovation-driven economy" (Department of Education and Skills 2011, p. 10).

Given the rapid growth already seen and the continued objective of expansion within the sector, it is important to gain an understanding of the factors that may influence individuals to participate in higher education. It is also useful to investigate participation in higher education from an equity viewpoint. This may help evaluate current and inform future higher education policy. This chapter aims to provide this examination in the Irish context. The next section will provide an overview of participation in higher education. We then explore the most prominent theoretical aspects of how the decision to participate in higher education may be formed. We also outline the relevant international literature to have empirically examined these decisions within this section. We next present the results from empirical models of participation using Irish data. These specifically highlight the influence of factors such as social class, gender and policy tools on both the decision to attend higher education and also the type of higher education institution (HEI) an individual may attend. This section also presents estimates of the main determinants of upper secondary exam performance in Ireland. The final section of the chapter presents a summary of our findings and a discussion of their implications.

2.2 Higher Education Participation in Ireland

Enrolment numbers in higher education in Ireland are provided by the HEA on an annual basis and Table 2.1 provides a summary of such data across undergraduate and postgraduate levels for universities, institutes of technology (ITs) and colleges of education (CEs) for 2014/15. It also includes the number of part-time students across these levels in the different types of HEIs.

The data presented shows that full-time undergraduate students constitute the vast majority of those participating in higher education in Ireland. There is also a significant part-time cohort at both undergraduate

Table 2.1 Participation in higher education in Ireland across level, HEI type and mode of study for 2014/15

	Number of full-time undergraduate students	Number of full-time postgraduate students	Number of part-time undergraduate students	Number of part-time postgraduate students
Universities	77,515 (+7.6%)	17,605 (–1.6%)	6,414 (–13.6%)	9,241 (+10.7%)
ITs	65,164 (+6.5%)	3,160 (+17.4)	14,133 (+13.8%)	3,764 (+42.7%)
CEs	8,621 (+7.6%)	1,159 (+19.12%)	515 (–33.8%)	2,136 (18.2%)
Total	151,300 (+7.1%)	21,924 (+1.69%)	21,062 (+2.1%)	15,141 (+18.7%)

Note: Percentage change between 2011 and 2014 presented in parentheses
Source: Created by authors using data from HEA (2015)

and postgraduate levels. Besides the absolute student numbers, Table 2.1 also shows in parentheses the change in these respective numbers from 2011 to 2014.[1] As we can see, even across this relatively short time period, there is evidence of significant growth, particularly for full-time undergraduate and part-time postgraduate levels. One aspect of higher education participation that has seen a small measure of decline is the proportion of new entrants that are mature students.[2] From 2011 to 2014 this figure dropped from 15% to 13%, with the decline spread evenly across universities, ITs and CEs.

The overall expansion in participation is reflected in Ireland ranking eighth out of 28 OECD countries in an index of participation in higher education in 2011 as presented in Clancy (2015). This participation index was constructed using a combination of three indicators of enrolment and two output measures. The enrolment figures used were the gross enrolment ratio, a sum of age-specific enrolments and a measure of enrolment intensity. The gross ratio was based on the number of students enrolled, regardless of age, as a percentage of the population in the five-year age group following on from secondary-school-leaving age. The age-specific enrolments measure is based on the sum of the rates of enrolment for each year of various age groups, such as those aged 17–29, 30–34, 35–39 and over 40 years. The final enrolment indicator included

in the index is enrolment intensity, a measure based on the average enrolment rate for the two years of age with the highest enrolment. The output measures are the percentage of the population aged 25–34 and those aged 35–44 years with higher education. To calculate a comparative score of participation across these measures, the scores of each of the five indicators were standardised out of 100 and then added. This summation is then divided by 5 to obtain an overall score of 100. The scores and final ranking for this index for a selection of countries is presented in Table 2.2.[3] The relatively high ranking of Ireland in this index for 2011 and the improvement in this ranking from thirteenth to eighth from 2003 to 2011 helps shed some light on the evolution and current status of higher education participation in Ireland in an international context.

The increase in higher education participation in Ireland in the past 20 years has occurred in a period of significant economic fluctuation and important educational policy changes. The unprecedented growth and subsequent economic recession in Ireland is well documented. Many of the important policy changes are described in detail in Chap. 1. It is worth

Table 2.2 Higher education participation index score and ranking for selected OECD countries

Country	Participation in higher education index score	Ranking on index of participation for 2011	Ranking on index of participation for 2003
Korea	99.4	1	1
United States	76.5	2	3
Greece	71.6	3	8
Finland	71.5	4	2
Australia	68.3	7	7
Ireland	67.7	8	13
Belgium	67.0	9	6
Spain	65.6	11	11
Sweden	63.0	15	5
United Kingdom	61.7	17	14
France	60.7	18	12
Germany	47.8	23	19
Mexico	31.6	28	26

Source: Created by authors using data from Clancy (2015)

reiterating that arguably the most significant change was the abolition of undergraduate tuition fees in 1996. A key aim of the introduction of free fees was to help bring more equality into participation in third-level education in Ireland. For example, as stated by Department of Education and Science (1995, p. 106) at the time, "these decisions are a major step forward in the promotion of equality. They remove important financial and psychological barriers to participation at third level". However, the evidence provided in Denny (2014) suggests that this policy did not have the desired effect—see the discussion in Sect. 2.5.

As noted in Chap. 1, there are other measures in place to help alleviate potential inequalities in accessing higher education. For example, a significant proportion of students qualify for some measure of financial aid from the state, be it in the form of subsidisation of the student contribution fee and/or receipt of a maintenance grant. The Higher Education Access Route (HEAR) and Disability Access Route to Education (DARE) schemes have also been established to specifically target increased participation for those from disadvantaged backgrounds and those with disabilities.

2.3 Higher Education Participation: Theory and Evidence

2.3.1 Human Capital Theory

The theoretical work of Mincer (1958), Becker (1964) and Ben Porath (1967) first presented the decision to accumulate human capital from a life-cycle viewpoint. They specifically detailed the association between the life-cycle earnings of an individual and their investment in education and that this investment will be based on the expected returns and costs. In the context of a decision to undertake higher education, these returns are the extra earnings from having a higher education level over one's lifetime. The costs are the direct cost of the education itself (fees, books, etc.) and also associated indirect costs, such as the foregone labour market earnings while in education.

Support for the human capital model is found in international empirical work such as Willis and Rosen (1979), which showed the positive influence of expected gains in lifetime earnings in young people's decisions to attend college. In more recent times, Lauer (2002), Canton and De Jong (2005) and Wilson et al. (2005) found a positive impact on attending post-secondary education from higher expected lifetime earnings using data from Germany, the Netherlands and United States (US) respectively. Card and Lemieux (2001) also presented evidence that enrolment rates for the US in the 1970s were correlated with changes in the earnings gains associated with a college degree, supporting the life-cycle theory of an individual choosing an educational outcome that will yield highest life-cycle earnings. In other studies, Fuller et al. (1982), Dubois (2002), Duchesne and Nonneman (1998) and Oppedisano (2014) focused on the potential role of opportunity costs on human capital investments. They each used simulated labour market earnings of potential higher education participants as a measure of the opportunity cost of attending university for the US, Canada, Belgium and Italy respectively. They all found lower opportunity costs to have a negative impact on participation.

Tuition fees provide another cost to an individual wishing to participate in education within the human capital framework, with the expectation being that higher levels of fees have a negative impact on participation. Leslie and Brinkman (1987) analysed 25 previous studies from across the US that investigated the sensitivity of higher education participation to changes in tuition fees. Using meta-analysis techniques, they concluded that increasing tuition costs had a negative effect on college enrolment. Neill (2009) and Coelli (2009) provided more recent updates to this work using Canadian data and came to the same conclusion: an increase in tuition fees negatively impacts on higher education participation. Using state-level variation in Germany, Hübner (2012) found that a €1000 increase in tuition fees decreased enrolment by 2.7%. Variation in tuition fees may also affect different individuals' participation decisions in different ways. For instance, a rise in tuition fees may impact those from lower social classes more negatively compared to individuals from higher socioeconomic backgrounds (Reay et al. 2005).

2.3.2 Beyond Human Capital Theory

While the human capital framework provides a helpful outline of the higher education participation decision, other factors may have to be considered such as distance-related costs, intergenerational factors, financial aid and socioeconomic factors. For example, costs relating to the distance from where a potential student resides relative to HEIs may influence the decision to participate in education, and these costs may include transportation and accommodation costs that accrue due to living away/further from home. Frenette (2006) examined the role of distance on the decision to proceed to university in Canada and found that students living beyond commuting distance were 32% less likely to attend university compared to those living within commuting distance. Sa et al. (2006) used a more robust higher education accessibility measure for young Dutch students to show that living closer to a HEI significantly increased the probability of those leaving upper secondary education pursuing their education at a university or professional college.

Other international studies, including Spiess and Wrohlich (2010) and Gibbons and Vignoles (2012), have also found evidence of important distance effects for Germany and the United Kingdom (UK). The former study found that distance to the nearest university at the time of completing secondary school significantly affected the decision to enrol in a university. The latter used UK data to suggest that geographical distance had little influence on the decision to participate in England but had a strong influence on institutional choice. (Chap. 3 of this book considers these issues and this literature in more detail.) Higher education financial aids such as grants or scholarships may help offset some of the extra costs imposed by tuition fees or from living away from home, which may therefore be expected to have a positive influence on participation. Indeed, Heller (1997), Dynarski (2002) and Deming and Dynarski (2009) all show that higher levels of education grants may have a positive effect on higher education participation.

There is also a considerable literature that considers intergenerational effects on education decisions. Black and Devereux (2011) provide a comprehensive review of this, with the prevailing conclusion that parents have a strong influence on the educational decisions of their children.

This may manifest itself as an individual with higher parental educational attainment showing stronger preferences for education; perhaps because they have first-hand experience of the gains of higher education through their parents and so order their educational preferences accordingly (Cullinan et al. 2013).

The human capital framework of higher education participation also has an implicit assumption of perfect capital markets, which may be relaxed to acknowledge the role of differing capital constraints. This could be because some individuals find it difficult to finance educational investments by borrowing against their potential future earnings. In a world of imperfect capital markets, where this type of borrowing may not be fully available, household income levels may have an important influence on the decision to participate in education or not. The role of household or parental income on a child's educational decisions is a topic that has generated a great deal of debate in empirical work. In this context, Acemoglu and Pischke (2001) found that an increase in family income was associated with a higher probability of a child participating in higher education. However, Cameron and Heckman (2001) took a different perspective. While they acknowledged the negative association between lower household incomes and education participation, they maintain that it was not as a result of short-term credit constraints but rather due to more long-term factors including cognitive ability and family environment. Carneiro and Heckman (2002) also found that only a small proportion (around 8%) of US school leavers were credit constrained when it came to attending higher education.

The robustness of the labour market may also vary the indirect costs associated with undertaking education and thus influence participation decisions. This relationship will typically present as counter-cynical. In conditions of lower labour demand, the opportunity cost of participating in education is lower and thus a person may have a greater likelihood of staying/continuing in education when the labour market is depressed. The empirical work of McVicar and Rice (2001) and Sievertsen (2016) supports this notion by estimating the relationship between local employment conditions and post-secondary education decisions for the UK and Denmark respectively. The latter specifically showed that this effect was strongest for children of parents without a higher education qualification.

2.4 Evidence from Ireland

In an Irish context, studies such as Clancy (1997, 2001), O'Connell et al. (2006), Smyth (1999) and McCoy et al. (2010) have considered the determinants of higher education participation in Ireland with a particular focus on the impact of socioeconomic background. They all highlight the persistence of social inequality in the Irish higher education system with higher social group populations having a disproportionate percentage of third-level admissions relevant to their population size. However, these studies are largely descriptive in nature, using summary data rather than undertaking more robust quantitative analysis of the key factors that may influence participation in higher education. From an intergenerational perspective, Chevalier et al. (2009) found that the association between education levels of individuals and their parents was highest in Ireland when compared to 19 other OECD countries. Flannery and O'Donoghue (2009) also presented evidence of a strong intergenerational effect in attending higher education in Ireland, even when controlling for factors such as household income and tuition fee levels. This study also showed a significant gender effect with females more likely to participate in higher education.

From a spatial viewpoint, O'Connell et al. (2006) acknowledged the wide variations in both county and regional admission rates to HEIs in Ireland and indeed across higher education sectors. Cullinan et al. (2013) also showed some evidence of regional variation in participation in higher education. Subsequently, in a recent consultation paper on the development of a *National Plan for Equity of Access to Higher Education 2015–2019*, the HEA highlighted the strong geographic dimension to higher education participation, using summary data on enrolment rates across counties (HEA 2014). With regard to financial aid, McCoy et al. (2010) found that grants were extremely important for higher education participation for those from lower social classes. They provided evidence that individuals at the margins of grant eligibility thresholds have amongst the lowest higher education participation rates in Ireland.

Overall, studies from Ireland suggest a strong degree of social inequality in the Irish higher education system and some evidence of spatial variation. However, notwithstanding the studies discussed above, sig-

nificant gaps in the literature exist in relation to our understanding of the relationship between both socioeconomic and policy factors and the decision to participate in higher education in Ireland. In the remainder of this chapter, we address some of these gaps.

2.5 An Economic Analysis of Higher Education Participation in Ireland

2.5.1 Progression to Higher Education

In this sub-section we consider in detail three microeconometric analyses of progression to third-level education in Ireland: Denny (2014), Cullinan et al. (2013) and Flannery and Cullinan (2014). The first of these papers drew on pooled School Leavers Survey (SLS) data from 1994 to 1998 inclusive. These years were chosen as they bracket the abolition of university fees for undergraduates in 1996,[4] which was the focus of the paper. The SLS was based on a stratified random sample of those leaving the second-level system, with respondents interviewed between 20 and 26 months after leaving school. The survey collected a wide range of individual, school, income, social, demographic, education and labour market related information (see Byrne et al. 2008 for further details). For example, it included details of the current education and/or labour market activities of respondents and thus allowed for identification of those school leavers in the sample who made the transition to higher education (or not). It was also possible to identify which HEI an individual chose to study at (if they did).

The analysis consisted of a series of probit models where the dependent variable was whether a student progressed to university (or not). The focus was on the socioeconomic background (as measured by the father's occupation) and the second-level educational attainment of respondents, although some demographic controls were also included. Table 2.3 is based on Table 3 of Denny (2014)[5] and reports marginal effects. Note that there are other ways of measuring socioeconomic background with this data. While there is no information on family income, we observe mothers' occupational group and the educational level of both parents.

Table 2.3 Probit models of attending university in Ireland

	Model (1)	Model (2)	Model (3)
Points/100		0.055*** (7.07)	0.055*** (7.04)
No. of honours		0.044*** (9.87)	0.044*** (9.88)
No. of fails		–0.032* (2.38)	–0.032* (2.34)
Father professional	0.305*** (8.03)	0.041 (1.85)	0.023 (0.80)
Father other white collar	0.114*** (6.67)	0.0068 (0.63)	0.016 (0.97)
Father skilled manual	–0.0104 (0.56)	–0.0081 (0.68)	0.007 (0.39)
Father unemployed	–0.074*** (3.79)	–0.0066 (0.41)	–0.021 (1.15)
'Free fees' × Father professional			0.031 (0.74)
'Free fees' × Father other white collar			–0.015 (0.79)
'Free fees' × Father skilled manual			–0.025 (1.28)
'Free fees' × Father unemployed			0.0467 (0.91)
Father disabled	–0.074* (2.21)	–0.009 (0.31)	–0.009 (0.33)
Mother disabled	–0.065 (1.42)	–0.040* (2.04)	–0.039 (1.92)
Parent dead	–0.026 (1.03)	0.034 (1.43)	0.034 (1.410)
Age	–0.074*** (11.44)	–0.019*** (4.49)	–0.019*** (4.47)
Urban	0.183*** (10.61)	0.047*** (4.14)	0.047*** (4.12)
Woman	0.057*** (5.09)	–0.0017 (0.25)	–0.001 (0.25)
Pseudo R^2	0.138	0.481	0.482

Notes: $n = 4983$. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. Absolute t statistics in parentheses. Year and region dummies not shown. Estimation is by probit and marginal effects are shown

Source: Adapted from Denny (2014)

The simple formulation used in this case was to facilitate comparisons of the socioeconomic gradient across specifications.

The strong socioeconomic gradient in progression was illustrated by the estimated parameters for fathers' occupational grouping. Relative to the omitted category (semi- and un-skilled manual), the children of professional fathers were approximately 31% more likely to progress to university. For children of 'other white collar' fathers the difference was smaller, at about 11%. It is interesting that there were no statistically significant differences between the blue collar/manual groups. Given that there were likely to be substantial differences in income amongst manual

workers, this argues against a simple income-based explanation of differences in progression. On the other hand, the children of fathers who were unemployed (and hence have lower income) were about 7% less likely to progress to university. One other interesting finding is that having a father who is disabled also had a significant negative effect on the probability of going to university. This is a reminder that there are other forms of disadvantage than the socioeconomic variety.

These results are cast in a very different light by those in Model (2) which adds measures of attainment in the Leaving Certificate, specifically the total number of points scored, the number of 'honours'[6] achieved and the number of papers failed. All of these had the effect on the outcome that one would expect, but what is more important is its effect on the socioeconomic gradient which essentially disappears: fathers' occupational group and unemployment status were no longer statistically significant and the coefficients were much smaller. Interestingly, the effects of being female and of having a disabled father also became statistically insignificant. In short, second-level attainment helped explain much of the socioeconomic gradient, amongst other things. The paper also estimated (for those who were going to university) an ordered probit model of the prestige of the university attended (using the Shanghai rankings). Because of space constraints we do not show the results here (see Table 5 of Denny 2014). What is notable is that the socioeconomic background effects remained even after conditioning on Leaving Certificate results. This may partly reflect subject mix (e.g. the lower-ranked universities did not have a medical school), but conceivably young people's aspirations and self-confidence are also affected by their upbringing.

One of the objectives of Denny (2014) was to assess the effect, if any, of the abolition of university fees (commonly known as the 'free fees' reform) given the government's stated objective that it would reduce inequalities in accessing third-level education. The paper tested this by interacting the socioeconomic background variables with a dummy variable indicating the post reform period (after 1995)—see Model (3) of Table 2.3. One is unable to reject the hypothesis that there was no change in these coefficients ($p = 0.26$), that is, the socioeconomic gradient was unchanged after the reform. This is hardly surprising for two reasons. First, low-income students would generally not have been paying fees

as they would have been in receipt of the means-tested higher education grant. Thus, effectively, fees were abolished for better-off students only. Second, the results in Model (2) show that it is secondary school attainment (Leaving Certificate results) that largely drives the socioeconomic gradient in access and this would have been unaffected by the reform.

Cullinan et al. (2013) also employed the SLS but used more recent data, the 2007 wave. The paper used a broader concept of participation, as opposed to solely university participation. A binary logit model was estimated with a dependent variable taking a value of one if an individual participates in higher education and a value of zero otherwise. Table 2.4 presents a slight variant of the results in their Table 3 with controls for a range of individual, spatial and school-level factors. Specifically, these included the socioeconomic background of the young person, second-level attainment and a measure of teacher engagement.[7] The latter variable was constructed using principal components analysis from responses to a series of questions within the survey asking students to rate the competencies of their teachers in their last year of upper secondary education. These questions included the ability of the teacher to keep order in class and the availability of teachers to talk to the student. Socioeconomic background is based on father's occupation but is specified somewhat differently to Denny (2014): the omitted category is 'higher or lower professionals' with one dummy variable for 'other white collar and skilled manual' and a second for 'semi- and unskilled'. For some consistency with Table 2.3, the results are presented with and without a control for attainment in the Leaving Certificate.

The results are broadly similar to those using the older SLS data in Table 2.3 in terms of the effect of social class; including upper secondary attainment significantly dampens the effect that socioeconomic background may have on progression to higher education. They show that children of 'other white collar and skilled manual' fathers are no longer less likely to participate in higher education compared to children of those in the 'higher or lower professionals' social class. While the results indicate that those in the lowest social class grouping (semi- and un-skilled) still have a 7% lower probability of participating in higher education relative to children of 'professional' fathers, the effect is more than halved when Leaving Certificate attainment is included.

Table 2.4 Binary logit models of higher education participation

Variable	ME	*z*	ME	*z*
Social Class II	−0.101***	(3.52)	−0.035	(1.46)
Social Class III	−0.172***	(4.7)	−0.071**	(2.46)
CAO Points	–	–	0.001***	(17.23)
Distance to Nearest HEI	−0.000	(0.3)	−0.001	(1.45)
Midlands Region	−0.053	(0.81)	−0.099*	(1.75)
Western Region	−0.001	(0.02)	0.007	(0.12)
Dublin Region	0.009	(0.16)	−0.009	(0.19)
Mid-East Region	−0.089	(1.5)	−0.084*	(1.96)
Mid-West Region	0.023	(0.41)	−0.012	(0.23)
South-East Region	0.000	(0.01)	−0.030	(0.76)
South-West Region	0.079	(1.43)	0.002	(0.04)
Youth Employment Rate	−1.884**	(2.16)	−0.904	(1.2)
Gender	−0.022	(0.37)	−0.001	(0.03)
Grinds	0.133***	(5.21)	0.049**	(2.24)
Teacher Engagement	0.041***	(5.33)	0.017**	(2.53)
Enrolment mix is female only	0.034	(0.66)	−0.008	(0.17)
Enrolment mix is male only	−0.001	(0.02)	−0.010	(0.28)
Church of Ireland sponsored school	−0.157*	(1.79)	−0.081	(0.89)
Interdenominational sponsored school	−0.103***	(2.82)	−0.042	(1.38)
Other sponsored school	−0.134**	(1.96)	0.119**	(1.98)
Number of observations		858		

Notes: The models are binary logit models with clustered standard errors and sample weights and the table reports the average marginal effects (MEs). The base category for the regional dummies is the Border region of Ireland. The base category for the school sponsorship dummies is a Catholic-sponsored school. The base category for the school enrolment mix dummies is a mixed enrolment. Absolute values of *z* statistics are presented in parentheses. *** Denotes significant at 1%, ** denotes significant at 5%, and * denotes significant at 10%

Source: Adapted from Cullinan et al. (2013)

In other findings, Cullinan et al. (2013) also showed that having taken extra private tuition (grinds) outside of normal class hours results in a higher probability of participating in higher education, while the gender mix of a student's school was not an important determining factor. There were also no statistically significant differences in progression between Catholic, Church of Ireland and interdenominational schools, once second-level attainment, spatial and socioeconomic factors were con-

trolled for. However, the results did show that positive teacher engagement had a statistically significant association with higher education participation.

In a subsequent study, Flannery and Cullinan (2014) also used the 2007 SLS and considered at what type of HEI students chose to study at if they progressed to third level. Specifically, they defined two binary outcomes. The first was whether students attended a university or a non-university institution and the second was whether they did honours or non-honours degrees (National Framework of Qualifications [NFQ] level 8 versus NFQ level 7). Since these decisions are unlikely to be independent, conditioning on covariates, they used a bivariate probit model. Table 2.5 shows the results from their Table 3. As with the previous studies, they controlled for Leaving Certificate attainment, in the form of points, and socioeconomic background. The socioeconomic background effects were as one would expect; for example, those in the lowest category were 26% less likely to go to a university than a non-university and they were 29% less likely to do an honours degree than a non-honours one. The results also highlighted significant gender effects, with males less likely to progress to university compared to females. It was also shown that having taken extra private tuition outside of normal class hours resulted in a higher probability of undertaking an honours degree. There was also no significant relationship between attending a Catholic sponsored or DEIS-designated second-level school and variation in HEI type.

What is striking here is that these effects were conditional on the students' CAO points. Since the outcomes are different from those of Denny's (2014) (and the specification of the model somewhat different), the results are not necessarily inconsistent. What we see is that for those going to third-level, socioeconomic background mattered even conditional on points. In general, universities are more prestigious than other third-level institutions and, likewise, honours degrees are more prestigious than non-honours. So the results are, to some extent, in line with those reported in Denny (2014) and discussed briefly above, where we conjectured that higher aspirations or greater self-confidence or some other non-cognitive skill by those from better-off backgrounds may play a role.

Table 2.5 Bivariate probit model of university participation and degree type

	University		Honours degree	
Variable	ME	*z*	ME	*z*
Minimum Distance to University	–0.001	(0.41)	–0.0005	(0.18)
Minimum Distance to Non-University	–0.006	(1.14)	–0.004	(0.72)
Midlands	0.53*	(2.27)	0.41	(1.35)
West	0.04	(0.16)	0.09	(0.33)
Dublin	–0.15	(0.51)	–0.08	(0.30)
Mid-East	–0.41	(1.40)	0.28	(0.83)
Mid-West	–0.15	(0.51)	0.24	(0.74)
South-East	–0.19	(0.76)	0.26	(1.08)
South-West	–0.01	(0.07)	0.12	(0.44)
Gender	0.29***	(2.68)	0.11	(0.98)
CAO Points	0.009***	(10.83)	0.007***	(12.50)
Grinds	0.05	(0.56)	0.20*	(1.70)
Social Class II	–0.24**	(1.96)	–0.22**	(2.07)
Social Class III	–0.26*	(1.64)	–0.29*	(1.69)
Deis	–0.02	(0.11)	–0.13	(0.79)
Sponsorship	0.19	(1.56)	–0.05	(0.43)
Wald χ^2	452.11			
$\hat{\rho}$	0.57*** (47.2)			
Number of observations	761			

Notes: The model is a bivariate probit model with clustered standard errors and sample weights and the table reports the average marginal effects (MEs). The base category for the regional dummies is the Border region of Ireland. Absolute values of *z* statistics are presented in parentheses. *** Denotes significant at 1%, ** denotes significant at 5% and * denotes significant at 10%

Source: Adapted from Flannery and Cullinan (2014)

2.5.2 Upper Secondary Education Attainment

The previous sub-section discussed some of the key economics papers on progression to third level in Ireland and in particular the strong association with students' socioeconomic backgrounds. An obvious question is what drives this association? This is not just an academic issue, as clearly any policies to address educational inequalities require a clear understanding of their causes. This is a far from straightforward task: children from low-income backgrounds tend to live in low-income neighbourhoods. Their parents tend to have low levels of education and the schools they go

to, particularly in urban areas, tend to be different from the schools that better-off children attend. That still doesn't explain all the differences, since parents may differ not just by their income and education but also in their values and attitudes towards education. So it is difficult to determine which factor or combination of factors is responsible for educational inequalities given this 'perfect storm' of correlations. However, it may be possible to isolate some of the proximate causes using existing data.

A point that emerges from Denny (2014) is that the inclusion of second-level educational attainment in the progression models explains a large part of the socioeconomic gradient—a finding in line with research elsewhere, for example, Chowdry et al. (2010) for Great Britain. That is, the reason young people from low socioeconomic status (SES) backgrounds are less likely to progress to university is that they do significantly worse in the state-level exams. This was documented in Denny (2010, Table 4). Here we present new and more up-to-date results of the same model using the data used in Cullinan et al. (2013) and Flannery and Cullinan (2014), the SLS for 2007.

We consider three linear regression models in Table 2.6. In each case the dependent variable is the number of Leaving Certificate points attained by the students. While the focus is on the socioeconomic gradient, we include a small number of demographic controls, specifically the age and sex of the student and whether they have a disability. In Model (1) we use indicators for the father's social class (professional, other white collar, skilled manual), with the omitted category being semi- and un-skilled manual. Dummy variables for whether the father is disabled, for whether each parent is unemployed and if either parent is deceased are also included. We also control for regional effects at the NUTSIII level. What is immediately clear is that there is a steep socioeconomic gradient in attainment: students with a father who is a professional can expect to get almost 80 more points than if their father is semi- or unskilled.[8] The premium for children of 'other white collar' workers is just under 40. Interestingly, there are no statistically significant differences between the blue collar/manual groups. A student's father or mother being unemployed also carries with it a significant penalty in terms of lower points. This suggests that short-term as well as more long-term fac-

Table 2.6 OLS models of upper secondary attainment

	Model (1)	Model (2)	Model (3)
Female	22.8 (3.09)**	22.2 (3.12)**	27.1 (3.97)***
Age	−17.5 (7.50)***	−15.8 (6.77)***	−9.7 (3.92)***
Father (professional)	75.7 (6.64)***	47.9 (4.18)***	29.0 (2.61)**
Father (other white collar)	36.6 (3.73)***	23.1 (2.40)*	17.4 (1.89)
Father (skilled manual)	−6.3 (0.58)	−4.3 (0.41)	−4.1 (0.41)
Father unemployed	−37.2 (2.16)*	−28.9 (1.70)	−20.3 (1.30)
Mother unemployed	−52.0 (2.32)*	−48.6 (2.13)*	−38.0 (1.75)
Parent dead	−4.7 (0.29)	−9.3 (0.64)	1.3 (0.10)
Disability	29.2 (1.45)	26.2 (1.34)	31.5 (1.74)
Father disabled	−67.4 (3.27)**	−64.1 (3.05)**	−60.3 (3.04)**
Father graduate		51.1 (5.09)***	40.5 (4.05)***
Mother graduate		48.1 (5.08)***	38.5 (4.21)***
Mother housewife		−14.9 (1.84)	−11.8 (1.53)
Did transition year			27.4 (3.74)***
Fee paying school			12.2 (0.83)
DEIS school			−45.3 (4.06)***
Vocational school			−63.6 (6.15)***
Secondary school			−6.6 (0.72)
Grinds			14.3 (2.13)*
Constant	612.5 (9.74)***	577.5 (9.41)***	457.8 (7.39)***
N	1079	1079	1079
R^2	0.160	0.218	0.305
Adjusted R^2	0.147	0.204	0.288

Notes: The dependent variable is CAO points. Regional dummies (NUTS 3) not shown. Absolute *t* statistics in parentheses based on robust standard errors. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Source: Authors' calculations based on School Leavers Survey data for 2007

tors play a role. This exacerbates the socioeconomic gradient since higher unemployment rates tend to be associated with lower SES. We also find that students with a disabled father can expect to achieve significantly fewer points relative to someone without a disabled father. By comparison, the magnitude of this effect is a multiple of the widely documented disadvantage to males.[9]

There is no perfect way of modelling socioeconomic background and Model (2) of Table 2.6 provides a variation on this by including separate dummy variables for whether each parent is a third-level graduate and also whether the mother is a housewife. As expected, the children of

parents with higher education levels do substantially better. As a result, the coefficients associated with father's social class are smaller. Our third model adds a small number of school characteristics: whether the school is fee-paying, whether it is a vocational school and whether it is a DEIS school. We also control for whether the student did the transition year programme and whether they took grinds in preparation for their Leaving Certificate.[10] What is notable is that there is no clear benefit from attending a fee-paying school, other things being equal. If one omits parental background then, unsurprisingly, this variable appears to matter. In short, the apparent benefit to fee-paying schools is simply due to sorting. We do not interpret the positive coefficient on the transition year programme as necessarily a causal effect, as it may simply be a marker for a good school. Similarly, those who took grinds may be more motivated students.

What these results do show however is that socioeconomic factors are very strong predictors of students' second-level attainment which, it is already known, has a huge effect on progression to third-level education. What is unknown is the cause of the attainment gradient. This may be driven by differences in school quality and/or the parents' values and attitudes towards education.

2.6 Conclusion

In this chapter we have outlined the theoretical framework used by economists to think about young people's decisions to attend third-level education and discussed some of the international evidence. We have described in detail some of the relevant Irish research focusing on the importance of a student's socioeconomic background and how this is mediated by their attainment in secondary school. We also present an analysis of the determinants of upper secondary attainment in Ireland. While this analysis is simple in its specification, it emphasises the importance of socioeconomic factors in determining second-level attainment. Without knowing what causes this, and in the absence of major educational or other reforms to reduce this gradient, it may be difficult to significantly reduce the unequal access to third-level education in Ireland.

It is important to acknowledge some caveats within the research presented in this chapter and to suggest some areas for future work. Firstly, studies that investigate participation in higher education in Ireland such as those presented in this chapter focus solely upon the 'traditional' route of entry. No significant economic analysis of more non-traditional routes such as those taken by mature students or international students has been undertaken but may provide useful insight into a growing proportion of the student population in Ireland. Secondly, while beyond the scope of this chapter, future analysis of the relationship between upper secondary attainment and socioeconomic factors may help illustrate the impact of these factors across the distribution of second-level attainment rather than just at the mean. For instance, one may speculate that socioeconomic background is a more significant factor for those of lower ability.

Finally, it is important to remember that students proceed to third-level education so that they can subsequently graduate. What the analysis here (and the research in Ireland generally) lacks is a treatment of the determinants of graduation and ensuing labour market outcomes. Is it the case that once low SES students get to college that they progress through the system like their better-off peers and have the same experience in the labour market subsequently? We do not know and it is not clear that there is data that would allow us to investigate this. Despite these limitations, this chapter provides important insights into analysing participation in higher education in Ireland from an economic perspective.

Notes

1. While not considered in specific detail within this chapter, it is noteworthy that students from outside the island of Ireland constituted 10% of overall full-time student enrolments within Irish HEIs in 2014, an increase on 8% for 2012 (HEA 2015). Furthermore, a higher proportion of international students study at a postgraduate level compared to an undergraduate level.
2. In Ireland a mature student is someone that enters higher education aged 23 years or over.
3. More details of these measures can be found in Clancy (2015).

4. Non-EU students were still liable for fees.
5. We have omitted the last (4th) model for simplicity.
6. 'Honours' corresponds to a grade of C or better on a higher level paper.
7. See Cullinan et al. (2013) for a full description of all the variables used within the analysis.
8. The mean and standard deviation of the dependent variable for the sample are 345 and 128 respectively.
9. If we interact parental disability with the student's gender we find that this penalty only applied to girls, suggesting that daughters take on a significant share of household responsibilities and possibly employment when their father is disabled. Details are available on request.
10. Transition year is a year of school between the junior cycle and senior cycle where students engage in mostly non-academic activities.

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3

A Spatial Economic Perspective on Higher Education Choices

John Cullinan and Brendan Halpin

3.1 Introduction

Adopting a spatial perspective is now understood to be increasingly relevant for our understanding of a range of economic phenomena, including issues relating to international trade, regional development, population migration, clustering of economic activity and many other important questions in urban and regional economics. Indeed, the importance of geography in considering topics in these areas has been highlighted in both theoretical and empirical work. For example, in 'economic geography', the study of the location, distribution and spatial organisation of economic activities across the world, the work of Paul

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Krugman has helped add a significant new dimension to our theoretical understanding of the relationship between geography and trade, leading to a vast new literature dubbed the 'new economic geography' (Krugman 1991). Empirical analysis of spatial economic issues has also flourished with the increasingly widespread availability of geographically referenced data and geographic information systems (GIS) software packages, which have greatly facilitated more robust spatial analysis. There have also been notable developments, both theoretical and computational, in the subfield of spatial econometrics, allowing us to much better understand and address issues relating to spatial dependence and spatial heterogeneity in economic relationships, for example.

While the original focus of spatial economics[1] was on issues relating to broad and traditional economic questions, increasingly there is now a focus on spatial economic issues in more specific sectors, such as health, agriculture, housing and so on. The education sector, and the higher education sector in particular, is no different. Indeed, given the non-uniform spatial distribution of higher education institutions (HEIs) in most countries, a number of researchers have started to focus on the role of geography in shaping a range of higher education choices (Abreu et al. 2014). These decisions include, from an individual's perspective, whether to proceed to higher education or not, as well as choices relating to where and what to study. As this chapter will show for Irish school leavers, these decisions are heavily influenced by spatial considerations.

One likely reason for the importance of geography in this context is the 'transaction cost argument', which implies that the greater the travel distance to a HEI, the higher the transaction costs of higher education and the lower the associated probability of participation (Spiess and Wrohlich 2010). The authors outline a range of transaction costs that could influence school leavers, including direct financial costs such as commuting costs, search costs such as finding a place to live, indirect financial costs relating to forgone economies of scale associated with living at home, information costs associated with obtaining knowledge about different HEIs, as well as potential emotional costs associated with leaving home. It is also possible that so-called neighbourhood effects might play a role (Spiess and Wrohlich 2010). For example, the presence of a local university may generate 'spillover effects' that influence the behaviour of young

people living in the vicinity of a HEI and make them more likely to proceed to higher education. Furthermore, there may also be 'information network effects', such that information about higher education could be more readily available in communities that are located closer to HEIs and that this could impact on decisions. Overall the basic argument is that students who live closer to a HEI may be more likely to participate in higher education (Cullinan et al. 2013).

Spatial analysis of higher education related decisions is not confined just to individuals however. For example, national or regional policymakers are likely to benefit from spatial economic analysis of choices related to choosing the optimal location of a new HEI or, as is currently the case in Ireland,[2] decisions relating to amalgamations and consolidations of HEIs (see Chap. 1 for details). In terms of regional economic analysis, quantifying the economic impact of a HEI in its local region is also important (see Chap. 8 for an example of how to estimate regional multipliers for HEIs). In fact, according to Abreu et al. (2014, p. 350), "there is now a substantial literature on the direct links between universities and the [local] business environment" with "the biggest and most consistent influence of HEIs on local economies [being] the production of yearly cohorts of graduates who subsequently enter the labour market".

This chapter considers the geography of higher education in Ireland, focussing on its relevance to school leavers for a range of decisions relating to higher education participation. More specifically, its main aim is to assess whether the spatial distribution and geographic accessibility of higher education has an (adverse) impact on higher education participation decisions. It does so by first employing cluster analysis and a range of innovative data visualisation techniques to identify and illustrate important patterns of transitions to higher education. It then utilises GIS techniques to illustrate the extent of geographic inequalities in higher education accessibility. The implications of these inequalities for higher education participation decisions are then discussed with reference to a number of recent Irish studies that have specifically considered the spatial economics of higher education participation. The final section concludes with some recommendations relating to reforming the student maintenance grant system.

3.2 Localism, Distance and Traces of Social Class

This section presents a descriptive overview of school to third-level transitions using a geographical perspective and cluster analysis and is based on recently published school-level data on student flows to HEIs between 2010 and 2014. This 'feeder-schools' dataset contains information on the total number of students from almost every secondary school in Ireland who accepted a place at each of 34 HEIs. As has been documented by Clancy (1995, 2001), Irish higher education is heavily influenced by geography, with students preferring nearer institutions, and with geographically more remote areas being at a significant disadvantage. But how do HEIs differ in the way distance affects their recruitment? Which HEIs have a greater national reach, and which are more local? Do the metropolitan universities, for instance, have a national market to an extent that regional universities do not?

We can get an insight into these questions from the feeder-schools data by examining how HEIs differ in the distances 'recruited' students travel, compared with the whole population of students who go to third-level. Because of the general population distribution, HEIs in the Dublin area are closer to the average student than HEIs elsewhere, and consequently the average student's distance will be lower, *ceteris paribus*. Table 3.1 lists for each institution the average distance to all students, to recruited students, and the ratio of these figures. This ratio is thus a measure of the extent to which the HEI recruits equally from the pool of all students, or disproportionately from local students. It will be 1 where distance has no effect on recruitment and will be lower the more local the HEI's recruitment is.

As we see in Table 3.1, there is a very high amount of variation in the relationship between distance and recruitment. The least local institutions are specialised, particularly teacher-training colleges (6 of the top 7), the Royal College of Surgeons in Ireland (RCSI) (medical school) and the Northern Ireland (NI) universities.[3] The main universities fall in the middle, with NUI Galway (NUIG) the least local, University of Limerick (UL) and the Dublin institutions in a narrow range (56% to 50%), and University College Cork (UCC) a remarkably local outlier at 30%. The

Table 3.1 Student travel distances by higher education institution

HEI	Rank	Distance all students (kms)	Distance recruited students (kms)	Ratio recruited/all
Teacher Training Colleges				
Church of Ireland College of Education	1	136.57	125.81	0.92
Marino Institute of Education	2	142.85	114.95	0.80
St. Patrick's College	3	135.43	106.62	0.79
St. Angela's College	4	226.57	160.32	0.71
Mater Dei Institute of Education	5	135.09	93.24	0.69
Froebel College of Education	7	143.30	90.56	0.63
Mary Immaculate College	17	173.19	86.04	0.50
Northern Ireland				
Queen's University Belfast	6	272.17	173.67	0.64
Ulster University	9	283.44	171.12	0.60
Universities				
NUI Galway	8	187.51	113.27	0.60
University of Limerick	11	169.66	95.66	0.56
University College Dublin	12	143.73	80.95	0.56
Maynooth University	13	134.11	72.69	0.54
Dublin City University	14	139.49	72.25	0.52
Trinity College Dublin	16	134.47	67.52	0.50
University College Cork	28	224.37	67.19	0.30
Other				
Royal College of Surgeons in Ireland	10	134.01	80.07	0.60
Institute of Art Design and Technology	23	145.04	58.30	0.40
National College of Art and Design	24	133.20	52.00	0.39
National College of Ireland	33	135.05	27.38	0.20
ITs				
Galway-Mayo IT	15	184.05	94.20	0.51
Athlone IT	18	141.05	68.54	0.49
Carlow IT	19	146.31	70.52	0.48
Tipperary Institute	20	173.68	83.48	0.48

(*continued*)

Table 3.1 (continued)

HEI	Rank	Distance all students (kms)	Distance recruited students (kms)	Ratio recruited/all
IT Sligo	21	221.91	91.12	0.41
Limerick IT	22	171.65	70.34	0.41
Waterford IT	25	185.96	71.01	0.38
Dublin IT	26	134.41	50.44	0.38
IT Tralee	27	251.72	84.85	0.34
Dundalk IT	29	192.11	56.11	0.29
Letterkenny IT	30	293.76	85.49	0.29
Cork IT	31	225.51	60.37	0.27
IT Blanchardstown	32	137.16	34.44	0.25
IT Tallaght	34	134.90	21.26	0.16

Source: Analysis of feeder schools and author-derived data

ITs fall largely in the lower half, typically around 40%, but with some displaying extremely local catchments (particularly IT Tallaght and IT Blanchardstown in west Dublin, along with the private-sector National College of Ireland (NCI)). Among the universities, the idea that the two older Dublin universities (Trinity College Dublin [TCD] and University College Dublin [UCD]) serve a more national catchment than the others is not supported, with NUIG having a greater relative reach than UCD (UL is similar to UCD), and TCD being sixth of seven (i.e. the second most local). However, UCC has a remarkably strong regional effect, recruiting very little outside its immediate hinterland but dominating within it.

A further insight into the influence of proximity on choice of third-level institution can be had from Fig. 3.1, which maps the recruitment of the four universities in or near Dublin. Dublin City University (DCU), UCD and TCD are a small number of kilometres (kms) apart, and Maynooth University (MU) is about 25 kms west of central Dublin. Nonetheless there is a strong tendency for students to pick the nearest HEI. While TCD and UCD both recruit very strongly in south Dublin, UCD is much stronger in the east (Blackrock, Dún Laoghaire) and TCD in the area due south. It is almost as if there is an impediment on going to TCD when that would involve passing UCD on the bus every day. Similarly,

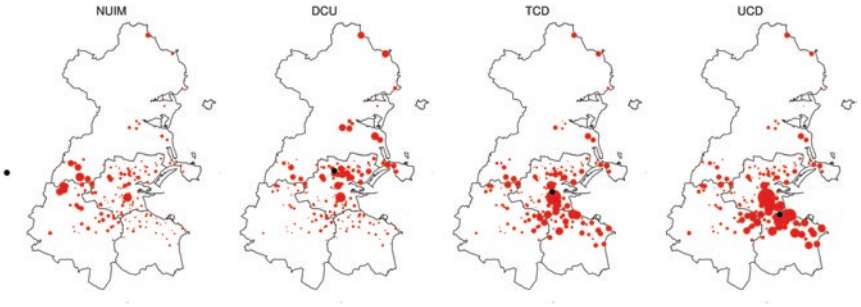


Fig. 3.1 Dublin-based school leaver recruitment patterns for selected universities. Source: Analysis of feeder schools data

DCU (in the northern suburbs) captures local students, and also those in the north county, and MU recruits predominantly in the west.

We can take a second cut at the question of where schools send their students, and where institutions recruit, by using cluster analysis. We take the school-by-institution matrix, containing for each school the amount of its total third-level cohort that it sends to each HEI, and then run two cluster analyses on it, first clustering institutions by their recruitment patterns, and then schools by their destinations.[4]

First, we cluster HEIs by the proportion of their intake they recruit from each school. Figure 3.2 shows the resulting 'dendrogram',[5] which illustrates the pattern by which the cluster analysis progressively groups the institutions. TCD and UCD form the closest pair, with similar very tight local clustering in Cork, Limerick and Galway cities. The main structure is clearly geographic, with a Dublin cluster, a small northern cluster, a southern cluster and a northwestern cluster (with a few outliers such as RCSI, Dundalk IT and the Church of Ireland College). Donegal's Letterkenny IT shows up as isolated, closer to the NI institutions than anything in the South. Within the four main clusters there is more geographic structure: Dublin splits into north/west versus centre/south clusters; the northwestern cluster into Sligo versus Galway; the south into Kerry versus Cork versus Limerick versus southeastern. Geography seems to trump institution type frequently, with ITs being clustered with universities in the same location (UCC, Cork IT; NUIG, Galway-Mayo IT; UL, Limerick IT; MU, Blanchardstown IT; DCU, Dublin IT). It

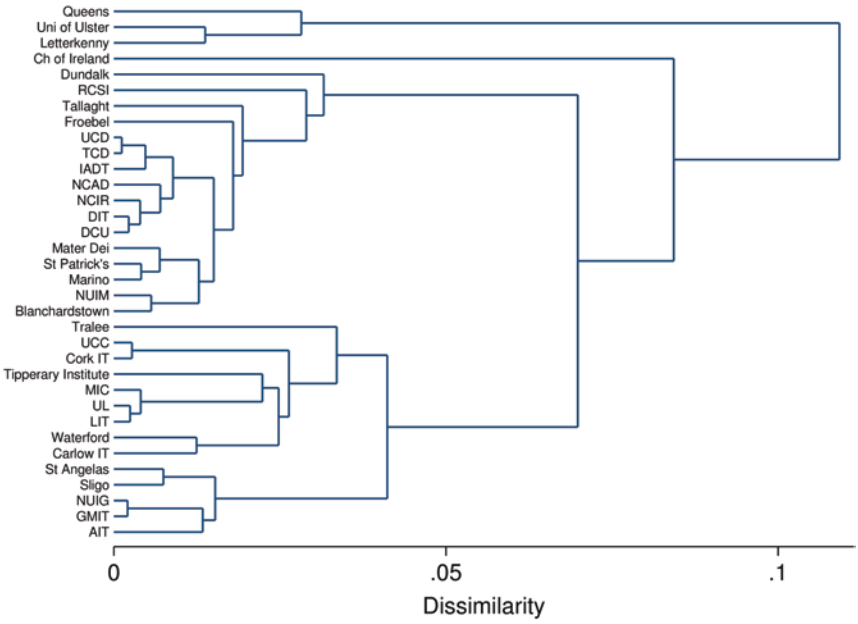


Fig. 3.2 Clustering institutions by intake. Source: Analysis of feeder schools data

is difficult to tell whether the close clustering of three teacher-training colleges in north Dublin city (St Patrick's, Mater Dei Institute, Marino Institute) is due to their geographical or their functional proximity.

Using the same data matrix we can also cluster schools according to the proportional destinations of their third-level cohort. There are too many schools to display in a dendrogram, so they are displayed in a map (see Fig. 3.3) with 12 clusters distinguished. These also display strong geographical features, with schools in the same area tending to fall in the same cluster, as implicitly a small mix of institutions dominates in each area. Interesting, Dublin is shared between three clusters, southeast, west and north. Most of the other clusters are relatively distinct and centred on cities or towns with third-level institutions. There is some evidence of a 'doughnut' cluster,[6] relatively remote from Dublin but still centred on it, predominantly in the north midlands and Wicklow.

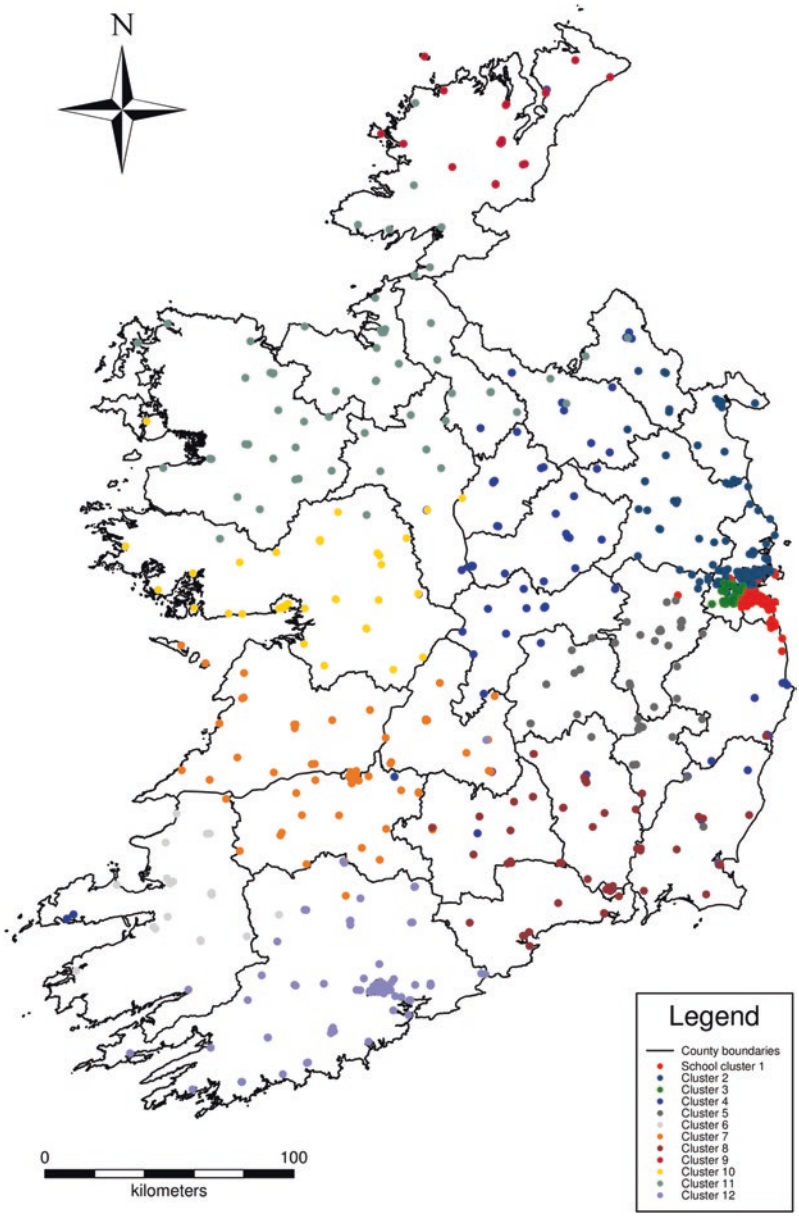


Fig. 3.3 Clustering schools by destinations. Source: Analysis of feeder schools data

It is also important to acknowledge that there is some subtle evidence here of features other than geography at play. The doughnut cluster has a small number of even more dispersed members, in Limerick, Tipperary and even Dingle in west Kerry. These schools clearly have destination patterns unlike their neighbours and more like those in the Dublin hinterlands. Inspection shows that a number of these are fee-charging boarding schools, whose pupils' residence is not local to the school. In Dublin, there is also a certain amount of geographical overlap in the clusters. Some members of the southeast cluster are based in north Dublin city and the northern suburbs. Again, inspection shows these also to be fee-charging schools, located in pockets of affluence comparable to the very substantial concentration of affluence in southeast Dublin.

The effects of affluence and deprivation are somewhat masked by the geographical focus, since with the exception of southeast Dublin and west Dublin, the regions marked out by the clusters contain a broad range of socioeconomic advantage and disadvantage. The west Dublin cluster is relatively deprived and has only 27% of the third-level cohort going to university or teacher training and 67% going to the IT sector (40% to IT Tallaght and 16% to Dublin IT). The southeast Dublin cluster is based in the largest and most distinct concentration of affluence in the country, with 63% of the third-level cohort going to university or teacher-training, a rate only exceeded in the Cork cluster.[7]

Whether the school is private (i.e. fee-charging) is another important factor. As we have seen, fee-charging schools outside Dublin tend to be more Dublin-focused than their neighbours, and fee-charging schools in north Dublin are more like schools in southeast Dublin. The distribution of fee-charging schools is very uneven: 36 of the 55 fee-charging schools are in Dublin city or county. Similarly, the third-level choices of fee-paying students are strongly patterned: of UCD's student body, 28% come from fee-charging schools, while in TCD the figure is 31.5% (compared to an overall rate of 14.5%). In no other university does the figure exceed 10%, and it goes as low as 4%. Some of this is due to the predominant location of such schools in south Dublin, but some must also reflect socially patterned preferences, if only to explain why TCD's rate exceeds UCD's.

Thus, overall the importance of location is confirmed in this analysis, with the proximity of HEIs having a marked effect, sometimes on a regional scale, but within Dublin also on a quite local scale. The broad geographic view tends to obscure the effects of social class to some extent, but some signs show through, particularly regarding the special position of fee-charging schools.

3.3 Transitions to Specific HEIs and Types of HEIs

So far the analysis has shown that proximity has implications for school leavers' choices of HEI. This pattern can be further examined, with additional insights, using Sankey diagrams of school-leaver transitions, which identify the specific choices of HEI by students at a county level. Sankey diagrams are a type of flow diagram in which the width of the arrows is shown proportionally to the flow quantity and were first used to represent student flows in Ireland by Healy (2016). The analysis presented here builds on that initial work and presents county-level transitions to HEIs for each province. It is worth noting that the majority of students in each province, apart from the three Ulster counties, tend to proceed to HEIs within their own province (Connacht: 58.7%; Leinster: 84.1%; Munster: 83.1%; Ulster (part of): 23.5%).

In terms of illustrating the spatial patterns of student transitions, the Sankey diagram in Fig. 3.4(a) shows that, for example, students who attended secondary school in Galway are most likely to attend NUIG or Galway-Mayo IT, both of which are located in Galway. Smaller numbers of Galway students proceed to UL and Limerick IT, with relatively few students proceeding to HEIs elsewhere (e.g. Dublin). For Mayo, students are most likely to attend a HEI based in neighbouring Galway or Sligo, or at UL, and this pattern of school leavers choosing to study at HEIs close to their county of schooling is repeated in other counties in other provinces. For example, Fig. 3.4(b) shows that Dublin school leavers generally attend HEIs that are located in Dublin, Fig. 3.4(c) shows that Cork students typically attend UCC or Cork IT, while Fig. 3.4(d) shows

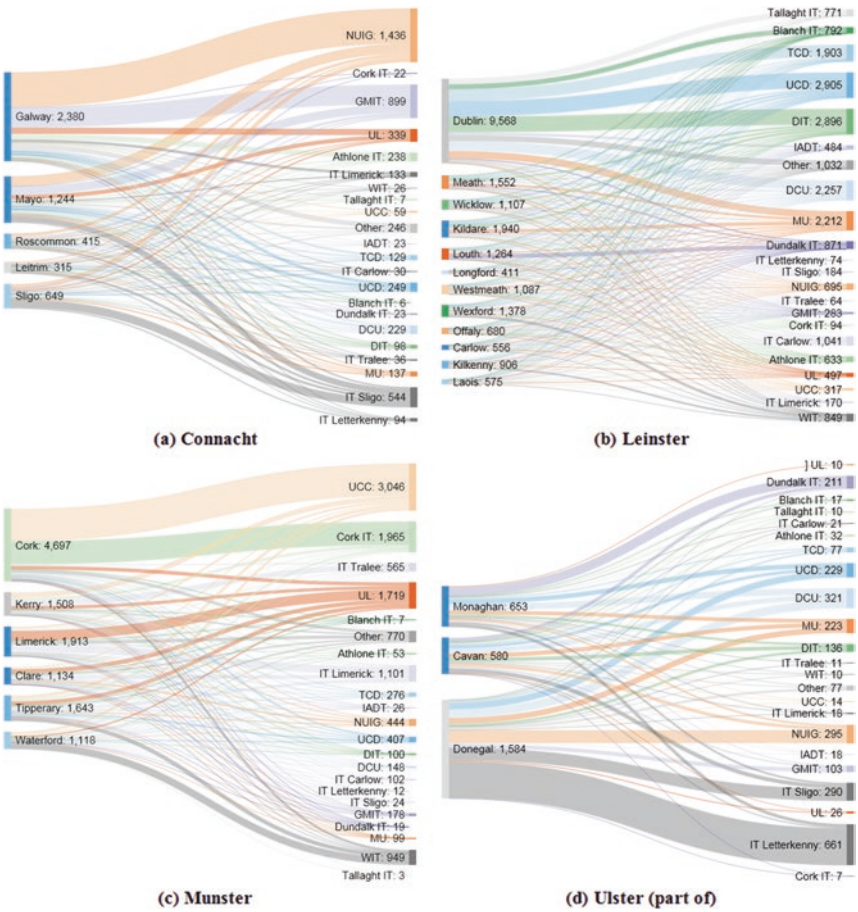


Fig. 3.4 Sankey diagrams of higher education transitions: (a) Connacht, (b) Leinster, (c) Munster, (d) Ulster (part of). Source: Analysis of feeder schools data

that large proportions of Donegal students proceed to Letterkenny IT or IT Sligo. Moreover, where a student from Donegal does proceed to a university in the South, this tends to be NUIG, the closest in geographic proximity.

Overall the Sankey diagrams again confirm that proximity to a specific HEI is a major factor in a student choosing to study there. Healy

(2016) characterises this pattern as evidence of a "strongly local character of transitions to third-level education" while *The Irish Times* (2015) refers to "how parochial our college choice is". A second notable pattern in the Sankey diagrams is that counties in which there is a university tend to have higher relative flows to universities. This is important since it suggests that it may be the case that the type of HEI a student attends is strongly influenced by where they live, as opposed to their preferences or the course to which they might be best suited. This could lead to a mismatch between a student's ability/preference and the college they attend, with implications for the efficiency of the higher education system.

Given these spatial patterns, it is natural then to ask if there is any association between a school leaver's county of residence and if they proceed to higher education at all and, if they do so, whether they choose to study at a university or an IT. One very basic way to consider these questions is to estimate county-level regression models using the aggregate flow data depicted in the Sankey diagrams—see Table 3.2. First, Column [1] presents a county-level linear regression model estimated using ordinary least squares (OLS) of the proportion of school leavers who proceed to higher education, controlling for the presence of a university and the presence of an IT in the county where the school leaver attended school. Interestingly, the model estimates suggest there is little or no correlation

Table 3.2 County-level regression models of progression rates to higher education and to university

	[1]	[2]
University	−0.0039	0.0960***
IT	0.0104	−0.0330*
Constant	0.7991***	0.4801***
R-squared	0.0119	0.3481
Observations	26	26

Notes: Model [1] is a county-level OLS model of school-leaver progression rates to higher education, while Model [2] is a county-level OLS model of the rates of progression to university (assuming the school leaver progresses to higher education). The independent variable *University* is a binary variable denoting the presence or not of a university in a county and *IT* is similarly defined for an IT. *** Denotes statistically significant at 1%, ** denotes significant at 5%, and * denotes significant at 10%

Source: Analysis of feeder schools and author-derived data

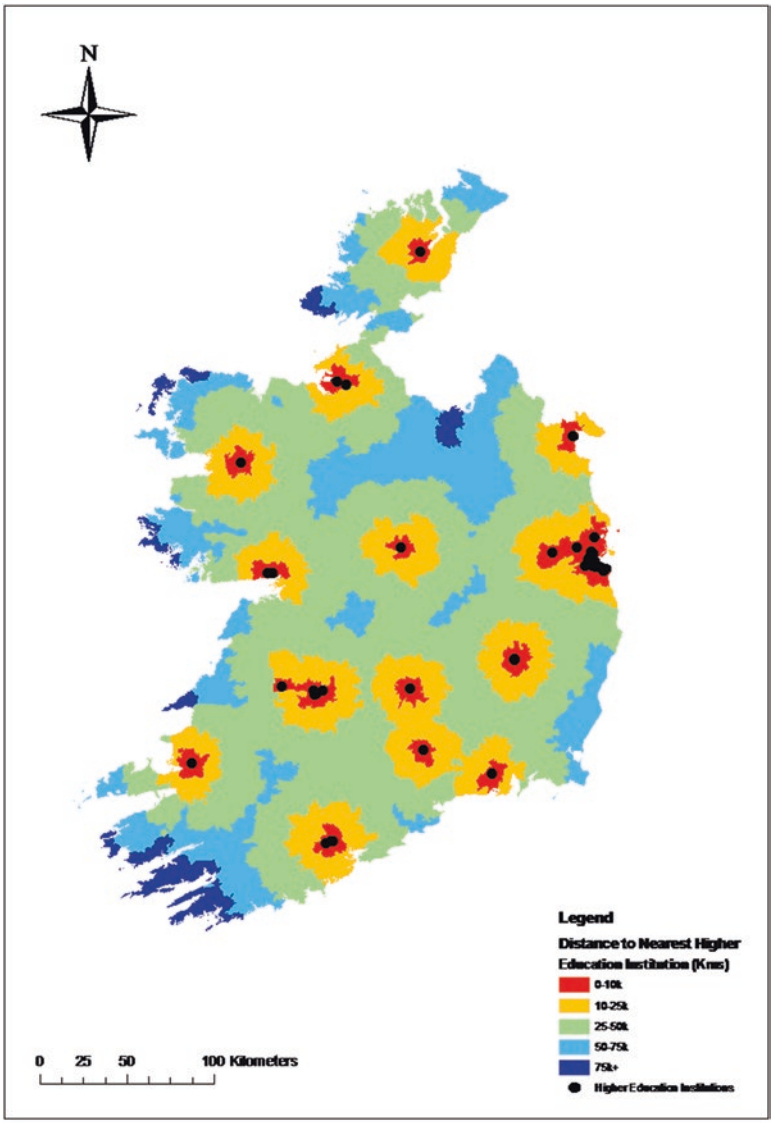
between the presence of a HEI in a county and the proportion of school leavers progressing to higher education. (More sophisticated analysis of this relationship using individual-level data and more disaggregated spatial information is considered in Sect. 3.5, revealing alternative patterns for some population sub-groups.)

Also interesting is the way in which relative proximity to different types of HEIs might influence an individual's choice of HEI type. For example, Fig. 3.4(c) shows that school leavers from Waterford, a county with an IT and no university, are much more likely to attend the former. This is in contrast to Cork, for example, where relatively higher proportions of school leavers attend a university (note: Cork has both a university and an IT). To consider this in more detail, Column [2] in Table 3.2 presents a model of the association between the proportion of school leavers attending a university (assuming they progressed to higher education) and proximity to a specific type of HEI. While the average proportion of students per county progressing to a university is 48.0%, Table 3.2 shows that proportion is 9.6% higher if there is a university in the county and 3.3% lower if there is an IT in the county. In other words, this evidence is supportive of the assertion that counties with a university have higher flows to universities, suggesting that a school leaver's likelihood of attending a university or an IT is dependent on the presence of a specific institution type in the local area. Of course these simple models do not control for other factors likely to impact on choice of HEI type and should therefore only be considered as statistical associations. They are, however, broadly consistent with results in O'Connell et al. (2006) who used 2004 data on county enrolment rates derived from the population of 17–19-year-olds by county. For example, O'Connell et al. (2006, p. 122) found that "counties with a more highly educated population and a greater prominence of farming, along with those with a university in closer proximity, have higher rates of admission to university. Conversely, counties with a lower average per capita income have greater rates of entry to colleges in the Institute of Technology sector". While the analysis in this section does not include other controls, the studies reviewed in Sect. 3.5 do so.

3.4 Geographic Inequalities in Accessibility

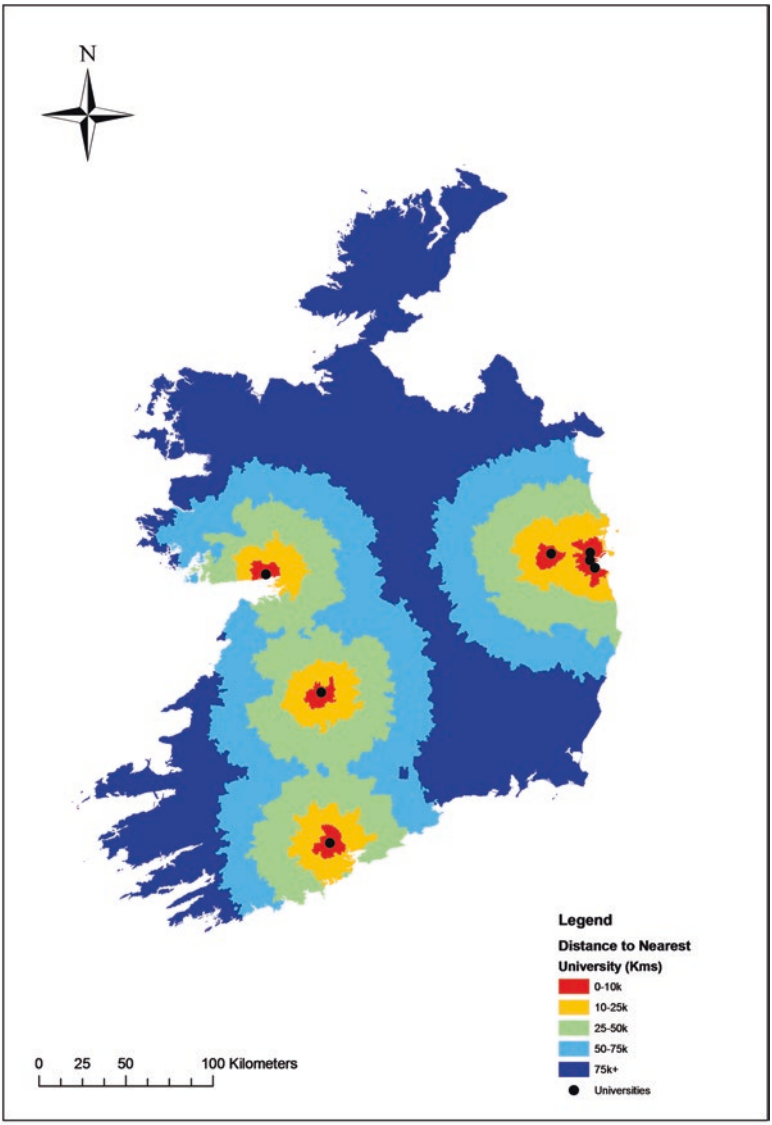
These 'localised' patterns of progression to HEIs are both interesting and important, especially within the context of geographic inequalities in accessibility to higher education. Two previous studies have recently considered this latter issue in detail by using GIS-based network analysis to calculate a range of higher education accessibility measures (Walsh et al. 2015, 2016). Network analysis is a GIS function used to calculate the distance covered and time taken in making a journey on a network, such as the road network, and facilitates a range of outputs including, for example, the creation of network-based 'service areas' (Cullinan et al. 2008). These service or catchment areas are regions that encompass all accessible points on a network from a particular location within a specified distance (or time) and can be calculated for, say, a HEI. They are better measures of accessibility than those based on standard Euclidean measures of distance given variation in road network densities across the country and, once calculated, they provide a visual representation of accessibility and an assessment of the extent of any geographic inequalities in relation to accessibility.

Figure 3.5 uses this approach to present the distance to (a) nearest HEI and (b) nearest university in Ireland from every electoral district (ED) in the country. Overall, Fig. 3.5(a) suggests that while there is a good geographic spread of HEIs across the country and that most areas have relatively good accessibility in terms of travel distance, there are large areas from which an individual would have to travel 50 kms or more, as well as areas from which the nearest HEI is over 75 kms away. While these areas tend to be more rural with relatively low population densities, the evidence does suggest some geographic inequalities in relation to HEI accessibility. Of course with a finite number of HEIs, some inequality in access is inevitable. The important issue however, addressed in Sect. 3.5, is whether this leads to inequalities in participation and other outcomes. Furthermore, since the map presented in Fig. 3.5(a) does not differentiate by type of HEI, Fig. 3.5(b) presents distance to nearest university as another measure of accessibility. In this case the geographic



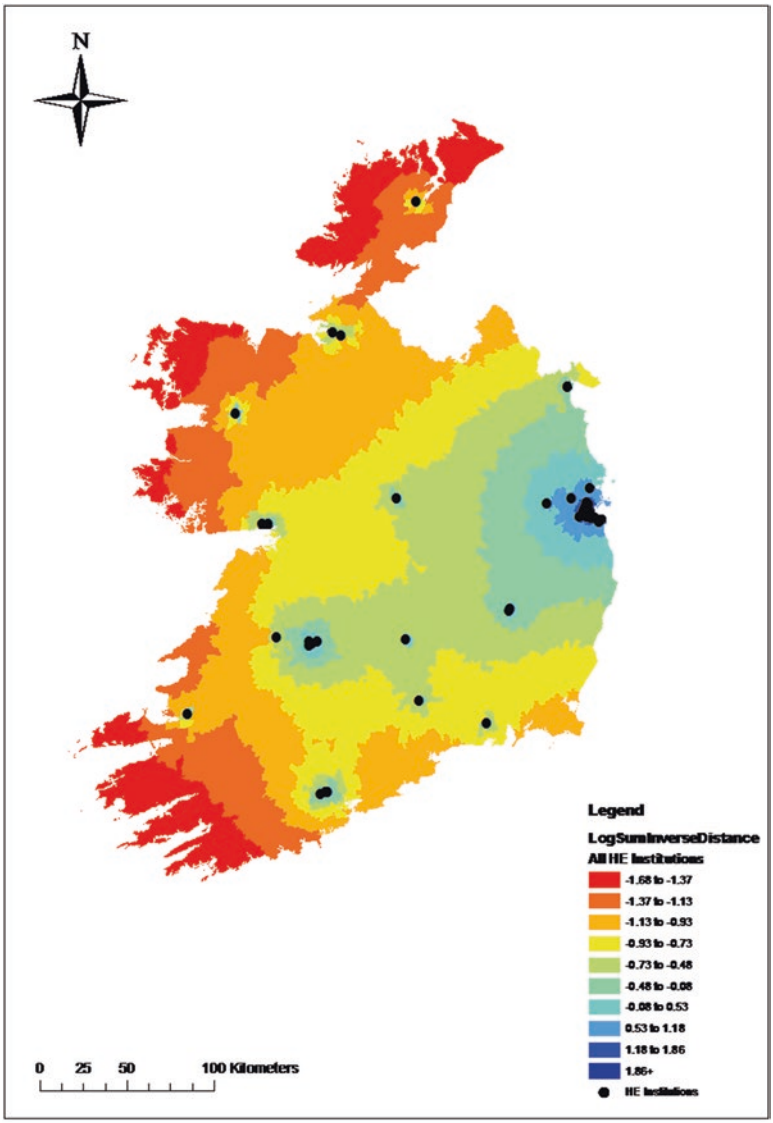
(a) Distance to nearest HEI

Fig. 3.5 Higher education accessibility maps: (a) Distance to nearest HEI, (b) distance to nearest university, (c) system-wide access to HEIs, (d) system-wide access to universities. Source: Author calculations



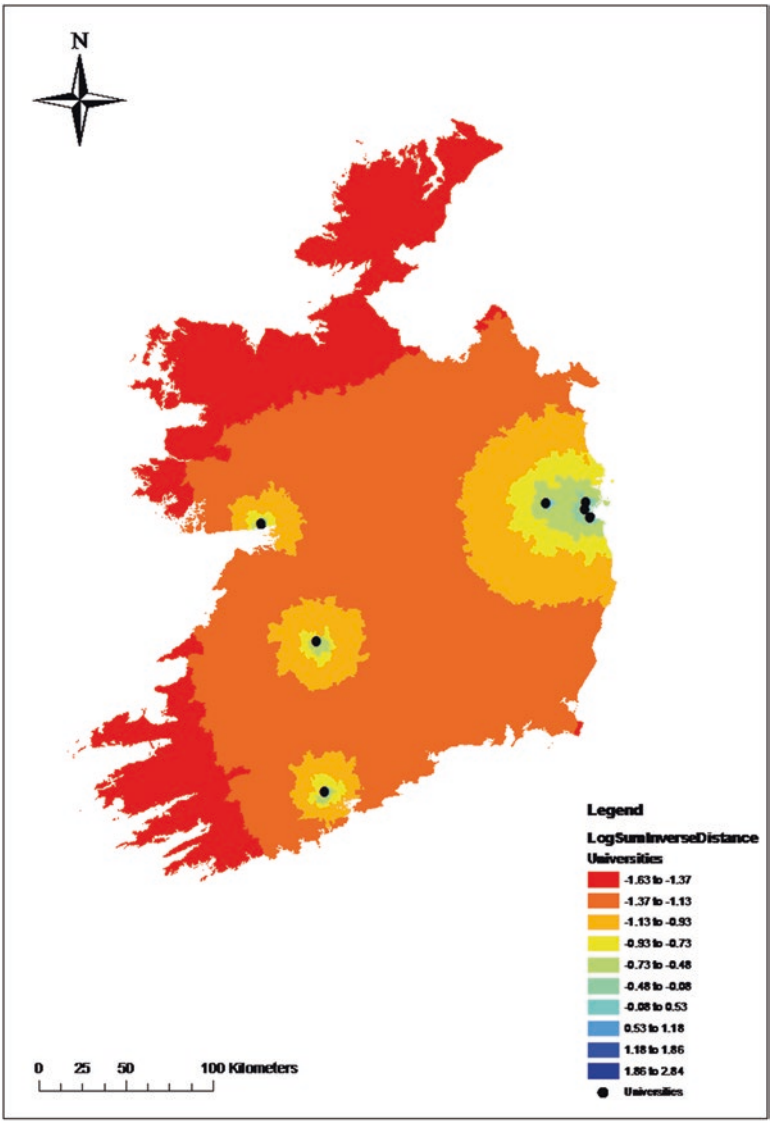
(b) Distance to nearest university

Fig. 3.5 Continued



(c) System- wide access to HEIs

Fig. 3.5 Continued



(d) System- wide access to universities

Fig. 3.5 Continued

accessibility inequalities are much more pronounced, especially in the southeast, southwest, northwest and along the border.

Walsh et al. (2015) presented similar measures of geographic accessibility to higher education on an all-Ireland basis, finding high levels of geographic accessibility to higher education overall in both jurisdictions but also that accessibility to universities in the South is poor relative to the North. Using data on enrolment and mobility rates, the authors found evidence that these geographic inequalities in accessibility may play a role in determining the type of higher education an individual pursues in the South. For example, consistent with the findings in Sect. 3.3, they found that there is an association between proximity to different types of HEIs and the type of education pursued. In particular, enrolment in ITs far exceeds that of universities in counties which are located in the southeast and northwest, regions which have poor accessibility to a university. This, according to the authors, provides some indication that proximity to a university influences the type of higher education undertaken.

Building on that study, Walsh et al. (2016) focussed on geographic accessibility to university education in Ireland using a wider variety of techniques and measures, paying particular attention to the effect of the proposed re-structuring of the higher education sector (i.e. the amalgamations depicted in Fig. 1.1 in Chap. 1). In particular, they utilised GIS-based methodologies to model the impact of the proposed reforms on both the level of, and inequalities in, geographic accessibility to university education in Ireland. This included mapping and analysing a wider range of accessibility measures, as well as calculating spatially based university accessibility Gini indices of inequality. The study moved beyond simple nearest-distance measures of accessibility to consider system-wide accessibility measures, calculated as the sum of the inverse of the network travel distance from the centroid of each ED to all HEIs (or universities). Examples are presented in Figs. 3.5(c) and (d), with larger values implying greater system-wide accessibility. This system-wide measure provides a more complete picture of overall accessibility to universities, for example, which is important for understanding the choices facing school leavers. From a policy perspective, such measures provide important information on the spatial distribution of universities across the whole system.

In terms of results, Walsh et al. (2016) found that the northwest and areas of the west and southwest are poorly serviced in terms of absolute and relative accessibility to university education both pre- and post-policy reform. These areas consistently remain in the bottom quintile of each measure of accessibility considered, implying that the impact of the reforms for those regions will be negligible. On a more positive note, they did find that the percentage of the 17–19-year-old cohort (a good proxy for the population of school leavers) who live more than 100 kms to their nearest university would fall from 14.5% to 7.9% post-reform. However, the same analysis showed that there would remain a significant minority living more than 150 kms from a university. Overall Walsh et al. (2016, p. 17) stated that "the reform will do little to remove geographical impediments to university participation for those that are most disadvantaged [currently] from a spatial standpoint". This assertion is also supported by their inequality (Gini) analysis, which showed little improvement in overall geographic inequality in university accessibility across Ireland as a result of the consolidation reform. They therefore concluded that the "analysis shows while that the proposed changes to the higher education sector in Ireland will result in some improvements in accessibility, most notably for those in the South-East, the policy could be viewed as somewhat regressive from a geographic accessibility stand-point as it does not target those most disadvantaged" (Walsh et al. 2016, p. 17).

3.5 Why Geography Matters

Within the context of localised progression patterns and geographic inequalities in higher education accessibility, it is useful to consider further whether the spatial availability of higher education impacts on higher education participation decisions in Ireland. The impact of distance and other spatial factors on participation and higher education outcomes and inequalities have previously been considered from a number of perspectives and by utilising a range of different empirical strategies. One approach has been to estimate individual-level choice models of the probability of participating in higher education or of choosing a particular HEI, type of HEI or field of study. A range of variables have been

included in these choice models, including student-level, socioeconomic and school-level variables, as well as a range of spatial variables such as regional indicators, distance to nearest institution, measures of system-wide higher education accessibility and so on. Examples of papers using this approach for Ireland include Cullinan et al. (2013) and Flannery and Cullinan (2014).

An alternative approach, the gravity model of student migration, considers distance and spatial effects from a different perspective, providing alternative insights. Such models are generally used to predict the degree of interaction or movement of individuals between two places, for example, to model the flow of students from a school (origin) to a HEI (destination). In general terms, the gravity model assumes that such flows are proportional to the product of the sizes of the origin and the destination and inversely proportional to the (travel) distance between them. They are useful as they can be used to provide estimates of the impact of distance on these flows, as well as to consider the impact of a range of other potentially important so-called push (e.g. school size, type, gender mix, socioeconomic status, etc.) and pull (e.g. HEI type, size, centrality, academic quality, resources, etc.) factors. A recent paper using such an approach for Ireland is Cullinan and Duggan (2016).

In terms of the key findings from these previous studies, Cullinan et al. (2013) used individual-level data from the 2007 wave of the School Leavers Survey to consider the impact of road network travel distance on the decision of school leavers to proceed to higher education, controlling for a wide range of other likely determinants. In relation to travel distance to nearest HEI, the authors found that while travel distance was not an important determinant of participation on average across the whole population of school leavers (similar to Model [I] in Table 3.2), greater distances were associated with lower participation rates for school leavers from lower social classes. In particular, for every extra 10 kms of travel distance, the likelihood of participation decreased by 2.7% for this group, all else equal. Thus, a school leaver from a lower social class living 50 kms from a HEI has a 13.5% lower probability of participating in higher education than if they lived next to the HEI.

Cullinan et al. (2013) also considered how these distance effects resulted in differential higher education participation rates across social

classes. They found that students from higher social classes have a higher probability of participating in higher education than those from lower social classes across all distances. For example, they found that for two otherwise similar school leavers living 10 kms from the nearest HEI, the probability of progressing to higher education was 5.8% higher for a school leaver from a higher social class than for a school leaver from a lower social class. Moreover, they found that this effect intensified as travel distance increased. So, for example, the probability differential for the two otherwise similar school leavers would be 12.5% if they both lived 50 kms away. This is most likely because the greater travel distances result in a range of higher direct and indirect costs (as discussed in Sect. 3.1) and the impact of these distance-related costs on participation is likely to be more pronounced for those living in households with lower incomes and/or those facing more significant credit constraints, that is, school leavers from lower social classes. Cullinan et al. (2013) also considered how these distance effects vary across the distribution of CAO points and found them to be most pronounced for lower-ability students from poorer backgrounds. Overall the results suggest a very significant effect of travel distance on the likelihood of individuals from lower social classes, in particular lower-ability students, participating in higher education, even after controlling for other factors likely to impact on the participation decision.

Building on these findings, Flannery and Cullinan (2014) considered the impact of geographic accessibility and social class on decisions relating to the type of HEI, degree level and field of study chosen by school leavers. They did so by modelling a number of joint decisions facing school leavers in relation to where and what to study using bivariate choice models which allowed them to control for correlations in these decisions. Overall they found that both geographic accessibility and social class play an important role in determining outcomes relating to HEI type, degree level and field of study. For example, they found that "an individual living 180 kms from a university is 17% less likely to choose a university compared to an otherwise similar individual living 20 kms away, while this differential increases with distance" (Flannery and Cullinan 2014, p. 2962). They also found that those from lower social classes who participate in higher education are less likely to do so

at university and at honours degree level. The authors argue that these decisions are important in terms of future labour market and other outcomes for school leavers and that current policy in Ireland does not go far enough in mitigating the impact of distance and socioeconomic barriers on these outcomes.

Finally, in a complementary piece of work, Cullinan and Duggan (2016) presented a gravity model of student migration flows to HEIs in Ireland using the same feeder-school data discussed in Sects. 3.2 and 3.3, for the year 2013. Their paper suggests that while geography plays a very important role in explaining student flows, so too do a range of school-level characteristics. For example, student flows were found to be significantly lower from boys-only schools and from schools that are designated as socioeconomically disadvantaged. In relation to distance, the elasticity of student flows with respect to distance, the usual primary variable of interest in gravity models of migration flows, was estimated to be −0.89. This implies that, all else equal, a 10% increase in distance between a school and a HEI leads to an 8.9% decrease in the number of student 'flows' between the two. However, this average elasticity masks considerable variation both within and across HEI types, suggesting that students are much more willing to travel further to attend some HEIs than others. In particular, Cullinan and Duggan (2016) found that lower absolute elasticities (i.e. where distance is less of an impediment) are in general correlated with higher levels of institutional quality and greater degrees of HEI specialisation.

3.6 Conclusion

This chapter provides a range of evidence that geography plays a very important role in determining higher education decisions and outcomes, particularly for school leavers from lower social classes. It highlights localised patterns of progression to HEIs, evidence of significant geographic inequalities in higher education accessibility, as well as confirmation that this impacts on a range of participation decisions. Overall the various pieces of evidence and previously published research indicate that student decisions and flows are responsive to travel distance, implying

that students living in relatively isolated areas are at a disadvantage in terms of accessibility to higher education. The chapter also discusses the reasons why greater travel distances are likely to lead to higher direct and indirect costs for potential students and how travel distance is likely to be an important factor in driving socioeconomic inequalities in higher education participation.

The pursuit of equity in access to higher education is central to education policy in Ireland. Although much of the focus has been on narrowing the social class differential in higher education participation, spatial factors have been increasingly acknowledged as a potential barrier to access and subsequent participation. Indeed, in a recent consultation paper on the development of a *National Plan for Equity of Access to Higher Education 2015–2019*, the Higher Education Authority (HEA) highlighted the strong geographic dimension to higher education participation (HEA 2014). At present, one of the main policy responses to address inequities in access to higher education in Ireland is the 'student grant scheme', which includes maintenance grants, fee grants and postgraduate contributions. The maintenance grant scheme is a contribution towards a student's living costs, and eligibility is based on meeting certain criteria based on parental income levels and means, as well as travel distance from a student's chosen HEI. Thus, the grant system explicitly acknowledges the potential impact that travel distance can have on higher education related decisions. The current grant eligibility limit for the so-called adjacent (partial) grant is 45 kms or less, while the non-adjacent (full) grant applies to those living more than 45 kms from the approved institution. Thus, two otherwise equal students, one living 50 kms from her chosen institution, the other living 250 kms away, would receive the same financial aid.

The results from the previous studies on geographic accessibility to higher education in Ireland, as well as the evidence compiled and presented in this chapter, suggest that consideration should be given to establishing a more flexible or stepwise higher education grant system, with progressively higher payments for those living further away. For example, as suggested in Cullinan et al. (2013), such students could receive a top-up to their grant payment to better reflect the increased costs associated with their chosen education path. As it currently stands

with a distance cut-off of 45 kms, the maintenance grant system does not take into account that significantly longer travel times could have important implications for students not only in terms of financial costs but also in terms of their available time to engage in paid employment to perhaps support their studies (Flannery and Cullinan 2014). Of course, any revised system would need to be carefully designed in order to avoid unnecessary transaction costs, as well as imposing perverse incentives for students to travel further than necessary.

Overall, the key finding of this chapter is that the choice set facing school leavers in terms of their higher education opportunities is very much a function of where they live. For resource-constrained students in particular, the distance impediment is not adequately addressed through current policies. Unfortunately, changes to the grant system rarely feature in the debate around the financing of higher education (see Chap. 10). Any move to an alternative financing system would provide an ideal opportunity to address this issue.

Notes

1. Spatial economics aims to analyse the role of geography and location in economic phenomena. For a good basic introduction to spatial economics, including a discussion of the 'boundaries' in which spatial economics takes place, see Duranton (2008).
2. Throughout this chapter Ireland is taken to be the Republic of Ireland and also sometimes referred to as the 'South'.
3. The position of the Church of Ireland teacher-training college and the NI universities is likely related to their serving the geographically dispersed protestant minority.
4. The clustering uses Ward's linkage. For the schools cluster analysis we use outflow proportions, to remove the effect of differential school size; for the HEI analysis, inflow percentages are used to remove the effect of differential institution size.
5. A dendrogram is a tree diagram that is generally used to illustrate the arrangement of clusters that are produced by hierarchical clustering.

6. A doughnut cluster is one that is weakly centred on a particular feature, but with a hole in the middle that is occupied by a cluster strongly centred on the same feature.
7. These figures exclude those not observed to go to third-level; it is likely the south Dublin cluster has a higher overall propensity to advance to third-level.

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4

Factors Influencing Higher Education Institution Choice

Sharon Walsh and John Cullinan

4.1 Introduction

Government policy with respect to higher education in Ireland is centred on increasing overall participation and promoting equality of opportunity for all individuals who wish to progress to higher education (Newman 2011). Based on these broad policy objectives, research to date has typically focused on examining the factors associated with progression to higher education (Flannery and O'Donoghue 2009; Cullinan et al. 2013; McCoy 2010; McCoy and Byrne 2011)—see Chap. 2 for a detailed discussion. However, within this context, little is known about students' preferences for higher education institutions (HEIs), or what factors influence students in their choice of institution in Ireland. Such information is relevant for policymakers seeking to increase overall partic-

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ipation rates and for HEI managers seeking to attract and retain students. Therefore, this chapter aims to fill this gap and presents findings from a national survey of Leaving Certificate students in Ireland. It explores a number of factors influencing institution choice, including peer, sibling and parental influences, as well as a range of institution attributes.

An examination of such factors has important implications for many stakeholders in the higher education sector, including individual HEIs. It has been suggested that a continued increase in Government spending in the higher education sector in Ireland may not be feasible (Department of Education and Science 2009) and so HEIs will have to operate in an increasingly competitive environment. As a result, it is becoming ever more important for HEIs to make informed choices about the allocation of scarce resources in an effort to attract students. Therefore, from a service provision and marketing perspective, HEI managers need to be aware of what students value in order to deliver quality services that will serve the needs and expectations of prospective students.

Furthermore, HEIs increasingly need to ensure the successful participation and progression of students within their respective institutions (Higher Education Authority [HEA] 2015a). Indeed, a recent report by the HEA examined the issue of non-progression in the higher education sector in Ireland (HEA 2016), finding that 16% of new entrants in 2012/13 did not progress to the following year of study (Chap. 5 of this book considers the issue of student retention in higher education in detail). Interestingly, they showed that females and students with higher prior educational attainment are more likely to progress to the following year (HEA 2016). Given this, it could be argued that understanding what students value may assist HEIs to better match the provision of courses to student preferences, which in turn may help to lower non-progression rates. Thus, overall, institutional attention is increasingly focused on the dual aims of recruitment and retention, both of which would be better informed by an understanding of what factors influence a student's choice of institution.

In addition to understanding the attributes of a HEI that influence institution choice, it is also important to consider the potential influences of peers, siblings and parents, as well as the factors associated with whether to live at home while attending higher education. For

example, it could be argued that parents who have no experience of higher education might be limited in the advice they can impart to their children, given their lack of exposure to and understanding of the system of educational opportunities. In fact, McCoy et al. (2010) found that young people from lower socioeconomic backgrounds in Ireland are far more reliant on advice and support from their school in making higher education decisions. They suggested that this is driven by the fact that parents have little experience of college and that their siblings and peers are not generally familiar with the higher education process. On the other hand, previous studies have found that parental encouragement is vital in shaping a student's initial thoughts and aspirations to progress to higher education (Hossler and Stage 1992). In this context, it is important to examine the factors associated with whether parental influence is important in shaping a student's choice of HEI. We also examine the importance and correlates of peer and sibling influences which, similar to parental influence, may impact in a positive or negative fashion.

The decision of whether or not to live at home while attending higher education can also have important implications for institution choice, though the two are of course inter-related. Sá et al. (2011) stated that the HEI choice of prospective students living at home is more likely to be geographically constrained. Thus, students living in areas with poor accessibility to HEIs may be limited in their choice of institution if they are not mobile (Walsh et al. 2015b). The decision to live at home, or not, while in higher education is an important one since Sá et al. (2011) have argued that living away from home can help to contribute to an individual's independence.

The chapter is organised as follows: the next section provides a review of the international literature on the factors influencing institution choice. Following this, we consider three such specific factors, namely peer, sibling and parental influences using recent data for Ireland. We also consider what factors are associated with a student's decision to live at home while in higher education. This is followed by a discussion of the usefulness of discrete choice experiments (DCEs) in examining student preferences for HEIs, as well as a summary overview from such a DCE for Ireland. The final section concludes.

4.2 Literature

This section examines the international literature in relation to the factors influencing HEI choice. This literature is of particular interest in an Irish context given the lack of research undertaken to date on the topic in Ireland.[1] Institution choice has been characterised as a highly complex decision that is subject to multiple influences (Briggs and Wilson 2007) and understanding how students make decisions regarding institution selection has led to the development of several student behaviour models. Depending on their aim and complexity, such models consider not only choice criteria and information sources but also environmental, institutional, and student characteristics (Paulsen 1990) and the process of decision-making (Paulsen 1990; Chapman 1981; Hossler and Gallagher 1987).

These models have provided the foundation for much of the research examining the factors influencing institution choice. Table 4.1 presents a list of some of the most important studies that have examined the issue, indicating which factors the studies have identified as important. One such factor is the cost of attending a HEI. For example, Dunnett et al. (2012) examined the impact of fee changes on students' university choice in the United Kingdom (UK) by measuring the utility associated with various attributes of a university. In particular, the study considered the potential impact of a change in the funding structure on students who tend to be under-represented in higher education. They showed that while individuals from lower socioeconomic backgrounds do not seem to be significantly different in their attitudes to fees, they had a marked preference for a local university over a non-local one, which they argued "may imply some cost consciousness since living at home is likely to be cheaper" (Dunnett et al. 2012, p. 214). These findings are echoed by Forsyth and Furlong (2000) who conducted a longitudinal study of school leavers from disadvantaged areas in Scotland. They suggested that cost is the underlying reason respondents choose to enrol at local universities or colleges and that "commuting from the parental home had the twin advantages of minimising accommodation costs and allowing continued access to parental support" (Forsyth and Furlong 2000, p. 38).

Table 4.1 Studies identifying factors that influence student choice of HEI

	Cost	Academic reputation	Courses	Location/ distance	Sense of fit	Teaching quality	Job prospects	Facilities	Influence of others	Country of study	Method
Briggs (2006)		✓		✓						UK	Survey
Broekemier and Seshadri (2000)			✓			✓	✓		✓	US	Survey
Callender and Jackson (2008)	✓									UK	Survey
Dao and Thorpe (2015)	✓		✓					✓	✓	Vietnam	Survey
Drewes and Michael (2006)				✓						Canada	Micro dataset
Dunnett et al. (2012)	✓	✓								UK	Conjoint analysis
Forsyth and Furlong (2000)	✓			✓						UK	Longitudinal study
Hagel and Shaw (2010)	✓	✓								Australia	Conjoint analysis
Holdsworth and Nind (2006)			✓				✓			New Zealand	DCE
Hooley and Lynch (1981)		✓	✓						✓	UK	Conjoint analysis
Joseph and Joseph (1998)	✓	✓	✓	✓				✓		New Zealand	Survey
Kee and Sia (2013)	✓		✓	✓					✓	Malaysia	Survey
Maringe (2006)	✓		✓				✓		✓	UK	Survey
Nora (2004)					✓					US	Survey
Obermeit (2012)	✓	✓		✓					✓	Germany/US	Literature review

(*continued*)

Table 4.1 (continued)

	Cost	Academic reputation	Courses	Location/ distance	Sense of fit	Teaching quality	Job prospects	Facilities	Influence of others	Country of study	Method
Price et al. (2003)								✓		UK	Survey
Reay et al. (2005)				✓	✓					UK	Interviews
Sá et al. (2012)									✓	Netherlands	Micro dataset
Shah et al. (2013)			✓			✓				Australia	Focus groups
Simoes and Soares (2010)				✓					✓	Portugal	Survey
Smith (2007)					✓					UK	Interviews
Soutar and Turner (2002)		✓	✓			✓	✓			Australia	Conjoint analysis
Verghese and Kamalanabhan (2015)		✓	✓					✓		India	Survey
Walsh et al. (2015a)		✓		✓						UK	Conjoint analysis

Source: Created by authors

Callender and Jackson (2008) also showed that students from lower social class households in the UK were more likely to report that their choice of institution was constrained by cost. It is worth highlighting that according to the authors, students from lower social class households were slightly more fearful of debt than those in the middle or upper classes, while individuals who perceived relatively few benefits of higher education focused more on reducing their costs. Hagel and Shaw (2010) concluded that undergraduate students in Australia were moderately price sensitive with respect to their choice of institution. However, the individuals surveyed had already enrolled in higher education and so it is not surprising that they would place less emphasis on the level of tuition fees at that point in their decision process. Obermeit (2012) contrasted the findings from German and United States (US) studies on the factors influencing HEI choice and found that financial considerations such as fees, grants and scholarships were key to the choice of HEI for American students. While it did not appear to have a direct influence on the choice of HEI in Germany, it may have influenced the decision of whether or not to participate in higher education. Cost is also highlighted as a key attribute in institution choice by Dao and Thorpe (2015), Joseph and Joseph (1998), Kee and Sia (2013) and Maringe (2006). Overall then, the cost of attending an institution appears to be a strong determinant of institution choice in a number of countries, particularly for those from lower social class backgrounds.

Another key attribute in institution choice identified in the international literature is academic reputation. Dunnett et al. (2012) found that course reputation and university reputation are the most important factors influencing institution choice in the UK and this was consistent across all respondent types. These findings are in line with those in Walsh et al. (2015a) who also found that course and university reputations were the key factors determining choice in the UK. Interestingly, they pointed out that reputation had a greater impact on students whose parents went to higher education compared to those with no parental experience of higher education. Similarly, Briggs (2006) showed that academic reputation is the most important factor influencing institution choice for first-year accounting and engineering undergraduate students in the UK.

Obermeit (2012) also found that academic reputation is one of the most highly ranked factors in both US and German studies, along with other quality aspects such as good faculty and quality of the programme. Moreover, they found evidence that students with high ability attach greater importance to quality features such as academic reputation. These findings are echoed by Hagel and Shaw (2010), Hooley and Lynch (1981), Joseph and Joseph (1998), Soutar and Turner (2002) and Verghese and Kamalanabhan (2015). Another important HEI characteristic, course offerings, has also been consistently identified as a key attribute in determining HEI choice (Broekemier and Seshadri 2000; Dao and Thorpe 2015; Holdsworth and Nind 2006; Hooley and Lynch 1981; Joseph and Joseph 1998; Kee and Sia 2013; Maringe 2006; Shah et al. 2013; Soutar and Turner 2002; Verghese and Kamalanabhan 2015). Each of these studies pointed to the fact that course offerings are fundamental to any choice of institution and that institutional merit can be defined in terms of courses or specialisations offered.

Distance from home has also been highlighted as an important attribute in HEI choice. For instance, Briggs (2006) found that distance from home is one of the top factors influencing institution choice and this was consistent across disciplines and genders. Interestingly, they suggested that while cost does not have an influence on institution choice, it underpins the importance placed on both distance from home and location. These findings are in line with Callender and Jackson (2008) who reported that many respondents considering a HEI close to home do so for financial reasons. In particular, they showed that fear of debt means that students reduced their costs by attending a university nearer their family home. They also pointed out that the more positive students were about the experience of going to higher education, the less likely they were to live at home with their parents. Living cost concerns were also found to have the greatest impact on institution choice in the UK in a study by Maringe (2006). They asserted that students account for the availability of part-time work along with the general cost of living in their preferences and that living cost concerns influenced the distance an individual was willing to travel to attend higher education.

In another relevant study, Drewes and Michael (2006) employed a micro dataset on university applications in order to examine the role of institutional attributes on choices made by final year high school students in Canada and found that distance and scholarship spending were important to prospective applicants. In particular, the authors found that students were much more likely to choose a university that is close to home and they responded positively to increases in scholarship spending, once again stressing the interplay between cost and distance concerns. These findings are echoed in an early study by Joseph and Joseph (1998), as well as in a more recent study by Kee and Sia (2013). In a comparison of US and German studies, Obermeit (2012) showed that distance from home was an important attribute in both jurisdictions. Similarly, Simoes and Soares (2010) examined the choice factors pertinent to students in Portugal and found that geographic proximity was the most important motive for choosing a HEI. They postulated that this tendency to stay close to home was motivated by economic reasons whereby rising education costs, along with a trend towards individuals bearing their own education costs, meant that students tried to reduce expenses by staying at home.

Focusing on individuals from lower socioeconomic backgrounds, Forsyth and Furlong (2000) found that individuals from disadvantaged areas who progress to higher education in the UK tended to limit their choice of HEI and degree due to the additional financial, geographical and social barriers they face. In particular, living at home restricted the options of students from low-income households in regions with limited higher education provision. Thus, prospective students in these disadvantaged areas were more likely to choose a university in a familiar area, within commuting distance from home. Similarly, Reay et al. (2005) concluded that geography determines choice for a majority of working-class students but not for their middle-class counterparts. In particular, they suggested that the constraints faced by such students meant that the cost of travel and accommodation were primary considerations.

Such preferences for shorter distances may also be driven by a desire to experience a sense of fit in the chosen HEI. Reay et al. (2005)

and Smith (2007) concluded that working-class students are strongly motivated by a desire for a sense of fit, whereby their priority is to go to a HEI that is familiar. According to Reay et al. (2005, p. 102) "working class fears and anxieties about the move into higher education are interwoven with desires to fit in and feel at home". Similarly, Nora (2004) identified personal and social fit as an important driver of institution choice. This is reflected in an individual's ability to project their personal and social identities onto a college campus to determine how well they would fit personally and socially at a specific institution.

While these are the most important institutional attributes identified in the literature, other characteristics have also been documented including teaching quality (Shah et al. 2013; Broekemier and Seshadri 2000; Soutar and Turner 2002), facilities (Dao and Thorpe 2015; Joseph and Joseph 1998; Verghese and Kamalanabhan 2015; Price et al. 2003) and job prospects (Broekemier and Seshadri 2000; Holdsworth and Nind 2006; Maringe 2006; Soutar and Turner 2002).

In addition to institutional attributes, previous research has also identified peers, parents and teachers as having a strong influence on institution choice. Sá et al. (2012) discussed the fact that individuals, especially those with little information or experience, obtain information from the decisions of others, which points to the existence of social interactions. Interestingly, they found that those who plan to live away from home are more influenced by their peers than those staying at the parental home. Indeed, Hooley and Lynch (1981), Broekemier and Seshadri (2000) and Kee and Sia (2013) also identified school friends and friends currently attending a HEI as major influences on HEI choice. Similarly, Obermeit (2012) identified a number of studies in the US in which advice from others, namely parents, siblings, teachers and counsellors had a profound impact on the decision of which HEI to attend. They also pointed to a number of studies in the US which suggested that parents who went to college themselves have a stronger influence than parents who did not progress to higher education.

Indeed, Reay et al. (2005) found that for the majority of parents in middle-income families, progression to higher education was taken

for granted. On the other hand, Maringe (2006) showed that while parents, teachers and career guidance provide the formal platform for advice to students on their HEI choice, male students considered all three sources as relatively unimportant compared to their female peers. According to the authors, "reasons for this difference are unclear, but could be related to the fact that at this stage, boys generally desire to demonstrate greater independence in decision making than girls" (Maringe 2006, p. 476). Simoes and Soares (2010) also uncovered personal influences (family and current higher education students) and guidance from teachers as important choice factors. In a recent study of current higher education students, Dao and Thorpe (2015) reported that undergraduates in Vietnam were influenced more by the opinions of parents and siblings while postgraduates were affected by the opinions of teachers, friends and colleagues. In Ireland, McCoy et al. (2014) found that young people rely on both formal and informal sources of advice in making decisions about what to do after leaving school. Interestingly, they pointed out that middle-class young people were more reliant on their parents as a source of advice while working-class students and immigrant groups are more reliant on school-based forms of guidance.

Notwithstanding the studies discussed above, significant gaps in the literature exist in relation to our understanding of the attributes of HEIs that influence institution choice, both in Ireland and internationally. In the remainder of this chapter, we attempt to address some of these gaps.

4.3 Peer, Sibling and Parent Influences on HEI Choice

4.3.1 Introduction

The literature review above suggests there are many factors that influence an individual's choice of HEI. In this section we consider three such factors, namely peer, sibling and parent influences, using new data from a recent survey for Ireland. We also consider what factors are associ-

ated with a student's decision to live at home while in higher education, including the role of peer and parent influences.

4.3.2 Data

The data analysed is from a national survey of Leaving Certificate students in Ireland, conducted in late 2015. The survey is the first of its kind to be undertaken in Ireland and focused mainly on identifying which attributes/characteristics of HEIs are most valued by prospective students, using a DCE. The sampling frame for the survey was taken from the Department of Education and Skills website which contains a full list of all secondary schools in Ireland. A sample of schools was chosen to be broadly representative across a number of dimensions, including geographic location, school size, DEIS status and gender enrolment mix. The survey questionnaire was distributed in person and Leaving Certificate students were asked to complete the survey during class time. In total, 1105 Leaving Certificate students from 34 schools took part in the study. Each student completed a DCE that examined the relative importance of HEI attributes in determining institution choice. They also provided information on their plans for higher education, and what factors might influence their decisions, while the survey also gathered information on the socio-demographic characteristics of the students. This section focuses on responses to a selection of questions relating to peer, sibling and parent influences, while Sect. 4.4 provides a summary overview of the findings from the DCE. For more details of the survey, see Walsh et al. (2017).

4.3.3 Empirical Approach

Our empirical strategy starts with a set of multivariate binary logit models to consider three separate dependent variables, namely: (i) whether a respondent's choice of HEI would be influenced by where their friends plan to go; (ii) whether a respondent plans to apply to the same HEI as one of her/his siblings; and (iii) whether parental influence is important for a respondent's choice of HEI. Overall 12.6% of respondents stated

that their choice would be influenced by their friends' plans, 19.0% indicated they would be applying to the same HEI as their sibling(s),[2] while 68.8% reported parental influence as being important—see Table 4.2. To model these influences, we define a latent variable *Influence** to be a linear function of a vector of control variables **X**, a set of parameter coefficients β to be estimated and an error term ε, such that:

$$\begin{aligned} &Influence^{*} = \mathbf{X}\beta + \varepsilon \\ &\text{where} \\ &Influence = \begin{cases} 1 & \text{if } Influence^{*} > 0 \\ 0 & \text{otherwise} \end{cases} \end{aligned} \tag{1}$$

In the final models that are presented, a range of variables are included in **X** and these are also listed in Table 4.2. For example, we include an indicator variable for the student's sex, a variable capturing the number of honours-level Leaving Certificate subjects the student is taking (likely a good proxy for student ability), an indicator for whether the student's mother has completed higher education, as well as an indicator for whether the student believes (s)he is eligible for a student grant. We also include a number of school- and spatial-level variables. For example, we include an indicator variable for whether the school has DEIS status, whether it is a single-sex school, the NUTS III region it is located in, as well as the network travel distances to the student's preferred/chosen HEI and to her/his nearest HEI. Sample descriptive statistics for these variables are presented in Table 4.2. All models are estimated using clustered standard errors at school level.

As an extension to this analysis we also consider the factors associated with a student's intention to live at home when attending higher education. In this instance we employ a multinomial logit model reflecting three categories of responses to this question, namely: doesn't plan to live at home; plans to live at home; doesn't know.[3] The same independent variables as before are included in the model, though we also include variables relating to whether a student reported being influenced by a friend or a parent.

Table 4.2 Variable definitions and sample descriptive statistics

Variable name	Variable description	*N* (%) or mean (SD)
Dependent variables		
Friends Influence	Indicator for whether respondent's choice of HEI would be influenced by where friends plan to go	
	= 0 if would have no influence	823 (75.23%)
	= 1 if would have an influence	138 (12.61%)
	= . if don't know or missing	133 (12.16%)
Sibling Influence	Indicator for whether respondent plans to apply to same HEI as one of her/his siblings	
	= 0 if plans to apply to different HEI	267 (24.41%)
	= 1 if plans to apply to same HEI	208 (19.01%)
	= . if don't know, not applicable or missing	619 (56.58%)
Parent Influence	Indicator for whether parental influence is important for respondent's choice of HEI	
	= 0 if unimportant	292 (26.69%)
	= 1 if important	753 (68.83%)
	= . if don't know or missing	49 (4.47%)
Live at Home	Indicator for whether respondent plans to live at home while in higher education	
	= 0 if doesn't plan to live at home	530 (48.45%)
	= 1 if plans to live at home	333 (30.44%)
	= 2 if don't know	206 (18.83%)
	= . if missing	25 (2.29%)
Independent variables		
Male	= 0 if student is female	439 (40.13%)
	= 1 if student is male	644 (58.87%)
	= . if missing	11 (1.01%)
Honours Subjects	Number of Leaving Certificate honours subjects	5.41 (1.64)
Honours Subjects Sq	Number of Leaving Certificate honours subjects squared	31.97 (16.33)
Mother Higher Education	Indicator for whether mother has completed higher education	
	= 0 if no	520 (47.53%)
	= 1 if yes	463 (42.32%)
	= . if don't know or missing	111 (10.15%)

(*continued*)

Table 4.2 (continued)

Variable name	Variable description	*N* (%) or mean (SD)
Grant Eligibility	Categorical variable for whether respondent believes that they are eligible for a student grant	
	= 0 if believe not eligible	280 (25.59%)
	= 1 if believe are eligible	457 (41.77%)
	= 2 if don't know	329 (30.07%)
	= . if missing	28 (2.56%)
DEIS School	Indicator for whether respondent attends a school with DEIS status	
	= 0 if no DEIS status	915 (83.64%)
	= 1 if DEIS status	179 (16.36%)
Single Sex School	Indicator for whether respondent attends a single sex school	
	= 0 if mixed school	697 (63.71%)
	= 1 if single sex school	397 (36.29%)
NUTS III Region	Region school is located in	
	= Border (base)	270 (24.68%)
	= Midlands	77 (7.04%)
	= West	184 (16.82%)
	= Dublin	227 (20.75%)
	= Mid-East	58 (5.30%)
	= Mid-West	90 (8.23%)
	= South-East	39 (3.56%)
	= South-West	149 (13.62%)
Distance Chosen HEI	Road network distance to first choice HEI (kms)	83.12 (91.37)
Distance Nearest HEI	Road network distance to nearest HEI (kms)	26.94 (22.58)
Observations		1094

Source: Analysis of data from Walsh et al. (2017)

4.3.4 Results

The results from the binary logit models are presented in Table 4.3. Starting with *Friends Influence*, the model implies that boys are 10.5 percentage points (ppts), or 120.0%, more likely to be influenced by their friends in making their decision about which HEI to attend, while students in a DEIS school are 7.8 ppts (50.0%) less likely to be influenced by their peers, all else equal. We also find that students living far-

Table 4.3 Binary logit models of friends, sibling and parent influence on choice of HEI

Variable	*Friends Influence*	*Sibling Influence*	*Parent Influence*
Male	0.105	0.034	−0.038
	(2.99)***	(0.57)	(1.29)
Honours Subjects	0.037	−0.235	0.031
	(1.07)	(2.41)**	(0.63)
Honours Subjects Sq	−0.004	0.022	−0.003
	(1.21)	(2.59)***	(0.75)
Mother Higher Education	−0.023	−0.016	0.088
	(1.02)	(0.34)	(2.85)***
Grant Eligibility = Yes	−0.016	−0.037	−0.055
	(0.58)	(0.52)	(1.94)*
Grant Eligibility = Don't Know	−0.042	0.018	−0.044
	(1.43)	(0.34)	(1.31)
DEIS School	−0.078*	−0.100	0.099
	(1.93)	(1.30)	(2.92)***
Single Sex School	0.018	0.044	−0.018
	(0.76)	(0.82)	(0.49)
Distance Chosen HEI	−0.000	−0.002	0.000
	(0.63)	(4.78)***	(0.68)
Distance Nearest HEI	0.001	0.005	−0.001
	(1.98)**	(4.09)***	(1.37)
Region	Y	Y	Y
Wald χ^2 statistic	218.56	106.88	36.30
Prob > χ^2	0.000	0.000	0.016
Observations	855	421	931

Notes: The table presents estimated average marginal effects from three separate binary logit models of *Friends Influence*, *Sibling Influence* and *Parent Influence*. Absolute values of *t*-statistics are presented in parentheses. Y denotes region indicator variables included in the model and were found to be statistically significant. *** denotes statistically significant at 1%, ** denotes statistically significant at 5%, and * denotes statistically significant at 10%. Standard errors are clustered at the school level

Source: Analysis of data from Walsh et al. (2017)

ther away from a HEI are more likely to take their friends' choices into account. In terms of *Sibling Influence*, the evidence suggests a non-linear U-shaped association with number of honours subjects, while distance to chosen HEI is negatively associated with this influence and distance to nearest HEI is positively associated with it. Finally, we find *Parent*

Influence to be 8.8 ppts (13.0%) higher for students whose mother has completed higher education, 5.5 ppts (7.1%) lower for those eligible for a student grant and 9.9 ppts (14.0%) higher for students in DEIS schools, all else equal.

Overall these results suggest that boys are more likely than girls to be influenced by their peers, though there are no differences across gender for sibling and parent influences. Mother's education is not associated with the extent to which students are influenced by their peers' or siblings' choices but strongly and positively correlated with parental influence. Being eligible for a student grant does not seem to affect the likelihood of peer or sibling influence but does matter for parent influence. In particular, grant eligibility is correlated with lower levels of parental guidance. Students in DEIS schools differ from students in non-DEIS schools in terms of both peer and parent influence, with the former less likely to be influenced by their friends and more likely to be influenced by their parents. Finally, geographic proximity to HEIs also appears to matter for peer and sibling influence, a finding that adds to the analysis in Chap. 3.

Turning to the multinomial logit model of planning to live at home, results are presented in Table 4.4. They suggest that students who are eligible for a grant are 7.7 ppts more likely to be unsure about this decision, while those who stated they would be influenced by their friends are 6.5 ppts less likely to live at home. Students influenced by their parents are 9.8 ppts less likely to live away from home, 4.1 ppts more likely to live at home and 5.7 ppts more likely to be unsure. School DEIS status is also a significant predictor, with students from a DEIS school 9.5 ppts less likely to live at home and 13.6 ppts more likely to be unsure. Students from single-sex schools are 10.9 ppts less likely to intend to live at home, while greater distances to a student's chosen HEI are associated with an increased likelihood of living away from home and a decreased likelihood of living at home, as would be expected. Similar effects are found for students living greater distances from their nearest HEI, again as expected. Overall the model suggests that friend and parent influence is associated with the decision to live at home or not, while grant eligibility too is important, all else equal. We also find

Table 4.4 Multinomial logit model of planning to live at home while at higher education

Variable	*Live Away from Home*	*Live at Home*	*Don't Know*
Male	0.020	0.013	−0.033
	(0.63)	(0.36)	(0.94)
Honours Subjects	0.062	−0.023	−0.039
	(1.37)	(0.70)	(1.03)
Honours Subjects Sq	−0.005	0.002	0.003
	(1.03)	(0.61)	(0.72)
Mother Higher Education	0.003	−0.019	0.016
	(0.14)	(0.55)	(0.43)
Grant Eligibility = Yes	−0.056	−0.022	0.077
	(1.63)	(0.79)	(2.34)**
Grant Eligibility = Don't Know	−0.050	−0.005	0.055
	(1.42)	(0.12)	(1.47)
Friends Influence	0.007	−0.065	0.058
	(0.20)	(2.00)**	(1.91)*
Parent Influence	−0.098	0.041	0.057
	(3.22)***	(1.81)*	(1.69)*
DEIS School	−0.042	−0.095	0.136
	(0.89)	(2.71)***	(3.02)***
Single Sex School	0.055	−0.109	0.053
	(1.28)	(2.62)***	(1.37)
Distance Chosen HEI	0.002	−0.002	0.000
	(11.19)***	(10.45)***	(1.05)
Distance Nearest HEI	0.007	−0.006	−0.001
	(5.98)***	(5.34)***	(1.15)
Region	Y	Y	Y
Pseudo R^2		0.367	
Observations		842	

Notes: The table presents estimated average marginal effects from a multinomial logit model of whether respondents plan to live at home while attending higher education. Absolute values of *t*-statistics are presented in parentheses. Y denotes region indicator variables included in the model and were found to be statistically significant. *** denotes statistically significant at 1%, ** denotes statistically significant at 5%, and * denotes statistically significant at 10%. Standard errors are clustered at the school level

Source: Analysis of data from Walsh et al. (2017)

interesting differences across school characteristics, with students from DEIS schools and single-sex schools less likely to plan to stay at home while in higher education. As expected, proximity to HEIs plays a big role too, which is consistent with the analysis presented in Chap. 3.

4.4 Student Preferences for HEI Attributes: A Discrete Choice Experiment

4.4.1 Using DCEs to Examine Student Preferences for HEIs

Although the factors influencing institution choice have been well-documented, there is little robust evidence on the relative importance of HEI characteristics in determining student preferences for HEIs. Some previous studies have employed basic ranking and rating exercises, while others have used 'conjoint analysis', a form of stated preference methodology. However, Louviere et al. (2010, p. 67) argue that "conjoint analysis lacks a sound, theoretical relationship with real market choice behaviour(s), which serves to reinforce the ad hoc, predominantly statistical and methodological nature of conjoint analysis research and practice". On the other hand, Louviere et al. (2010) argue that DCEs, a survey-based research methodology used to elicit preferences, are grounded in a long-standing, well-tested theory of choice behaviour. More specifically, in a deviation from standard consumer theory, Lancaster (1966) argued that it is the attributes of a good that determine a good's utility and, as a result, utility can be expressed as a function of a good's attributes.

In this context, we summarise selected findings from a DCE of student preferences for HEIs in Ireland (Walsh et al. 2017). Since education is not 'traded' in a market, we do not know the value that individuals place on HEIs or their characteristics. However, a DCE allows us to estimate the value of a non-market good/service, in this case a HEI, by examining students' preferences for HEIs. DCEs are based on the principle that, firstly, any good or service can be described by its characteristics (or attributes) and, secondly, the extent to which an individual values a good or service depends upon the nature and levels of these characteristics. The technique involves presenting individuals with choices of scenarios described in terms of characteristics and associated levels and for each choice they are asked to choose their preferred scenario. The alternatives presented are constructed by means of an experimental design that varies

one or more attributes within and between respondents. This allows us to examine how preferences change when we change the attributes.

An advantage of DCEs is that they encourage people to think systematically about the attributes of a good or service by asking them to reveal how they would be willing to trade off different bundles of these attributes. From a policy viewpoint, this can help to identify the key drivers influencing young people in Ireland in their choice of HEI, which will have important implications not only for policy makers and institution managers in terms of planning decisions and service provision but also for students and parents as stakeholders in the sector.

4.4.2 DCE Design

The DCE was developed through an extensive design process—see Walsh et al. (2017) for full details. First, a literature review was conducted to identify previous studies that examined factors influencing HEI choice. Following this, a number of focus group discussions were held, the purpose of which was to explore the attributes (i.e. the characteristics that make up a HEI) and levels (i.e. the different values of an attribute) that influence student preferences for HEIs. Based on this qualitative work, five attributes were chosen for inclusion in the DCE:

(i) *Travel time from home*: This ranges from 1 hour to 3 hours.
(ii) *Type of HEI*: This could be a university or an institute of technology (IT).
(iii) *Course reputation*: This indicates the reputation of the courses on offer at the HEI in providing the knowledge and skills required for future employment and/or study.
(iv) *Work placement*: This describes whether or not work placements are available as part of degree programmes at the HEI.
(v) *Student fee*: This ranges from €1500 up to €6000 and is an out-of-pocket expense for individuals.

A total of 1094 Leaving Certificate students completed the DCE and each individual was required to complete 12 choice cards, resulting in 13,128 observations for data analysis.

4.4.3 Findings

This sub-section sets out a summary overview of some of the findings from the DCE and full results are available in Walsh et al. (2017). To begin, Fig. 4.1 presents the attributes that respondents indicated were the *most* and *least* important factor to them when considering a HEI. It shows that 32.7% of students in the sample identify course reputation as the most important factor when considering a HEI, while only 5% of the sample identified it as the least important factor, which highlights its significance. The availability of work placement is also identified as a key driver of institution choice, with 21.1% of respondents indicating that it is the most important factor determining choice. Results are mixed with regard to student fee, with 17.6% of respondents identifying it as the most important factor and 11.0% identifying it as the least. Interestingly, while 17.1% of students state that the type of institution (university or IT) is the most important factor when choosing a HEI, 30.8% identified it as the least. Finally, travel time is identified as the most important factor by only 10.7% of the sample, with 41.1% categorising it as the least important factor.

These findings are consistent with those from the DCE which suggest that, in general, students have a very strong preference for both good and excellent course reputation relative to fair. This is also consistent with the international research discussed in Sect. 4.2, which highlights course reputation as key to determining institution choice. Furthermore, students were found to have a strong preference for a HEI that offers work placement as part of their degree programmes relative to one that does not—see Walsh et al. (2017). With regard to the type of HEI, in general students prefer a university as opposed to an IT, while they also have a preference for shorter travel time from home (1 hour) relative to longer travel times (2 or 3 hours).

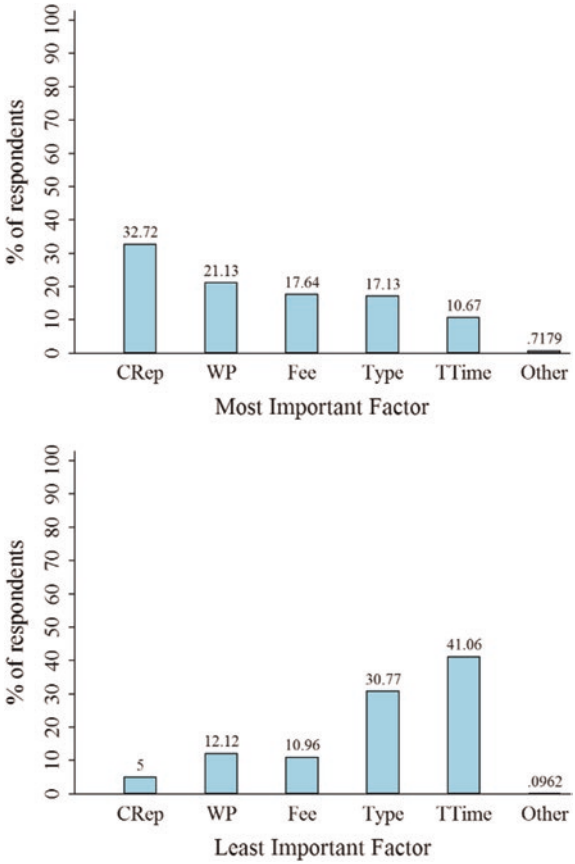

Fig. 4.1 Most and least important factors influencing HEI choice. *Notes: CRep* refers to course reputation, *WP* refers to work placement, *Fee* refers to student fee, *Type* refers to the type of institution, *TTime* refers to travel time from home. *Source:* Analysis of data from Walsh et al. (2017)

4.5 Conclusion

Increased participation and equity of access are key aims of higher education policy in Ireland. While much of the research to date in Ireland has focused on examining the determinants of progression to higher education, relatively little is known about student preferences for HEIs. Understanding these preferences will have important implications for policymakers and institution managers in terms of service provision and planning decisions. There are also important implications relating to geographic inequalities in accessibility to higher education in Ireland.

Within this context, this chapter has presented a detailed examination of the factors influencing institution choice in Ireland, looking particularly at the importance and correlates of peer, sibling and parental influences, as well as student preferences for HEI attributes. Using data from a national survey of Leaving Certificate students, we find that male school leavers are more likely than females to be influenced by their peers, though there are no differences across gender for sibling and parent influences. This could be part of the explanation for why males are less likely than females to progress in higher education once enrolled (HEA 2016), if dependence on peers results in male students choosing a course or HEI that does not necessarily match their own independent preferences.

We also find that mother's education is strongly and positively correlated with parental influence, while grant eligibility is correlated with lower levels of parental guidance. Students in DEIS schools are less likely to be influenced by their friends and more likely to be influenced by their parents. These findings are seemingly at odds with previous Irish research that found that students from more disadvantaged backgrounds are more reliant on formal school-based guidance, rather than parental guidance (McCoy et al. 2014). With regard to the decision to live at home while attending higher education, we find that friend and parent influence plays a role, while grant eligibility too is important. Interestingly, students from DEIS schools and single-sex schools are less likely to plan to stay at home while in higher education. As expected, proximity to HEIs plays an important role in this decision.

In terms of HEI attributes, we find that course reputation is the most important determinant of institution choice, which suggests that the quality of the courses on offer at the HEI is key to shaping an individual's choice of institution. This has important implications for HEI managers with regard to course offerings but also in terms of the provision of information to prospective students. While it is difficult to know how students currently evaluate quality and reputation, student satisfaction surveys, HEI rankings and 'word of mouth' may act as proxies. In light of this, initiatives such as the Higher Education Authority System Performance Report (HEA 2014) and the Irish Study of Student Engagement (HEA 2015b) may help to bridge the information asymmetries which exist for students in their assessment of course quality and reputation. Given that these measures are currently in their infancy, it is not yet possible to assess their effectiveness or impact. However, such an evaluation should be conducted in the future. We also show that the availability of work placement is a highly valued institution attribute, which implies that students are strongly motivated by graduate employment and improved labour market outcomes. This suggests that students treat higher education as an investment good, which could suggest that students should bear a share of the cost of higher education.

We find that, in general, universities are preferred to ITs. This can perhaps be explained by the fact that those who obtain higher level qualifications have a significant labour market advantage over those with lower level qualifications. In addition to this, Kelly et al. (2010) showed that the type of institution attended (university or not) can have significant implications for future earnings. This preference for a university over an IT may also have important implications in the context of spatial equity of access. In particular, those that are most disadvantaged from a spatial standpoint may experience geographic impediments to university participation and are thus at a relative disadvantage compared to those living in close proximity to a university (Walsh et al. 2016). Given this, the current proposal to establish technological universities in Ireland should be positive for students, as it will result in an improvement in geographic accessibility to universities in Ireland. Finally, we find that students have a preference for shorter travel time from home (1 hour) relative to longer travel times (2 or 3 hours), which again has implications with respect to spatial equity of access.

Notes

1. One notable exception is Flannery and Cullinan (2014) who considered the importance of geographic accessibility and social class for decisions relating to HEI type, degree level and field of study. See Chaps. 2 and 3 of this book for more details of that study.
2. It is important to note that this question was not relevant to a large proportion of respondents who did not have a sibling in higher education. Therefore, models relating to sibling influence are estimated using a sub-sample of students who indicated that they had a sibling in higher education.
3. We also estimated a binary logit model excluding those students who stated they don't know. Results were broadly consistent with the multinomial choice model.

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Part III

Progression & Outcomes

5

Student Retention in Higher Education

Selina McCoy and Delma Byrne

5.1 Introduction

In an age of growing accountability and performance monitoring, attention is increasingly focused on how well institutions, including higher education colleges, are doing. The successful progression and performance, or 'study success', of students in higher education are key components of institutional effectiveness, as acknowledged in recent national policy frameworks, including the *National Strategy for Higher Education to 2030* and the *System Performance Framework 2014–2016*. The concept of 'successful participation' is a central tenet of Ireland's National Framework of Qualifications, which aims to ensure that learners can suc-

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cessfully participate in a programme, or series of programmes, leading to an award, or series of awards, in pursuit of their learning objectives (Government of Ireland 2012). A Higher Education Authority (HEA) report also noted that in the context of growing accountability and efficiency, "minimising students' non-completion of courses is an important part of ensuring that the resources available to the HE sector are utilised with maximum efficiency" (Mooney et al. 2010, p. 10).

It seems timely to assess the factors that contribute to student success in higher education and, in particular, to examine the extent to which higher education institutions (HEIs) vary in their 'effectiveness'. Recent research indicates that, overall, one-in-six higher education students in Ireland do not successfully progress from first to second year in their course of study (Liston et al. 2016). Such patterns, it should be noted, occur in a context of rapid expansion in higher education participation rates, to among the highest in Europe, as well increasing diversity in the composition of entrants (McCoy and Smyth 2011; McCoy et al. 2014; McGuinness et al. 2012; Byrne and McCoy 2017). As acknowledged internationally, improving student retention represents an on-going challenge because as the goal of increased student diversity is being embraced, the needs of the student body are shifting (Thomas 2002).

In looking to contextualise Irish retention patterns in an international context, there is a clear lack of systematic knowledge, data and indicators on study success. International comparisons, such as those of the OECD, have to be interpreted with care due to differences in underlying indicator definitions, as well as differences in national contexts and institutional arrangements between countries (European Commission 2015). Further, they note only 12 out of 35 European countries regularly report a national indicator of completion. Even fewer countries report on retention and dropout rates and time-to-degree.

Internationally research is increasingly focused on how students fare after entry to college, with the focus on student experiences in relation to retention, completion and withdrawal.[1] However, while research is increasingly focused on student experience and performance, the vast majority of studies are based on single-institution data (Braxton 2000) or small-scale qualitative research. Comparisons of institutions within or across countries are relatively rare. Much of the research is centred on the

role of student characteristics and success, variously defined. The work of Arum and Roksa (2011) and colleagues in the United States (US) is one such study. They found that students coming to college were not only poorly prepared by prior schooling for highly demanding academic tasks but entered college with attitudes, norms, values and behaviours that were often at odds with academic commitment. They entered college, Arum and Roksa argue, largely 'academically adrift'. They cited a number of studies in the US context, showing a dramatic decline in college students' academic effort (e.g. time spent on academic pursuits) in recent decades. The findings to some extent resonate with recent research in the Irish context. McCoy et al. (2014) also examined students' experiences of the transition to higher education, with a majority of leavers reporting significant differences in teaching and learning styles in higher education, with particular difficulties in relation to the standard expected of them, the difficulty of the course and managing their workload. Course non-completion was found to relate to a range of underlying factors, but academic and course-related factors were prominent, such as the course not being as expected and the content and difficulty level of the course. Support within the HEI was found to play a key role in reducing the prevalence of both academic and social difficulties (see also Byrne et al. 2013).

Our focus in this chapter is on the institutional level: how do HEIs compare in their student retention patterns and does this change when we compare on a like-for-like basis taking account of student characteristics such as prior academic performance? The chapter is based on analysis of data compiled by the HEA on non-progression in higher education among the full population of entrants to HEIs in Ireland[2] in 2007. The nature of the multivariate analysis undertaken represents the first study of its kind in Ireland and provides a valuable contribution to our understanding of the factors shaping college persistence and retention and the extent to which HEIs vary in enabling students to successfully progress and complete their courses. The study draws on rich individual-level data on a range of student characteristics, including gender, social class, prior academic performance and financial aid receipt. In addition, the analysis assesses the extent to which progression patterns vary across different fields of study, course levels, institutional sectors and individual

institutions, crucially taking account of the composition of the student body to allow for a more like-for-like comparison.

5.2 The Higher Education System

Ireland has witnessed a dramatic expansion in higher education participation since the 1960s. It has been argued that such expansion was one of the main factors underlying Ireland's rapid economic growth during the 1990s (Fitzgerald 2000). The Irish higher education sector comprises two main sectors: the university sector (which also comprises colleges of education [CEs] and art colleges) and the institute of technology (IT) sector. The oldest university dates back to the sixteenth century, with a further group of universities established in the nineteenth century. There are now eight institutions with university status in Ireland (seven universities and Royal College of Surgeons in Ireland [RCSI]), in addition to a number of CEs and art colleges, and students attending the universities can avail of degree (or higher) level courses. The IT sector originated in the late 1960s as Regional Technical Colleges, largely to provide sub-degree courses in technical areas (Clancy 2008). Over the period 1992–2006, these colleges were re-designated as ITs. Their function has evolved considerably in that they now offer sub-degree, degree and postgraduate (including doctoral) degree courses across a range of disciplines (McCoy and Smyth 2011). The IT sector currently accounts for over 40% of all higher education places, with the remainder located in the universities/CEs.

Applications for undergraduate courses (both degree and sub-degree) are centralised nationally through the Central Applications Office (CAO). Entry is predominantly based on performance in the Leaving Certificate (terminal upper secondary) examination, with applicants awarded 'points' for each grade achieved in the examination. Because the Irish system operates on the basis of *numerus clausus*, applicants for specific places are ranked in terms of points with the highest ranking applicants offered a college place (see McCoy and Smyth 2011 and www.cao.ie for further details on the nature of the system). The points required for higher education entry vary between fields of study and institutions, as well as over

time. As a result, the higher education sectors differ somewhat in their student intake. Universities and CEs (also referred to as 'first tier' institutions) in offering more traditionally academic, degree level courses, typically attract students performing more highly in the Leaving Certificate. ITs ('second tier' institutions), in contrast, in providing a wider diversity of courses at degree and sub-degree level, cater for greater numbers of young people from disadvantaged backgrounds (McCoy and Smyth 2011; Byrne 2009). Further, participants in different institutional sectors face different employment prospects with greater employment chances and employment quality in the former 'first tier' colleges, in line with international research (Arum et al. 2007; McGuinness et al. 2008).

Students may receive state financial support to assist them in meeting the costs of college and exempt them from the student registration charge.[3] The proportion of full-time students requiring higher education grant (financial) support increased from 37% in 2008 to 51% in 2013. On average 46% of higher education students are in receipt of a state student aid (HEA 2015). Eligibility is determined on the basis of family and/or personal income, with differential rates operating for students living at the parental home and those living independently. Such student aid typically meets between one-quarter and one-third of the average monthly expenditure of students attending college (McCoy et al. 2010b).

5.3 Data, Methodology and Analytic Strategy

This chapter draws on individual-level data compiled by the HEA and gathered from all publicly funded HEIs in Ireland (which constitutes the vast majority of higher education provision in Ireland). The data was collected through a survey of the student body during the registration process in 2007[4] and allows an analysis of student progression across all institutions, from the 2007/08 to the 2008/09 academic years.[5] The analysis is focused on progression from first to second year of study among full-time new entrants to higher education (just under 34,000 students). International research points to the importance of this transition in the longer-term educational outcomes of young people and repeatedly highlights the fact

that dropout rates peak at this first hurdle, with withdrawal risks declining steadily as students progress through their courses (OECD 2008; Lassibille and Gomez 2008). Porter (1990) in the US context found that over half of student attrition occurs in the first year, while Smith and Naylor (2001) find a similar result in the UK. Such dropout may reflect a range of reasons, including a mismatch of student interest/aptitude and course choice, the experience of difficulties in the transition to higher education or examination failure. The outcome variable in all analysis is a binary measure of whether the individual did not progress to the second year of their course. Non-progression is defined as those who are not recorded on 1 March 2009 in their institution of study in 2007/08. The analysis presented here is restricted based on this definition. Furthermore, students who repeated a year or who changed course or programme type within their institution are identifiable and are grouped with those deemed to be still present.

As well as presenting raw (unadjusted) differences in progression chances across institutions, this chapter is particularly focused on an examination of the net effect of institutions controlling for the differences in student intake across sectors and institutions. As noted, universities and CEs typically attract higher performing students, while ITs cater for greater numbers of young people from disadvantaged backgrounds (McCoy and Smyth 2011). By taking account of the gender, social class background and prior educational attainment of the students entering different colleges, this analysis provides a value-added picture of institutional variation in non-progression rates, thereby allowing a like-for-like comparison of higher education sectors and institutions. The chapter is focused on two core research questions:

1. What student characteristics influence student progression within higher education?
2. Taking account of individual student characteristics, does the average chance of progression vary between HEIs?

As detailed in Table 5.1, the student background characteristics include gender, age and a number of socio-demographic measures. Parental social class (father/mother) is included in the data, based on

Table 5.1 Summary of variables used in analysis

	% did not progress
Overall	**14.9**
Gender	
Male	17.0
Female	13.1
Age	
18 or under	14.5
19–22	15.5
23+	14.7
Parental social class	
Professional	10.9
Managerial/Technical	15.1
Non-manual	17.2
Skilled Manual	19.8
Semi-skilled Manual	17.3
Unskilled Manual	20.3
Unknown	13.7
Prior educational attainment	
250 points or less	38.1
255–300	25.6
305–350	19.2
355–400	13.8
405–450	8.6
455–500	6.0
500+	3.3
Financial aid	
Yes	16.4
No	14.2
Field of study	
Education	4.4
Social Science, Business, Law, Arts & Humanities	14.7
Science, Agriculture and Veterinary	13.9
Computer Science	27.1
Engineering	19.4
Construction-related	20.5
Healthcare	9.4
Services	27.6
Combined and Other Disciplines	11.6

(*continued*)

Table 5.1 (continued)

	% did not progress
NQAI level	
Level 6	26.2
Level 7	26.4
Level 8	10.5
Sector	
University	9.3
IT	23.5
Other Colleges	3.1

Source: Analysis of HEA data

the UK SOC classification. From these measures we derive a household social class variable, and distinguish those from the professional and managerial classes relative to all other social class groups. A measure of previous academic attainment was based on performance in the Leaving Certificate, which as noted in Sect. 5.2 serves a central role in determining higher education entry given the *numerus clausus* system operating. Where the applicant had sat the Leaving Certificate examination on more than one occasion, the entrant's most recent Leaving Certificate examination results comprising six or more subjects was selected as this is most likely to reflect entrants' strongest academic achievement. The results are converted into CAO 'points' based on the six highest performing subjects, with points ranging from 45 to 100 for subjects taken at 'higher level' and 5 to 60 for subjects taken at 'ordinary level'. Finally, the analysis includes a binary variable indicating whether students are in receipt of state financial assistance available in Ireland, which was the case for approximately 37% of students in 2008.[6]

In addition, two main course characteristics are examined. The first is field of study, based on the ISCED 2-digit classification. Secondly, course level is included distinguishing sub-degree courses ('Higher Certificate' and 'Ordinary Degree') from bachelor degree courses ('Honours Degree'). Unfortunately, the data does not include more subjective information such as motivation for enrolling in college, financial well-being, participation in part-time employment, academic engagement, views on teaching staff, attendance and participation in non-

academic social and cultural activities, all of which may be expected to play a role in successful transitions to, and retention in, higher education (McCoy et al. 2014).

The analysis is based on binary logit multivariate models estimated in STATA. Analysis of missing data across variables revealed that listwise deletion of missing data would have resulted in a considerable reduction in the sample size. To avoid this problem, the models include additional terms for missing cases, allowing a direct test of the progression probabilities of the groups with missing data on explanatory variables. This allows an examination of the extent to which variables have non-random missing data.

Results are presented in the form of odds ratios; values above 1.0 identify predictors that increase the risk of non-progression while those below 1.0 reduce the risk. In each of the figures statistically significant results ($p < 0.05$) are presented for the final model. All models assess the likelihood that an individual with certain characteristics does not progress from first to second year study between 2007/08 and 2008/09, relative to the reference group.

5.4 Results

5.4.1 Introduction

The results are presented in two main sections: Sect. 5.4.2 examines variation in non-progression across the three main sectors: university, IT and other colleges (predominantly CEs), focusing on the role of composition (gender, age, social background, Leaving Certificate performance, grant receipt) and course type (field of study and course level) in non-progression rates in the three higher education sectors. This model is largely to illustrate the methodology adopted and the importance of taking account of student intake and course provision in measuring institutional effectiveness. Section 5.4.3 then examines variation in non-progression across all individual HEIs, presenting raw results and results adjusted for differences in student intake and course provision.

5.4.2 Characteristics of Students Who Do Not Progress

Individual Characteristics

The first set of analysis, presented in Table 5.2, focuses on the chance of a student not progressing, with cumulative models taking into account:

1. Gender, age and social class (Model 1)
2. Leaving Certificate performance and student aid receipt (Model 2)
3. Higher education sector (Model 3)
4. Field of study and course level (Model 4)

The results show that, overall, males are less likely to progress from first to second year and are almost 1.4 times more likely to be in the non-progression group than females. However, this gender differential predominantly reflects lower levels of (upper secondary) Leaving Certificate performance among male higher education entrants. When Leaving Certificate performance is taken into account, males are just 1.1 times more likely to be in the non-progression group. The gender difference is no longer significant when field of study and course level are controlled for, indicating that *ceteris paribus*, in terms of 'ability' and type of course taken, males are no less likely to progress than their female counterparts. This is consistent with the findings of McGuinness et al. (2012). Considering the age of students, mature students who are at least 23 years of age in the first year of their studies are significantly less likely to not progress than younger students.

Institutions varied considerably in the completeness of the data collected on the social class background of students. Using the information available (which is broadly representative of the population of new entrants) and including individuals where social class information is not provided in a separate category, strong social class differentiation in progression rates is evident. Students from manual and non-manual backgrounds are significantly less likely to progress than those from professional/managerial backgrounds. For the most part, social class differences in progression are largely mediated by Leaving Certificate

Table 5.2 Logit regression model of the factors associated with non-progression into second year

	Model (1)	Model (2)	Model (3)	Model (4)
Male	1.366***	1.139***	1.097**	0.958
	(9.19)	(3.68)	(2.59)	(−1.08)
Age 19–22	1.089*	0.983	0.989	1.007
	(2.35)	(−0.45)	(−0.27)	(0.19)
Age 23+	1.066	0.759***	0.795**	0.863*
	(1.19)	(−3.92)	(−3.23)	(−2.04)
Manual and Non-manual Groups	1.383***	1.036	1.022	1.022
	(7.18)	(0.73)	(0.45)	(0.45)
Social Class Unknown	0.982	0.999	1.041	1.054
	(−0.44)	(−0.02)	(0.91)	(1.16)
Ref:				
150 points or less		2.960***	2.644***	2.483***
		(8.27)	(7.37)	(6.79)
155–200		2.918***	2.614***	2.403***
		(11.59)	(10.32)	(9.17)
205–250		2.487***	2.221***	2.034***
		(12.79)	(11.07)	(9.49)
255–300		1.460***	1.315***	1.254***
		(5.79)	(4.14)	(3.34)
355–400		0.673***	0.765***	0.760***
		(−6.39)	(−4.21)	(−4.30)
405–450		0.396***	0.496***	0.488***
		(−12.80)	(−9.28)	(−9.48)
455–500		0.268***	0.360***	0.357***
		(−15.27)	(−11.30)	(−11.32)
505–550		0.145***	0.195***	0.196***
		(−14.71)	(−12.14)	(−12.06)
555–600		0.142***	0.188***	0.207***
		(−10.82)	(−9.16)	(−8.61)
LC Points Unknown		0.905	0.936	0.902
		(−1.46)	(−0.96)	(−1.48)
In Receipt of Grant		0.878***	0.838***	0.827***
		(−3.37)	(−4.52)	(−4.85)
Institute of Technology			1.542***	1.461***
			(9.52)	(6.38)
Other Higher Education			0.367***	0.418***
			(−4.94)	(−4.08)
Education				0.699
				(−1.95)
Science, Agriculture and Veterinary				1.161*
				(2.40)

(*continued*)

Table 5.2 (continued)

	Model (1)	Model (2)	Model (3)	Model (4)
Computer Science				1.480***
				(5.51)
Engineering				1.066
				(0.88)
Construction and Related				1.083
				(1.15)
Healthcare				0.655***
				(−6.68)
Services				1.164
				(1.80)
Combined and Related				1.129
				(1.70)
NQAI Level 6				1.065
				(0.90)
NQAI Level 7				1.128*
				(2.03)
N	27,644	27,644	27,644	27,644

Notes: Results are presented as odds ratios. The reference categories are: Female; Age 18 or younger; Professional/Managerial; 305–350 points; No grant; University; Social Science, Law and Arts; NQAI Level 8. *t* statistics in parentheses.
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$
Source: Analysis of HEA data

performance—there are no longer significant social class differences in progression once Leaving Certificate performance is included (Model 2). While not shown here, the skilled manual group is the only exception—this group displays significantly lower progression rates than the semi-skilled manual group. This may bear some relationship to the low (and declining) levels of student aid eligibility among this group (McCoy et al. 2010b) and the fact that this group are often on the margins of the student aid eligibility income thresholds (McCoy et al. 2010a).

This finding is reinforced by results showing significantly lower levels of non-progression among student aid recipients, a finding which remains even after taking account of the type of course taken and institutional sector. This indicates that financial support plays an important role in student retention—perhaps due to greater financial security, reduced reliance on (often difficult to secure) part-time work or simply students ensuring that they fulfil the requirements of their courses to retain student aid eligibility (since students who fail their exams and are required to repeat the year lose their eligibility for student aid). Internationally,

research shows that financial support plays an important role in reducing dropout—see, for example, Lassibille and Gomez (2008) in the Spanish context and Dynarski (1999) and Bettinger (2004) in the US context. In the UK, Yorke (1998, p. 59) concluded "scholarships and grants tend to have the greatest beneficial effects on [college] persistence". Additional analysis (not shown here) examined the extent to which the impact of student aid receipt varied across 'ability' groups: results showed that the impact of student aid receipt on progression chances was even greater for students with higher Maths performance levels.

As shown in Fig. 5.1, Leaving Certificate performance also plays a central role in student progression—the relationship is linear with rising points predicting lower non-progression, a finding which holds when taking account of field of study and course level. For each additional rise of 50 points, non-progression odds fall steadily: for example, relative to those securing 305–350 points, students who achieved 255–300 points are 1.2 times more likely to drop out, while those with 205–250 points are twice as likely to not progress to second year (Model 4). It is interesting to note that Leaving Certificate performance plays an equally important role in student retention in both the university and IT sectors,

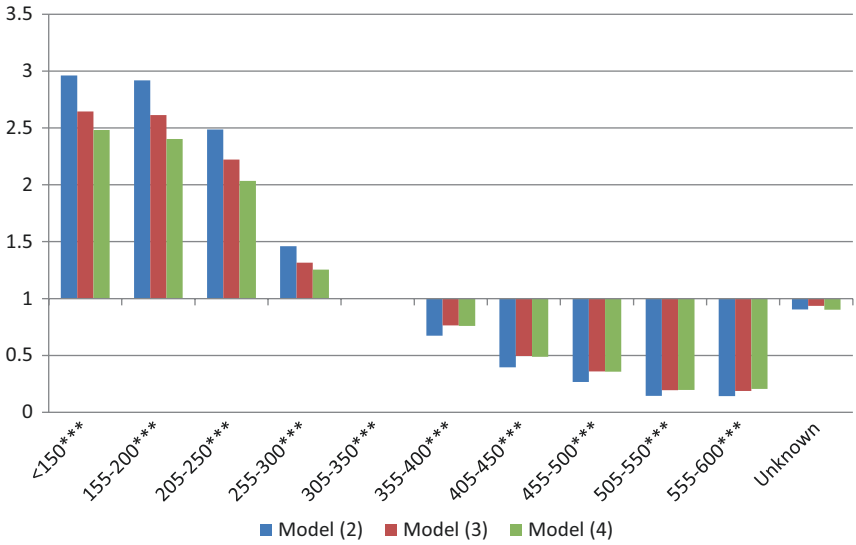

Fig. 5.1 Overall non-progression odds by leaving certificate points. *Source*: Analysis of HEA data

signalling the importance of student 'ability' in meeting the academic demands of higher education. The results also highlight the importance of academic preparedness prior to entry and adequate learning supports on entry to higher education. In the Spanish context, Lassibille and Gomez (2008), with similar results, argue that reducing the entry standards to satisfy the demand for higher education from an increasing pool of secondary-school leavers who are not necessarily equipped with the basic skills needed to succeed in higher education would have adverse effects. They argue that tighter selection at the point of entry to higher education might be needed. In the Irish context, given the *numerus clausus* system in operation, the academic requirements for entry reflect variation in student demand for courses and result in considerable variation between fields of study and institutions (and over time) in the academic 'standard' of higher education entrants. This makes it more difficult to impose higher education entry standards.

Additional models presented in Table 5.3 examine progression patterns according to Irish, English and Maths performance in the Leaving Certificate,[7] rather than overall points achieved. The overall non-progression odds based on performance in these three core subjects are displayed in Fig. 5.2. In all three subjects, students with lower performance are more likely to not progress, while those with higher performance levels are significantly more likely to progress. It is interesting to note that the influence of Maths performance is greater than performance in English, while Irish performance is least likely to influence non-progression in higher education. Students with lower points in Maths are 1.7 times more likely to not progress to second year than are students with medium points (Table 5.3, Model 4). These findings indicate that students with low levels of performance in Leaving Certificate Maths struggle to meet the academic standards of college. However, additional analysis (not shown) examined to extent to which English and Maths performance was equally important in progression across all fields of study. The results point to Maths being significantly more important in student success in computer science, engineering and construction. Recent research in the University of Limerick (Treacy and Faulkner 2015) found that even controlling for student performance in secondary level Maths, the Maths skills of beginning undergraduates (in science and technology-based courses) was significantly below the performance of undergraduates ten years previously.

Table 5.3 Logit regression model of the factors associated with non-progression into second year: Irish, English and Maths attainment

	Model (1)	Model (2)	Model (3)	Model (4)
Male	1.366***	1.183***	1.129***	0.976
	(9.19)	(4.68)	(3.34)	(−0.61)
Age 19–22	1.089*	0.988	0.991	1.009
	(2.35)	(−0.32)	(−0.24)	(0.23)
Age 23+	1.066	0.812**	0.840*	0.906
	(1.19)	(−2.95)	(−2.43)	(−1.36)
Manual and	1.383***	1.110*	1.075	1.068
Non-manual	(7.18)	(2.17)	(1.50)	(1.35)
Social Class	0.982	0.982	1.051	1.058
Unknown	(−0.44)	(−0.42)	(1.13)	(1.26)
Irish Low Attainment		1.232***	1.141*	1.109*
		(4.02)	(2.52)	(1.96)
Irish High		0.791***	0.899	0.896
Attainment		(−3.84)	(−1.72)	(−1.78)
Irish Attainment		1.193*	1.154*	1.107
Unknown		(2.55)	(2.05)	(1.45)
English Low		1.408***	1.234***	1.164**
Attainment		(6.85)	(4.14)	(2.93)
English High		0.740***	0.863**	0.871*
Attainment		(−5.71)	(−2.71)	(−2.53)
English Attainment		0.770*	0.748*	0.740**
Unknown		(−2.32)	(−2.54)	(−2.58)
Maths Low		1.927***	1.764***	1.749***
Attainment		(14.37)	(12.29)	(11.95)
Maths High		0.503***	0.555***	0.549***
Attainment		(−10.34)	(−8.75)	(−8.80)
Maths Attainment		1.548***	1.543***	1.552***
Unknown		(4.11)	(4.02)	(3.99)
In Receipt of Grant		0.921*	0.851***	0.836***
		(−2.16)	(−4.15)	(−4.58)
Institute of			1.879***	1.640***
Technology			(14.46)	(8.42)
Other Higher			0.329***	0.387***
Education			(−5.47)	(−4.40)
Education				0.665*
				(−2.21)
Science, Agriculture				1.201**
& Veterinary				(2.96)
Computer Science				1.598***
				(6.58)
Engineering				1.111
				(1.44)

(*continued*)

Table 5.3 (continued)

	Model (1)	Model (2)	Model (3)	Model (4)
Construction and Related				1.035 (0.49)
Healthcare				0.644*** (−6.99)
Services				1.207* (2.25)
Combined and Related				1.141 (1.85)
NQAI Level 6				1.217** (2.91)
NQAI Level 7				1.262*** (4.03)
N	27,644	27,644	27,644	27,644

Notes: Results are presented as odds ratios. The reference categories are: Female; Age 18 or younger; Professional/Managerial; Irish moderate attainment; English moderate attainment; Maths moderate attainment; No grant; University; Social Science, Law and Arts; NQAI Level 8. *t* statistics in parentheses. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Source: Analysis of HEA data

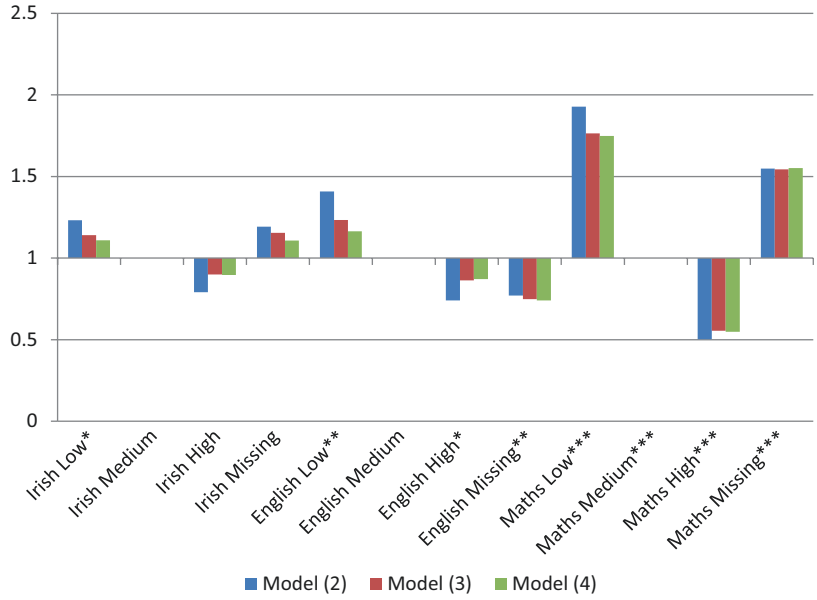

Fig. 5.2 Non-progression odds by leaving certificate performance in English, Irish and Maths. *Source*: Analysis of HEA data

Course and Institution

A noteworthy feature of the results is that students in computer science experience a relative risk of dropout that is 1.6 times higher than their counterparts in social science, arts and law (Fig. 5.3). Students in healthcare courses have significantly lower non-progression rates, all else being equal. Other work shows important variation in course intensity across the fields of study (McCoy et al. 2010b), which may explain variation in non-progression, while class size also varies considerably across the fields of study. It may also be the case that the factors behind non-completion vary across fields of study—in their research on students in ITs, Eivers et al. (2002) found that course difficulty was much more frequently cited as a reason for wanting to leave the course among electronics and computing students.

Taking account of student intake, progression rates vary considerably across the three main sectors, universities, ITs and other colleges.[8]

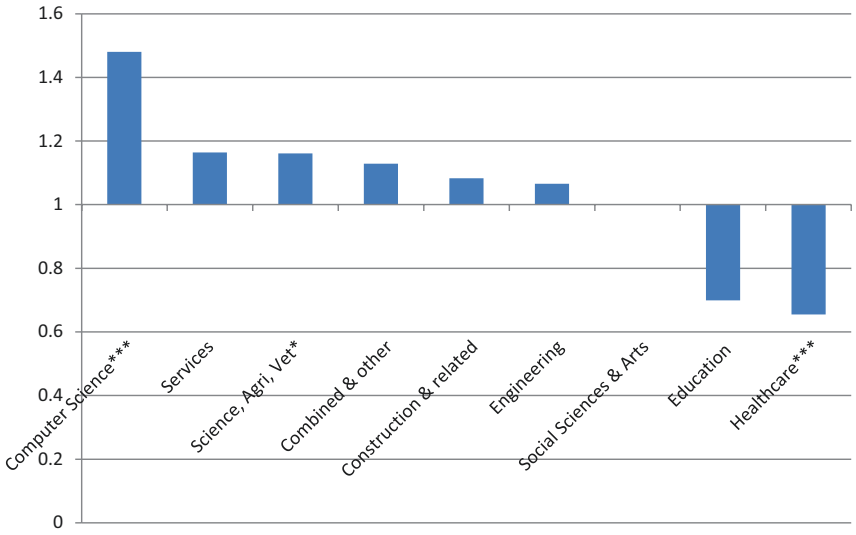

Fig. 5.3 Non-progression odds by field of study. *Note*: Models control for social background and Leaving Certificate performance. *Source*: Analysis of HEA data

As displayed in Table 5.2, students attending ITs are significantly more likely to not progress relative to their counterparts in the university sector, while students attending other colleges (predominantly teacher training colleges and National College of Art and Design [NCAD]) are substantially more likely to successfully progress. Students attending ITs are 1.5 times more likely to not progress than students attending a university, *ceteris paribus* (i.e. taking account of student characteristics such as social class and Leaving Certificate performance). This differential falls slightly when taking account of field of study and course level (Table 5.2, Model 4). To some extent sectoral differences reflect variations in the course level taken; additional analysis examining course-level effects on non-progression showed much higher levels of non-progression among Level 7 course participants, compared to students taking Level 8 Honours Degrees (traditionally referred to as bachelor degrees). These differences are largely captured by variation across sectors, since universities and CEs offer almost exclusively honours degree courses, while ITs offer courses at all three levels.

5.4.3 Non-Progression Across All Institutions

Further analysis was undertaken but this time including dummies for each of the HEIs—see Table 5.4. Overall, the results of the binary logit analysis reveals large differences in average unadjusted chances of non-progression, with many of the ITs displaying significantly higher non-progression risks relative to the reference group, NCAD (Fig. 5.4). However, when individual student characteristics are taken into account (particularly Leaving Certificate performance), variation across the HEIs declines significantly, pointing to the importance of taking a value-added approach in measuring institutional effectiveness in student retention. When all adjustments for student intake are included (Table 5.4, Model 4), all ITs display significantly lower non-progression odds than those observed in the unadjusted Model 1, while each of the universities display significantly higher non-progression odds than those observed in the unadjusted Model 1.

Table 5.4 Logit regression model of the factors associated with non-progression into second year: institutional analysis

	Model (1)	Model (2)	Model (3)	Model (4)
Athlone IT	5.581***	5.555***	3.544**	3.696**
	(4.34)	(4.33)	(3.17)	(3.24)
Blanchardstown IT	6.617***	6.601***	4.149***	3.716**
	(4.64)	(4.63)	(3.46)	(3.18)
UCC	2.096	2.092	2.985**	2.877**
	(1.89)	(1.88)	(2.77)	(2.67)
Carlow IT	6.632***	6.474***	4.626***	4.461***
	(4.81)	(4.74)	(3.86)	(3.74)
DCU	2.774**	2.772**	3.348**	3.594**
	(2.59)	(2.58)	(3.04)	(3.21)
Dundalk IT	6.568***	6.419***	4.059***	4.014***
	(4.80)	(4.73)	(3.53)	(3.49)
Dun Laoghaire	3.957***	3.852***	2.973**	2.810*
	(3.37)	(3.30)	(2.65)	(2.51)
UCD	2.053	2.048	2.836**	2.923**
	(1.84)	(1.83)	(2.64)	(2.72)
Galway-Mayo	8.273***	8.041***	5.701***	5.197***
	(5.41)	(5.33)	(4.42)	(4.15)
NUIG	2.114	2.084	2.582*	2.373*
	(1.91)	(1.87)	(2.40)	(2.17)
Limerick IT	6.405***	6.097***	4.474***	4.298***
	(4.71)	(4.58)	(3.76)	(3.64)
Letterkenny IT	6.113***	6.051***	3.902***	3.584**
	(4.57)	(4.54)	(3.40)	(3.16)
Mater Dei	0.793	0.804	0.914	1.336
	(−0.33)	(−0.31)	(−0.13)	(0.40)
NUIM	2.431*	2.440*	2.730*	2.605*
	(2.25)	(2.25)	(2.52)	(2.40)
St Pats	0.573	0.593	1.114	1.417
	(−1.20)	(−1.13)	(0.23)	(0.73)
Sligo IT	6.332***	6.214***	4.058***	3.827***
	(4.68)	(4.63)	(3.52)	(3.34)
Tallaght IT	8.645***	8.270***	4.621***	4.372***
	(5.44)	(5.32)	(3.82)	(3.66)
Tralee IT	4.616***	4.608***	3.299**	3.118**
	(3.79)	(3.78)	(2.93)	(2.77)
TCD	1.907	1.905	3.049**	3.402**
	(1.64)	(1.64)	(2.81)	(3.07)
Waterford IT	6.131***	6.051***	4.844***	4.961***
	(4.64)	(4.60)	(4.00)	(4.05)
Male		1.154***	1.087*	0.954
		(4.08)	(2.33)	(−1.18)

(*continued*)

Table 5.4 (continued)

	Model (1)	Model (2)	Model (3)	Model (4)
Age 19–22		1.052	0.987	1.005
		(1.36)	(−0.34)	(0.12)
Age 23+		0.893*	0.789***	0.871
		(−2.00)	(−3.30)	(−1.89)
Manual and Non-manual		1.098*	1.024	1.025
		(1.99)	(0.47)	(0.51)
Social Class Unknown		1.069	1.022	1.027
		(1.39)	(0.44)	(0.54)
150 points or less			2.710***	2.539***
			(7.49)	(6.91)
155–200			2.666***	2.453***
			(10.42)	(9.31)
205–250			2.239***	2.051***
			(11.06)	(9.52)
255–300			1.336***	1.269***
			(4.35)	(3.50)
355–400			0.767***	0.762***
			(−4.17)	(−4.23)
405–450			0.493***	0.482***
			(−9.33)	(−9.58)
455–500			0.354***	0.346***
			(−11.36)	(−11.51)
505–550			0.192***	0.189***
			(−12.15)	(−12.20)
550–600			0.184***	0.197***
			(−9.19)	(−8.78)
Points Unknown			0.938	0.890
			(−0.91)	(−1.65)
In Receipt of a Grant			0.849***	0.844***
			(−4.13)	(−4.25)
Education				0.600**
				(−2.66)
Science, Agriculture & Veterinary				1.152*
				(2.26)
Computer Science				1.475***
				(5.41)
Engineering				1.056
				(0.74)
Construction and related				1.059
				(0.79)
Healthcare				0.628***
				(−7.11)

(*continued*)

Table 5.4 (continued)

	Model (1)	Model (2)	Model (3)	Model (4)
Services				1.144
				(1.55)
Combined & Related				1.198*
				(2.29)
NQAI Level 6				1.086
				(1.13)
NQAI Level 7				1.101
				(1.52)
N	27,644	27,644	27,644	27,644

Notes: Results are presented as odds ratios. The reference categories are: NCAD; Female; Age 18 or younger; Professional/Managerial; 305–350 points; No grant; Social Science, Law and Arts; NQAI Level 8. *t* statistics in parentheses. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$
Source: Analysis of HEA data

It is clear that, *ceteris paribus*, retention rates are significantly higher in the CEs (and NCAD), perhaps reflecting selection processes operating in these institutions, the more specialised nature of the courses in these institutions (with students enrolling on a course with a clear career orientation, as opposed to a more 'general' course with no specific career direction) and the labour market opportunities for students successfully completing courses in these colleges.

5.5 Discussion

This chapter has highlighted the complexities around assessing and evaluating HEIs, in this case on the basis of progression rates. Overall, it is clear that wide overall differences across institutions to a large extent reflect differences in the types of students enrolling in different colleges. This provides *some* support for an argument that colleges cannot be held solely accountable for retention and graduation rates. This message is echoed in international research with Titus (2006, p. 693), for example, arguing that "holding institutions accountable for their 'unadjusted' persistence rate is inappropriate, given that such a rate is influenced by a complex set of variables largely at the student level". It is clear that a focus on raw or absolute levels of progression/completion across institutions carries the danger of

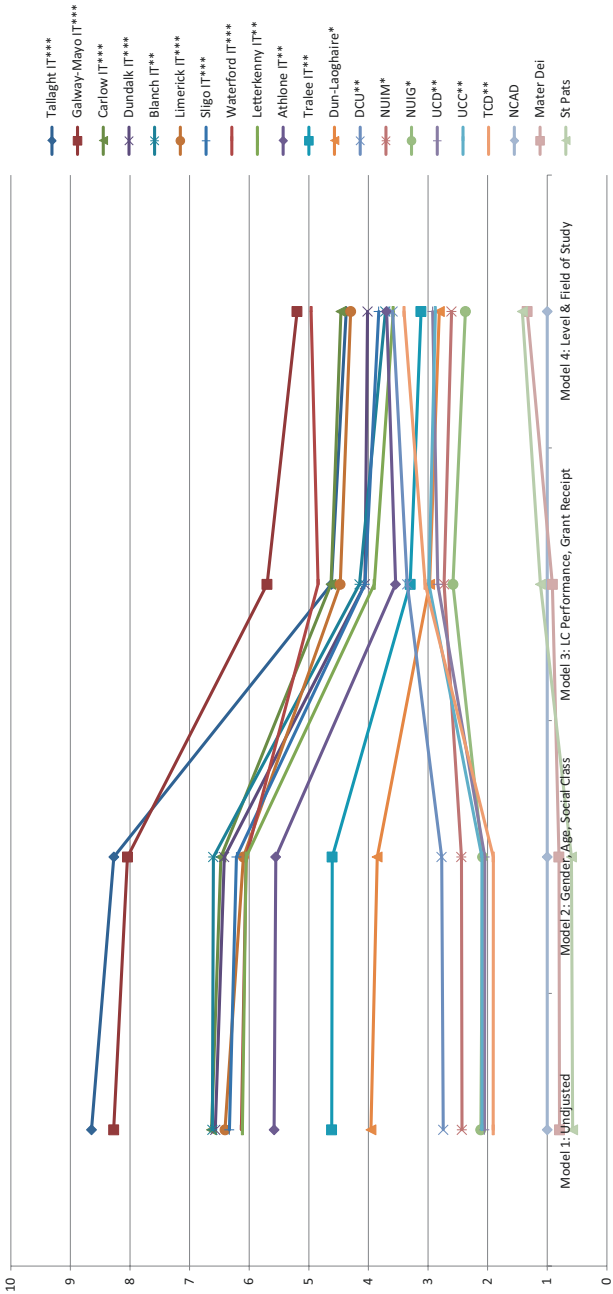

Fig. 5.4 Non-progression odds across institutions. *Note*: Figure contains unadjusted odds and odds controlling for additional individual characteristics. *Source*: Analysis of HEA data

rewarding institutions with more selective student intakes. As Astin (1997, p. 656) argues in relation to a focus on absolute levels of performance, "the most dangerous aspect of such an approach to accountability is that it provides negative incentives for institutions to enrol underprepared students, since such students tend to lower the institution's *absolute* level of outcome performance". The results also highlight that performance-based funding mechanisms require careful design, to avoid unintended consequences or perverse incentives. In the Netherlands, between 1993 and 2011, 50% of the teaching funds were distributed according to the number of graduates per institution. This incentivised institutions to implement measures to reduce the average duration of study. Not unrelated, some countries, including Ireland, also include performance-related incentives in the student financial support schemes to encourage students to spend more time on their study and thus to achieve sufficient progress. Examples include imposing a limited period for grant eligibility (as applies in Ireland), providing scholarships to high achieving students, or rewarding completion, for example, by turning loans into grants.

The sectoral differences in progression warrant considerable research and policy attention. Rapid expansion in the numbers enrolled in the ITs has played an important role in greater numbers of disadvantaged students and students with lower levels of Leaving Certificate attainment accessing higher education (see McCoy and Smyth 2011 for a fuller discussion). Given strong differentiation in progression according to Leaving Certificate performance, the question can be asked: are significant numbers of students in the ITs struggling to meet the academic demands of their courses? Is it the case, as Smith and Naylor (2001) and Cave et al. (1997) maintain, that indicators of non-completion can potentially conflict both with policies of widening access to higher education and with the maintenance of academic quality?

However, it is also clear that some colleges with a more disadvantaged intake fare better than others, perhaps pointing to the role of academic supports, teaching and learning approaches and broader student engagement in college life in promoting student success. To date, a number of studies in the Irish context have shed some light on this. McCoy et al. (2014) highlighted the importance of both academic and social supports for student engagement and retention. Byrne et al. (2013) in their evaluation of the HEAR and DARE supplementary admission routes to higher educa-

tion found that HEAR/DARE applicants (including those who entered on reduced points) had on average the same probability of progressing to second year as all other higher education students, controlling for a range of factors including Leaving Certificate attainment. The research indicates that when under-represented students are supported academically and socially, these groups emerge as having the same probability of progressing as all other students (as opposed to a lower probability). In the US context, Webber and Ehrenberg (2010) found that expenditure on student services (academic and social supports) influences graduation and persistence rates, and the effects of such expenditure are greater for students at institutions with lower entrance test scores and higher grant expenditure per student. Gansemer-Topf and Schuh (2006) similarly found that institutional expenditures, particularly those directly supporting students' academic integration, were found to contribute significantly to retention rates across US HEIs. Chen (2012) reported a similar result with students who attended institutions with a higher level of expenditure on student services tending to have lower risks of dropping out.

The issue of decision-making processes and guidance supports for students in second-level education has received much attention in recent times and the Leaving School in Ireland study[9] further highlights the implications of poor decision-making for student achievement and progression in higher education (McCoy et al. 2014). This study, and earlier work (McCoy and Smyth 2011), noted that even prior to the recent changes in guidance allocation, not all students in all school contexts receive the supports that will allow them to make informed choices. Similarly, the UK Department for Business, Innovation and Skills (2014) highlighted the centrality of career guidance and advice prior to applying to university in student dropout, noting that students from less well-off families often do not have the sources of support and advice (e.g. from family, career professionals) available to students from better-off families. Recent proposals to reduce the number of specialist courses within higher education (Department of Education and Skills 2015) should have positive effects in this regard, with less necessity for young people to choose from a wide plethora of courses in the same overall field of study.

Given the current debates around funding higher education and the potential introduction of student fees and income-contingent loans, it

is interesting that financial support emerges as important in this study. Earlier research highlighted the role of financial aid in college access, and increasing participation in higher education among those from disadvantaged groups, across a range of contexts—US (Dynarski 1999), Denmark (Nielson et al. 2010) and UK (Dearden et al. 2014). It is interesting to find, *ceteris paribus*, that student aid also matters for college retention with recipients displaying greater progression rates than those not in receipt of such support, suggesting the importance of this support for the financial well-being of students and their reduced reliance on part-time work (particularly more intensive work which is likely to impact on academic time) (see McCoy et al. 2010b; Heublein 2014 in the German context). Further, given the stipulation that student aid recipients pass their exams to retain student aid eligibility, this may also be playing a role in timely student progression. In the German context, Glocker (2011) also found that student aid recipients (financial support to students from low income families) finish college faster than comparable students who are supported by the same amount of parental/private transfers only. His results also showed that increasing student aid also reduces the risk of dropout, suggesting that student aid enhances the study time of students and reduces time on paid employment. Chen (2012) similarly found a negative relationship between the amount of financial aid received and dropout.

Prior academic performance emerges as a strong predictor of successful transition, in line with earlier work examining the relationship between Leaving Certificate results and degree results in four HEIs (Fitzgerald 2006). Similar findings emerge in the US context, with Adelman (1999) finding that high school academic achievements such as grades and test scores provide the best indicators of success later in college. Similarly in the UK, Yorke (1999) found that capabilities at the start of a course of study had an effect on early dropout. However, Byrne et al. (2013) highlighted the importance of access to academic and social supports for student engagement and retention among under-represented groups. It is interesting that we find that Leaving Certificate Maths performance is an important predictor of higher education progression, suggesting that students with poor Maths skills, in particular, struggle to meet the academic demands of higher education. While research internationally has highlighted the importance of mathematical ability for persistence

and success in STEM-related courses (see, e.g., Kokkelenberg and Sinha 2010; Treacy and Faulkner 2015 in the Ireland context), the relevance of mathematical skills for other fields of study is less clear.

Finally, it is important to note that student non-progression should not be considered a negative phenomenon for all students. In some cases, non-progression may signal an inability to meet the academic requirements of the course and transferring to an alternative course may be the optimum outcome. Similarly, withdrawal may signal a lack of interest in the course content and transfer to an alternative course in which the student is more intrinsically motivated may be a positive step. This suggests that greater flexibility to transfer between institutions and programmes may play a positive role in enhancing retention for such individuals. In some Scandinavian countries, for example, credit transfers are widely accepted, which means that students can start one degree and then switch to another (European Commission 2015). Credit transfer is not generally available in Ireland, an issue that perhaps warrants greater policy attention.

Notes

1. Studies vary widely in how these key issues are defined with some, for example, focusing on long-term dropout, in the process distinguishing short-term 'stopouts', while other studies define dropout as non-progression of any type. Similarly, some studies distinguish academic failure from non-enrolment.
2. 'Ireland' is used to refer to the Republic of Ireland throughout this chapter.
3. While students in Ireland do not currently pay tuition fees, they are liable for the 'student contribution', which currently stands at €3000 per year. The charge to students in 2007/08 was €825 and €900 in 2008/09 (Mooney et al. 2010).
4. In this analysis four HEIs were not included due to missing data on household social class and/or Leaving Certificate performance. These are Cork Institute of Technology, Dublin Institute of Technology, University of Limerick and Mary Immaculate College.

5. A number of studies of higher education non-completion have been undertaken in Ireland: Healy et al. (1999) examined enrolment in three ITs; Morgan et al. (2001) focused on non-completion in universities; Eivers et al. (2002) examined completion in ITs; Kinsella et al. (2006) examined completion rates in ITs; and Byrne et al. (2013) examined the influence of alternative pathways to higher education (HEAR, DARE) on progression. The HEA have also published four reports, in a series on progression, the most recent in 2016 (Liston et al. 2016).
6. Higher education student aid includes the VEC Scholarship Scheme, Third Level Maintenance Student Aid and other Student Aid.
7. Owing to variation in student performance across the three subjects, to ensure roughly one-third of students fall into each category the criteria for 'low', 'medium' and 'high' performance differed as follows: for Irish 'low' performance is less than or equal to 35 points, and 'high' performance is at least 65 points; for English 'low' performance is less than or equal to 45 points and 'high' performance is at least 75 points; while for Maths 'low' performance is less than or equal to 30 points and 'high' performance is at least 60 points.
8. The unadjusted results show wide differences in progression rates across the three sectors, with just 2% of honours degree students for example not progressing in CEs, compared to 5% in universities and 9% in ITs.
9. Quantitative studies are limited in providing insight into the causal mechanisms leading to non-progression. The Leaving School in Ireland study was a mixed method study which drew on both quantitative and qualitative evidence to explore the mechanisms and processes shaping young people's post-school decision-making and pathways (McCoy et al. 2014).

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6

Access Programmes and Higher Education Outcomes

Patricia McMullin

6.1 Introduction

There is a well-established socioeconomic gradient in educational attainment in Ireland despite much effort in recent decades to address this inequality. One initiative in this context has been the introduction of access programmes (APs), which aim to encourage young adults from socioeconomic groups that are under-represented in higher education, mature adults, persons with disabilities and ethnic minorities, to go to university. Today all Irish universities run APs designed to address inequalities in access. While they are becoming increasingly diverse in their approach to tackling barriers to progression, many programmes internationally have focussed mainly on financial supports. Thus, much of the economics literature evaluating these programmes has tended to concentrate on the effectiveness of such financial aid.

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This chapter considers an evaluation[1] of the 'New ERA' AP at University College Dublin (UCD), Ireland's largest university with 22% of all university students. The programme targeted disadvantaged socioeconomic groups by tackling three main barriers to participation in higher education, namely financial, academic and social (Lynch and O'Riordan 1996; O'Reilly 2008). It did so by providing support for eligible students at both pre-entry level in designated disadvantaged schools linked to the university and post-entry level through financial, social and academic aid, in order to improve retention. It was recognised that in order to affect initial participation, second-level students needed to be supported in completing the Leaving Certificate (LC) and encouraged to access higher education. Preferential entry to university was given to some students (i.e. some AP students enter university with grades that are lower than the regular minimum grades necessary to be offered a place at university), initially based on the number of places made available to the programme by individual college departments.[2] In tackling the institutional barriers to participation, the AP also acted as a mediator between the students and the university. The New ERA programme took a multidimensional approach to access and, as such, the evaluation of the programme fills a gap in the literature regarding the role of these programmes in supporting students across several dimensions of disadvantage.

The chapter is structured as follows: it starts with an overview of why APs are important, followed by a review of the history of APs in Ireland. It then discusses in detail the evaluation of New ERA. This is followed by an examination of changes in the programme since the evaluation and a discussion of possible avenues for future research.

6.2 The Role of University Access Programmes

Despite the considerable expansion of higher education in recent decades, students from socioeconomically disadvantaged backgrounds have lower levels of educational attainment and remain under-represented at tertiary level. As mentioned in Chap. 1 of this book, a school leaver whose parents have tertiary education is 3.3 times more likely to participate in

tertiary education compared to one whose parents have lower secondary education. The sociological literature has considered whether the association between social background and educational outcomes has declined or remained stable over time (Shavit and Blossfeld 1993; Breen et al. 2009; Shavit et al. 2007). It suggests, on the one hand, that inequalities in education will only begin to decline when enrolment for the most advantaged groups reaches 'saturation'. This is known as maximally maintained inequality (MMI) (Raftery and Hout 1993). On the other hand, there is a view that as educational systems expand and the level of educational attainment rises, qualitative differences in the education system will become more important for social inequality, with more advantaged students occupying better positions. This is known as effectively maintained inequality (EMI) (Lucas 2001).

Differences in levels of educational attainment remain a real and persistent problem. Revisiting the MMI hypothesis, Hout (2007) concluded that Ireland remains one of the countries in the International Social Survey Programme (ISSP) with the highest associations of educational achievement across generations, despite rapid expansion and more opportunities for mobility. McCoy and Smyth (2011) found that the initial expansion of higher education resulted in a widening of the participation gap between higher professionals and others, with some reduction as higher professionals reached saturation levels. They also found that there is strong differentiation between those who attend universities and those who attend institutes of technology (ITs), with the university sector comprising a larger proportion of middle-class students. This is consistent with the analysis in Flannery and Cullinan (2014), which was discussed in Chap. 2 of this book. Furthermore, as also discussed in Chap. 2, the removal of tuition fees was not enough to improve participation among the disadvantaged (Denny 2014; McCoy and Smyth 2011; Flannery and O'Donoghue 2009).

The relevant evaluation literature largely focuses on financial constraints in entry to tertiary-level institutions. For example, financial aid has been found to have a positive effect on university completion rates and graduating on time in the United States (US) (Scott-Clayton 2011; Dynarski 2000). The magnitude of this effect is typically around a 5% or less increase in enrolment for a $1000 reduction in student costs

(Deming and Dynarski 2009). However, in addition to the costs of attending university, socio-cultural, academic and institutional barriers also play an important role in progression and retention. There is also some evidence that academic support programmes, without financial aid, can be effective. For example, Lesik (2007) found a positive relationship between a remedial mathematics programme and student retention in the US, while Scrivener et al. (2008) identified a positive treatment effect on first semester academic performance in an experimental evaluation of the 'Open Doors' programme in a US community college that provided improved counselling and monitoring of students.

Overall, there have been relatively few studies that have examined programmes that combine financial aid with academic and social supports. Angrist et al. (2009) conducted an experimental evaluation of the 'Student Achievement and Retention' (STAR) project in a Canadian university. Students were randomly assigned to three groups that received academic support, financial incentives or a combination of the two. They found that the programme reduced the probability of first year withdrawal by 10% and had positive effects on GPA. These effects were greater for students who received the combined financial and academic supports, yet the effects were found for women only.

6.3 The History of Access Programme Policy in Ireland

The Higher Education Authority (HEA) Act (1971) and the Universities Act (1997) brought equality in accessing higher education to the forefront in the development of higher education policy in Ireland. The HEA was established to further develop higher education and promote equality of opportunity. The White Paper *Charting our Education Future* (Department of Education and Science 1995a), the *Report of the Steering Group on the Future of Higher Education* (Department of Education and Science 1995b) and the *Report of the Commission on the Points System* (Department of Education and Science 1999) all helped set the agenda for the development of access initiatives. They each identified barriers to

higher education (as outlined above) and provided recommendations as to how these barriers could be addressed.

In relation to the financing of access initiatives in Ireland, the HEA provided funding to the universities, under the so-called Targeted Initiatives, to develop special schemes to improve the participation of students from disadvantaged social backgrounds (Osborne and Leith 2000). The National Development Plan (NDP) also set aside finances for a third-level access fund for the period 2000–06, aimed at tackling under-representation of students from socioeconomically disadvantaged backgrounds, mature students, students with disabilities and students from ethnic minorities. The universities themselves also support the initiatives financially.

Linkages between designated disadvantaged schools and higher education institutions (HEIs) were created with each institution responsible for outreach to these schools. In this sense the evolution of APs was quite organic and needs-based, as individual access offices based in separate institutions responded to student requirements independently. Strategies ranged from providing a preparatory year (Trinity Access Program [TAP]; NUI Galway's Access Courses for Higher Education—School Leavers) to the provision of summer schools, shadowing days and school visits by access personnel to encourage enrolment.

In 2001 seven HEIs, namely Trinity College Dublin (TCD), UCD, Dublin City University (DCU), Maynooth University (MU), University College Cork (UCC), University of Limerick (UL) and Dublin Institute of Technology (DIT) collaborated to create the Higher Education Access Route (HEAR). Through this scheme students could apply to the participating institutions through the Central Applications Office (CAO) and a supplementary application. As described in Chap. 1, the HEAR Scheme allows school leavers from linked schools to apply for reduced point entry to any participating HEI along with post-entry supports. The scheme was initially supported by the HEA's Strategic Innovation Fund with all other costs divided between the seven participating organisations. More recently, the development of the HEAR scheme into a national scheme has been financed by the Strategic Innovation Fund. The HEAR scheme is, in part, a response to the suggestion made in *Charting our Education*

Future that designated disadvantaged schools should become linked to HEIs.

In June 2008 the HEAR National Access Office launched the *National Action Plan for Equity of Access to Higher Education* (HEA 2008). It set out targets and equity of access measures for the period 2008–13. These included an entry rate of at least 54% for all socioeconomic groups by 2020 and a doubling of the number of students in third level with sensory, physical and multiple disabilities by 2013. The scheme was re-launched in 2009 with the *Disability Access Route to Education* (DARE) scheme[3] and was extended from 305 DEIS and linked schools in 2008 to include all 730 secondary schools in Ireland in the same year (Byrne et al. 2013).

In addition to pre-existing access initiatives, 18 participating HEIs have developed the HEAR and DARE schemes to support students. As it stands, despite the rolling out of HEAR there is still considerable variation between HEIs regarding the type of access initiative in place, as some universities incorporated their existing initiatives into the scheme, while others kept both their programmes and the HEAR scheme separate (Byrne et al. 2013). At UCD, the programme grew considerably over the period observed in the New ERA evaluation, rising from 26 students in 1999 to 103 students in 2004 (Denny et al. 2009), mostly because of the increase of DEIS schools linked via HEAR. Current numbers also highlight a large growth in participation, increasing from 162 individuals in 2011 to 260 individuals in 2015—see Table 6.1.

In more recent policy reports, issues of access and equality have also featured prominently. For example, one of the eight principles underlining the *National Plan for Equity of Access to Higher Education* is to strengthen relationships between families, schools, and HEIs in order to support students' aspirations, engagement and achievement. The report

Table 6.1 Number of HEAR students admitted to UCD from 2011 to 2015

	2011	2012	2013	2014	2015
New entrants					
Total	162	189	223	227	260
Merit	67	101	118	128	137
Direct	95	88	105	99	123
All students					
Total	469	522	644	737	818

Source: Created by author using data from UCD InfoHub (2016)

recognises the need to foster partnerships between key stakeholders, for the systematic collection of relevant and comparable data, and for student consultation in the development of access policy. Additionally, 'mainstreaming' access policies into the everyday life of higher education also features, as does the configuration of system funding and student financial support so that it improves access, participation and completion rates (HEA 2015).

The *Hunt Report* also recommended that the Irish higher education system continue "to develop clear routes of progression and transfer, as well as non-traditional entry routes" (Report of the Strategy Group 2011, p. 17). Furthermore, the HEA recommends that pathways from further education to higher education improve so that more opportunities for entry to higher education become available (HEA 2015). Although this does not focus directly on students from disadvantaged backgrounds, 'alternative routes' can potentially increase the number of 'non-traditional' or 'under-represented' students entering universities. These students can benefit from some of the access initiative supports already in place, as well as from initiatives that specifically address their needs as adult learners.

6.4 An Evaluation of the UCD 'New ERA' Programme

6.4.1 Introduction

This section summarises the analysis and results from a study that used a quasi-experimental design to evaluate New ERA (Denny et al. 2009, 2014). The evaluation used a natural experiment that exploited the time variation in the expansion of the programme across schools. The identification strategy was based on the assumption that there was a random selection of schools into the programme over the observation period 1999–2004, as the programme expanded to include more designated disadvantaged schools. It was then possible to compare students from second-level schools that were chosen to be part of the programme in the early years (the 'Treatment' group) to those who matched the same

criteria but who did not participate in the AP because their schools joined the programme later (the 'Control' group).

Eligibility for participation in the programme was fourfold. This included means-testing, whereby parental income had to be below a threshold which shadowed the eligibility for the regular means-tested government grant that is available to all students whose family income falls under these thresholds. This grant is available to all low socioeconomic status (SES) students, regardless of the secondary school attended. As family income was not available in the data used in the evaluation, one of the selection criteria for choosing the 'Control' group was receipt of the regular grant. Second, in order to be eligible for the AP, neither parent could have graduated from university. Third, the student's parents must have been a member of the following socioeconomic groups: unskilled manual; semi-skilled manual; skilled non-manual; or, non-farming agricultural workers. Students whose parents were professionals, employers or managers were not eligible for the AP. As measures of parental education were not available in the data, socioeconomic status was used as a proxy. Finally, the student had to be attending a secondary school that was designated as 'disadvantaged'.

6.4.2 Data and Approach

6.4.2.1 Data and Treatment Groups

The study utilised pooled cross-sections of student-level administrative data containing information on all students entering UCD from 1999 to 2004 inclusive. The data contained information such as student outcomes at university, pre-university academic performance, second level school attended, grant status, the student's age, gender, treatment status (see below), and markers of eligibility such as the SES of the student's family. Some school-level census information, such as labour market conditions, average years of schooling and unemployment rates in the electoral district of a particular school was matched to the individual student-level data using a school identifier. School-level information regarding exam

results and other school 'quality' variables could not be included as this information is not available to researchers in Ireland.

Under the AP, two types of students were 'treated'. 'Merit Treatment' students were admitted to university through the nationally administered CAO admissions system. Students were ranked by converting their LC results into points using a common scale. The scale takes the best six subjects and has a range of 0 to 600 in increments of 5, with the minimum points level for a degree programme fluctuating year-to-year. About 45% of AP students attained sufficient grades to meet the minimum points level for regular university entry and were allocated a place on their preferred course in the usual manner. 'Discount Treatment' students, on the other hand, received a points concession of up to 20% on the competitive entry points for the course set by the national admissions system. Thus, a certain number of places on each course were reserved for students who did not meet the minimum points level required for that course. To be offered one of these places they must have met certain basic requirements (e.g. a medical student must have studied science in upper secondary school) and provided further information regarding their socioeconomic circumstances, as well as references from their secondary school teachers.[4]

6.4.2.2 Evaluation Design

There were over 300 linked schools involved in the AP but only 322 students in the Treatment group. For this reason a simple 'differences' model was estimated as opposed to a more standard 'difference-in-difference' model, which would require controlling for school fixed effects by including dummy variables for each school. For the binary outcome variables, such as progressing to second year, graduating and graduating on time, linear probability models were estimated, while for the categorical outcome variables, such as first year exam results and final degree classification, ordered probit models were estimated. These models controlled for faculty, year of university entry and number of points attained in university entry exams.

One concern with the expansion of the programme to include more DEIS schools was whether the date at which schools became linked to

the programme depended on the characteristics of the school. If there was a non-random selection of schools, this may have biased the results, as the Treatment group (those who joined earlier) and the Control group (those who joined later—see below for more detail) may have systematically differed. However, for several reasons, this was unlikely. First, there was no self-selection of the schools into the programme as the schools were chosen by the AP to join the scheme. Second, there was little overt heterogeneity in the quality of secondary schools linked to the AP. The government list from which the schools were drawn was not a ranking list and thus each school was regarded as being equally disadvantaged in that they all received the same level of additional government funding compared to regular schools. Another possible source of exogenous variation in the expansion of the AP was the introduction of the HEAR scheme (outlined above), which linked all DEIS schools to any AP. Overall 125 new schools were added to the New ERA programme as a result, and though these schools did not receive UCD pre-entry supports, they may have received some support from other universities.[5]

6.4.2.3 Control Groups

As only students who attended UCD were observed, the analysis was conditional on enrolment. A consequence of this is that the Control group, who were socio-demographically similar to the treatment group, may have been a self-selected group themselves, as they choose to attend university without the safety net of the AP. Such students may have differed regarding unobservable characteristics (e.g. they may have been more able or more motivated). Table 6.2 reports the average university entry grades for the Treatment and Control students. While the grades of the Control students were slightly higher than that of the treatment students, by between 2% and 10% (9 and 48 points), there was no systematic changes in the ability of either the Treatment and Control groups over time, suggesting that the composition of the groups was not changing regarding quality in any observable way, though it is still possible that they differed with regard to other unobservable characteristics. Therefore, additional analyses which test the robustness and sensitivity of the main

Table 6.2 Average university entrance exam grades for control and treatment group by year of linkage

Year of linkage	Control	Treatment
1999	438 (54)	429 (69)
2000	446 (64)	398 (70)
2001	433 (50)	388 (44)
2002	425 (55)	416 (74)
2003	436 (64)	400 (65)
2004	424 (61)	399 (65)
Average	434 (58)	404 (66)

Notes: Mean, standard deviation (in parentheses) reported. The average university entrance exam grades are based on final school exams consisting of 6 exams worth 100 points each, for a maximum score of 600 points
Source: Based on data from Denny et al. (2010)

results were conducted and both ability (school grades) and faculty were controlled for (see Table 5 in Denny et al. 2014, p.177).

It is worth noting that as Discount students were compared to students who had higher university entrance exam grades, a potential concern was that the Discount Treatment and Control groups were not comparable. However, this was not necessarily the case, as the distribution of university entrance exam grades intersects for Control students and all but the lowest achieving Discount students. In some cases, there were Control students with the same university entrance exam grades as Discount students in the same course but who entered the university in a year where the minimum points level had been lower. For example, there were Discount students who entered the Agricultural Science degree in 2001 with 320 points when the minimum required for the general student body was 330, and the following year a Control student entered with 320 points, as the minimum required had fallen to 310. The faculty of the student, rather than the individual degree course within that faculty was controlled for, which also allowed for the identification of Discount and Control students with the same grades.

However, for the Arts degree course, which required the lowest entry points and was the largest course, there were Discount students who had lower points than anyone else in the university and few Control students

with similar level of points. While this did not affect the results for higher achieving student (>400 points), it may have downwardly biased the results for the low point students if the low point Discount students were compared to Control students who mostly had higher points.

6.4.3 Results

Tables 6.3, 6.4 and 6.5 are based on three sets of results as presented in Denny et al. (2014). Table 6.3 is based on Table 4 of the Denny et al. paper and shows a positive treatment effect on first year exam performance, progression to second year and final year graduation rates, with the impact often stronger for higher ability students. Similar patterns of

Table 6.3 Impact of access programme on first and final year outcomes

	All	Discount	Merit
First year outcomes	*Model (1)*		*Model (2)*
Honours	0.122**	0.130*	0.121*
	(0.054)	(0.071)	(0.063)
Pass	−0.073**	−0.083	−0.077*
	(0.036)	(0.053)	(0.046)
Fail/dropped out	−0.049**	−0.047**	−0.044**
	(0.019)	(0.020)	(0.018)
Pseudo R^2	0.163		0.163
Sample size	425		425
Final degree outcomes	*Model (3)*		*Model (4)*
Honours	0.083*	0.066	0.096*
	(0.048)	(0.061)	(0.052)
Pass	−0.033*	−0.027	−0.040*
	(0.020)	(0.026)	(0.024)
Fail/dropped out	−0.050*	−0.039	−0.056*
	(0.029)	(0.035)	(0.029)
Pseudo R^2	0.182		0.098
Sample size	425		425

Notes: All four models are ordered probit models. Marginal effects and clustered standard errors (in parentheses) reported. All models include year of university entry, gender, number of points attained in final state exams, distance from the high school to the university, local unemployment rates and education levels in the locality of the high school. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

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Table 6.4 Impact of access programme on student performance for students from limited and Full pre-entry support schools

	Effect of pre-entry AP supports	
	Limited pre-entry supports	Full pre-entry supports
First year outcomes		
Honours	0.115 (0.115)	0.143* (0.074)
Pass	−0.074 (0.085)	−0.088* (0.052)
Fail/dropped out	−0.041 (0.031)	−0.055** (0.024)
Pseudo R^2	0.166	0.155
Sample size	285	355
Final degree outcomes		
Honours	0.046 (0.078)	0.090 (0.071)
Pass	−0.019 (0.035)	−0.034 (0.029)
Fail/dropped out	−0.026 (0.043)	−0.056 (0.043)
Pseudo R^2	0.91	0.12
Sample size	285	355

Notes: Both models are ordered probit models. Marginal effects and clustered standard errors (in parentheses) reported. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$
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Table 6.5 Impact of variation in financial aid on first year exam performance

First year outcomes	Effect of financial aid package	
	Main effect of AP	Interaction of AP & high aid package
Honours	0.092 (0.093)	0.081 (0.120)
Pass	−0.061 (0.066)	−0.055 (0.086)
Fail/dropped out	−0.031 (0.027)	−0.026 (0.035)
Pseudo R^2	0.16	
Sample size	349	

Note: The model is an ordered probit model. Marginal effects and clustered standard errors (in parentheses) reported. The model includes an interaction indicating whether the student received a high financial aid package or a low financial aid package. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$
Source: Reprinted from Denny et al. (2014) with permission from Elsevier

results were observed for students that entered through the regular system and the 'affirmative action' group, that is, the students that entered with lower high school grades. Specifically, the results show that AP students are 12 percentage points (ppts) more likely to achieve an honours grade in their first year exams and 8 ppts more likely to achieve an honours degree—see Models (1) and (3) in Table 6.3 respectively.

The results also highlight that the probability of dropping out or failing is reduced by approximately 5 ppts for all AP students for both first and final year outcomes. The positive effects of the AP on the students' final year outcomes represents the cumulative effects of the programme and suggests that overall the programme had a persistent positive effect on retention throughout university. The effect is also in line with the graduation effects of about 3–6 ppts found in financial-aid-based scholarship programmes in the US (Dynarski 2008).

Model (2) in Table 6.3 highlights that the effect on first year outcomes are similar for both Discount and Merit students, while Model (3) suggests that the AP also reduces the probability of receiving a pass degree by 3 ppts. Model (4) suggests that final degree outcomes are mainly driven by Merit students, as the AP increases their chances of obtaining an honours degree by 10 ppts and reduces the probability of a pass degree by 4 ppts and of failing in final year by 6 ppts. There appear to be no significant treatment effects for final degree outcomes for Discount students in Model (4). However a Wald test reported in Denny et al. (2014) reveals that the results for Discount and Merit students do not statistically differ.

Heterogeneous effects across different groups of students were tested for by including interactions for low (<400 points) and high (>400 points) ability students, male and female students, and students originating from schools within commuting distance. The analysis indicated no differential effect for high and low ability Merit and Discount students in their university entrance exam—see Table 6 in Denny et al. (2014). Additionally, no significant differences between genders or by distance to the university were observed, with the important caveat that these groups are possibly too small to identify significant effects (Denny et al. 2014).

Selection into treatment schools was also examined in detail and results were estimated separately between students who attended schools that received pre-entry supports (e.g. summer schools and extra tutorials) and those that received limited pre-entry—see Table 6.4 based on Table 7 of Denny et al. (2014). An additional analysis investigating the influence of changes in financial aid on first year exam performance was also conducted—see Table 6.5 based on Table 8 of Denny et al. (2014).

From Table 6.4 we see that students who attended the full pre-entry support schools (three or more activities) had better first year outcomes than those who received limited pre-entry support (less than three). The

probability of achieving an honours result increased by 14 ppts for those who attended a school that received full pre-entry support, compared to no significant effects for those who experienced limited support. However, once again a Wald test found that the coefficients did not statistically differ, implying that overall there was little evidence to suggest that students from high support schools were systematically better performing than those from schools with limited support. This also implies that the pre-entry activities are not having a large effect on pre-entry academic performance and therefore the treatment effects are not driven by selection in this way—see Denny et al. (2014) for more details.

Table 6.5 shows the estimated results for additional financial support. These suggest that the extra funding might be beneficial; however, there was no statistically significant difference in first year outcomes for those who received the higher package and those who received the lower. However, it is important to note that this does not suggest that the financial package was not beneficial, since one only observes variation in this between years (and not between students). What the results highlight is that increasing the value of the package from an average of €5407 to €6313 per annum did not lead to changes in student achievements. It is possible that a minimum threshold of financial security is relevant for students but financial support beyond this makes less of a difference. Finally, the analysis assumes that there is no other difference in students or AP activities between high- and low-value years.

6.5 Further Developments

Given the evaluation presented above covers the period 1999–2004, it is important to describe some subsequent developments related to APs. The 2008 *National Action Plan for Equity of Access to Higher Education* outlined the future focus of APs as: (1) including the recognition of the multiple dimensions to disadvantage; (2) expansion of outreach programmes to primary schools; and, (3) more community-based initiatives. The plan noted that disadvantage compounds on vulnerable subgroups, as well as the difficulty of accessing hard-working students who did not perform well in their LC. The move towards a more coordinated, collaborative effort between individual university programmes also continued. For example, UCD restructured its initiatives dealing with separate target

populations (disability; socioeconomic; mature students) and brought them together as part of the UCD Access Centre.

Another important change was that whereas discount places had previously been made available on an ad-hoc basis within colleges and departments and were negotiated year-to-year, this system was standardised and now stands at 5% for each course in UCD. Courses with traditionally large numbers of students (e.g. Arts or Science) offer a relatively high number of places and courses that are relatively small in size, such as Medicine or Law, offer fewer. As the CAO system is based on supply and demand, there is year-to-year fluctuation in the points needed for each course. While the points variation is normally small, there has been a dramatic increase in the number of points needed for Science at UCD in the intervening years, rising from approximately 310 (final) points in 2007 to above 510 points in 2013 (CAO). This is important to consider when analysing the impact of APs in the future, as the composition of Science students is likely to have changed substantially.

It is also important to consider how this may affect qualitative inequality, as subject field is increasingly recognised as one way in which gender and socioeconomic inequalities are reproduced (Smyth and Steinmetz 2008; Flannery and Cullinan 2014) and inequality is effectively maintained. Byrne et al. (2013) considered the dynamics of applications to, and acceptances of, courses by field of study for HEAR and DARE applicants and found evidence of significant variation in rates of applications and acceptances. HEAR-eligible applicants were typically over-represented in applications and acceptances to Arts, Social Sciences and Education, while being under-represented in applications and acceptances to Engineering/Technology.[6]

During the New ERA evaluation the national HEAR scheme was rolled out to all schools and it was hoped that this would capture those disadvantaged students within non-DEIS schools. The evaluation attempted to capture this by performing an analysis on students in the programme relative to students from non-disadvantaged schools who did not participate in the scheme (Denny et al. 2009). The results showed that students who attended the scheme were more likely to have positive outcomes, indicating that students from advantaged schools who met the income, socioeconomic and education eligibility criteria for HEAR should benefit.[7]

Byrne et al. (2013) identified a 'tension' between the definition of disadvantage adopted in national policy rhetoric and that used by the

schemes, which makes it difficult to estimate if the schemes have contributed to the realisation of national targets. The *National Action Plan for Equity of Access to Higher Education* defined socioeconomic disadvantage in terms of socioeconomic group, highlighting semi/unskilled manual and non-manual workers. HEAR potentially has the effect of screening out the advantaged among the HEA targeted group by selecting firstly on income and then on other socio-cultural indicators. Some students may also have been missed due to incomplete or missing financial information or because they exceeded the HEAR income threshold. The Byrne et al. (2013) evaluation was careful to recognise that much had been achieved by HEAR in contributing to national targets, but it recommended that policies and processes surrounding targets/quotas within and across participating HEIs be reconsidered for further gains. It also recommended that support and communication be improved for groups who submit incomplete applications, for example school leavers from lone parent families and school leavers born outside the EU.

Currently, students' family income must first fall below the HEAR income limit. The income measure is calculated based on the number of dependent children in the family, as well as on how many people are in full-time education. This ranges from €45,790 for less than four dependent children to €54,630 for more than eight dependents (with €4670 to be added for each sibling or parent enrolled in full-time college). According to Byrne et al. (2013), half of all 16–22 year olds are within the income limit. In addition to the income threshold, students must match a correct combination of two other indicators (out of a total of five). The other financial indicators include whether or not their family has a Medical/GP card, or is in receipt of means-tested social welfare. The socioeconomic criteria include: whether or not applicants belong to the socioeconomic groups outlined by the HEA; attendance at a DEIS school; and, living in an area of concentrated disadvantage, that is, an area where there is a high rate of unemployment or where only a small proportion of adults have third-level education.

The previous criteria had included the education background of parents, where a student was deemed eligible if a parent had never attended a HEI. This was aimed at capturing first-generation participants, but this indicator has since been removed. According to Byrne et al. (2013) the

combination of indicators (low income, means-tested benefit/medical card and low SES) are predictive of living in a household with lower levels of education. Nevertheless, even in households qualifying under these combinations, between 30% and 35% contain a family member who is educated to degree level or studying for a degree, or between 8.6% and 5.3% contain a parent who is educated to degree level or studying for a degree (Byrne et al. 2013).

6.6 Conclusion

Since the New ERA evaluation there have been several changes made to the structure of the programme, as well as further policy strategies developed to deal with the on-going issue of access. Applications to the HEAR scheme may also have been affected by the rapid deterioration in economic conditions in Ireland since the late 2000s. Typically, youth employment contracts during an economic downturn, which can lead to an increase in demand for higher education. This makes the role of APs even more important. In Ireland, individual institutions are still largely responsible for the provision of pre- and post-entry supports, with considerable diversity in the type of APs provided to students. The Byrne et al. (2013) evaluation identified a number of tensions existing between the schemes and educational policy, as well as considerable institutional variation that creates some inefficiencies. They recommended further alignments across institutions, specifically regarding agreements around minimum points.

The evaluation of the UCD New ERA AP showed that a multidimensional programme can have a significant and positive impact on progression. However, more work needs to be done in evaluating the impact of the socio-cultural pre-entry supports on student progression. The Byrne et al. (2013) evaluation recommends that HEAR and DARE provide a greater degree of flexibility in the transition to higher education. The schemes should clearly identify alternative pathways into higher education for their target groups. They also call for continued evaluation of the schemes, as well as further promotion regarding the uptake of pedagogies for fairness and widening participation among lecturing staff. Finally,

they recommend that HEIs should adopt a 'getting on' approach, meaning that students should be helped in moving beyond higher education (Byrne et al. 2013).

Since the New ERA evaluation, the UCD AP has evolved in response to changes in the broader context of HEIs and the economy at large. The programme continues to develop private sponsorship plus its outreach and mentoring programmes (FutureYou). Orientation is still provided but the duration of the programme has been reduced while expansion into primary level has also been suspended. Thus, repeated evaluation of the programme and more systematic recording of the type and number of activities that students are engaged in could potentially help identify different strategies for improving access under varying socioeconomic conditions. It would also be of considerable interest to follow up New ERA students to gauge any potential long-term returns to AP participation in the form of better labour market outcomes.

Furthermore, it would also be particularly beneficial to undertake more research into the issues associated with widening participation into highly prestigious and financially rewarding fields of study (horizontal stratification). More specifically, it would be of interest to look at how fluctuations in points during the recession influenced the socioeconomic composition of courses and how this affected Merit students. Finally, it would be informative to delve more deeply into the peer and social network influences of young students from disadvantaged backgrounds (see Byrne et al. 2013) and to consider how these change over the course of their studies.

Notes

1. Most of the discussion of the evaluation is based on Denny et al. (2009, 2010, 2014).
2. This was later standardised/formalised at 5% of intake.
3. This chapter focuses more on the HEAR scheme. For a comprehensive outline of the DARE scheme, see Byrne et al. (2013).
4. These references were only considered in tie-break situations, that is, where two or more students with the same points were competing for

a place on the same course. Therefore, this subjective information was not used by the AP office in the majority of cases.

5. For a fuller discussion of this issue please see Sect. 3.2 and Table 1 in Denny et al. (2014). Table 1 provides the characteristics of the AP schools and the localities of the schools by year of linkage, as well as an F-test of differences between schools in terms of average LC points (non-significant), average progression rates (non-significant), proportion unemployed in school locality (significant) and proportion leaving education after age 18 (non-significant). Information on the number of DEIS schools joining the program yearly from 1999–2005 can be found in Denny et al. (2009, p.17).
6. This is potentially related to the gender composition of applicants as HEAR applicants were predominantly female.
7. It is important to note however that the comparison between AP students and the disadvantaged students in non-disadvantaged schools could potentially be biased by various factors, as students from very different educational backgrounds are being compared.

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7

Overeducation in the Irish Labour Market

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7.1 Introduction

Overeducation refers to the phenomenon whereby workers are employed in jobs for which they have more schooling than necessary, in terms of what is required to either 'get' or 'do' their current job. Overeducation is particularly relevant for higher education policy, since potential drivers include an imbalance between the supply of higher education graduates and the number of available jobs. While there has been a huge amount

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of research published on overeducation in recent decades—see Quintini (2011) and McGuinness (2006) for reviews—little is known about overeducation in Ireland. This chapter aims to address this gap and provides a detailed assessment of the extent of overeducation in Ireland. It also considers the impact of overeducation on earnings within the Irish labour market, as well as the extent to which overeducation in Ireland can be explained in terms of factors such as human capital effects, job conditions/requirements, preferences, or the information held at the time of recruitment. It also discusses the policy implications that flow from these findings.

Overeducation is an important issue as it has potentially damaging impacts for individuals, firms and the macroeconomy. International research has shown that overeducated workers earn substantially less than their counterparts with similar levels of schooling who are in matched employment,[1] although they are also routinely observed to earn a wage premium relative to workers with lower levels of schooling doing the same job. This suggests that while overeducated workers tend to raise the productivity levels of jobs for which they are overqualified, earning them a premium relative to their less qualified colleagues, they cannot raise productivity levels to a degree that will enable them to earn their full potential wage. From the perspective of firms, there is ample evidence in the literature to show that overeducated workers have a much higher probability of job separation, suggesting that firms employing such workers will tend to incur higher recruitment and training costs. Furthermore, if overeducation restricts the ability of individual workers and firms to reach their full productivity potential then, arguably, it will also impose limits on the level of national income achieved within countries. Finally, overeducation is also potentially important across many key aspects of policy, including wage determination, firm-level performance and macroeconomic growth.

Therefore, within this context, this chapter takes the first in-depth look at the issue of overeducation within an Irish context. It is structured as follows: Sect. 7.2 presents an overview of the theory and evidence on overeducation, Sect. 7.3 discusses the data and methods employed in the chapter, Sect. 7.4 presents the results, while Sect. 7.5 concludes.

7.2 Overeducation: Theory and Evidence

7.2.1 Explanations for Overeducation

A number of key explanations for overeducation have been put forward in the literature, not all of which view it as a concern for policy. The principal arguments relating to overeducation can be summarised as follows:

- *An excess supply of educated labour*: This argument suggests that when the number of graduate workers exceeds the number of graduate jobs, overeducation occurs as a certain proportion of workers are forced to accept jobs with lower entry requirements. This explanation relies on the assumption that labour markets are not as flexible as assumed under human capital theory (Becker 1964) and that job conditions and requirements will either partially or wholly constrain wages. The framework that wages will be partially determined by both job conditions and workers' education is generally referred to as assignment theory (Sattinger 1993), while the argument that earnings will be wholly determined by job requirements is commonly known as the job competition model (Thurow 1975).
- *A statistical artefact*: Human capital theory assumes that labour markets are sufficiently flexible to allow workers to earn their marginal product. As all workers earn a wage proportionate to their productivity, any pay gap observed as overeducation simply reflects a productivity-related measure (that systematically varies with overeducation) that has not been appropriately captured in the data. Under this view, overeducation merely reflects the fact that key aspects of human capital, such as innate ability and/or skills accrued through training, are generally not appropriately measured in studies with earnings and that such factors are likely to be correlated with overeducation.
- *Career mobility*: Proponents of this argument state that workers may deliberately accept a low-level job in order to acquire basic information and skills related to their chosen profession (Rosen 1972; Sicherman and Galor 1991). According to this framework, overeducation is likely to be both deliberate and temporary in nature as such a strategy generally results in faster career progression.

- *Preferences*: It may be that people choose jobs for which they are overeducated and accept lower earnings as they are more than appropriately compensated by other aspects of the job such as intrinsic satisfaction, flexible working conditions, accessibility and so on (McGuinness and Sloane 2011).
- *Asymmetric information*: Under this framework, overeducation occurs because the worker had inadequate information about the employer before accepting their current job and/or vice versa. This argument is consistent with the signalling (Spence 1973) and job search (Stigler 1962; McCall 1970) literatures in labour economics.

In terms of where the balance of evidence lies, a number of studies have used empirical tests to establish that the assignment framework describes the wage determination process more adequately than either human capital theory or the job competition model (Hartog and Oosterbeek 1988; Alba-Ramírez 1993; Groot 1996; Kiker et al. 1997; Sloane et al. 1999). In a more recent study, McGuinness and Pouliakas (2015) used the European Skills and Jobs (ESJ) Survey (Cedefop 2015) to establish the proportion of the overeducation wage penalty that could be attributed to the various theoretical explanations. They found that less than half of the overeducation pay penalty could be explained by the information contained in their models. With regard to the element of the pay penalty that could be attributed to particular views of the labour market, McGuinness and Pouliakas (2015) reported that both the human capital and assignment/job competition frameworks were important contributing factors. They also found that asymmetry of information accounts for a significant part of the overeducation wage penalty for tertiary education but found little evidence to support theories of career mobility or compensating wage differentials. This chapter applies the McGuinness and Pouliakas (2015) approach to the Irish sample of the ESJ.

7.2.2 Overeducation in Ireland: The Evidence to Date

The most straightforward approach to measuring overeducation is to ask individuals questions regarding the educational requirements of

their current jobs and then compare the responses with the individual's acquired level of schooling. However, in many countries such as Ireland, there are little or no subjective measures available in datasets, and in such circumstances, researchers generally derive objective measures by comparing each individual worker's level of schooling with the average of their occupation. Using the objective approach, workers are identified as being overeducated if their level of acquired education is substantially higher than the mean or modal level for their given occupation.[2] Research has shown that substantial variations exist in the level of correlation across measurement methods, with typically less than 40% of individuals being simultaneously identified under both subjective and objective approaches (Battu et al. 2000). Nevertheless, despite the low levels of correlation, both approaches generate similar estimates of the impact of overeducation on earnings. It is difficult to be conclusive as to the most appropriate overeducation measure; however, given that the objective measure does not incorporate any component of actual job entry requirement or content and may be prone to cohort effects,[3] subjective measures are, on balance, likely to be more accurate.

The limited evidence on overeducation in Ireland to date has been based exclusively on objective measures; nevertheless, the evidence that does exist suggests that overeducation is both high and persistent within an Irish context. McGuinness et al. (2015) applied the objective approach to quarterly waves of the European Labour Force Survey in order to construct a time-series of overeducation rates for over 20 European countries. They reported that overeducation in Ireland averaged more than 30% over the period 1999 to 2012 with the trend remaining relatively stable over the period, dropping somewhat during the recession period of 2008 to 2010, before beginning to rise again in 2011. Taking a cross-sectional snapshot of countries in 2012, McGuinness et al. (2015) also estimated that, at 33%, Ireland had the highest rate of overeducation among the 36 countries included in their study. Using the same objective approach applied to data from the Programme for the International Assessment of Adult Competencies (PIAAC), Flisi et al. (2014) also estimated the incidence of overeducation in Ireland to have been 33% in 2012, lagging only behind Spain in terms of incidence. Thus, the limited evidence that

does exist is supportive of the view that the extent of overeducation in Ireland tends to be high by international standards.

7.3 Data and Methods

7.3.1 Data

This chapter uses data from Cedefop's ESJ survey, which is a survey of adult employees (aged 24–65 years) carried out in the 28 member states of the European Union, collecting information on the match of their skills with the skill needs of their jobs. It was financed and developed by the European Centre for the Development of Vocational Training (Cedefop), in collaboration with a network of experts on skills, the OECD and Eurofound (Cedefop 2015). The aim of the survey is to help inform the development of European policies on initial and continuing education and training and employment policies. To do so, it seeks to understand how individuals' qualifications and skills are matched (or not) to the changing skill demands and complexities of their jobs. The survey also looks at the extent to which employees' skills are developed and used in their workplaces over time.

A mixed methodology approach ensured that the data collected provided a representative sample of the adult working-age population in each of the EU 28 member states. The survey was carried out using quota sampling by the survey company Ipsos MORI and its network partners in each country between 7 March and 26 June 2014. In total, 48,676 respondents from different demographic groups took part either by telephone (9154 employees) or online interviewing (39,522 employees). In most EU countries about 1000–1500 employees were effectively interviewed, although the sample varies between countries. The size of the Irish sample was 1004. The survey asked respondents a series of questions designed to assess the extent to which their qualifications and skills are at the level needed to be hired for and to do their job. While overeducation is captured in the survey in terms of both the qualification necessary 'to get' or 'to do' the job, here we focus on the more heavily utilised measure based on the qualification to get the job,[4] that is, we capture

the extent to which individuals are overqualified in terms of the job's current entry requirements. Therefore, the key variable in the analysis is derived by comparing the level of education acquired by the respondent to the level required to get their current job: if the International Standard Classification of Education (ISCED) level of acquired schooling exceeds the ISCED level necessary to get their current job, then the respondent is identified as being overeducated.

7.3.2 Methods

As well as quantifying the incidence of overeducation in Ireland, this chapter also seeks to: (i) uncover the impact of overeducation on earnings within the Irish labour market; and, (ii) assess the extent to which overeducation in Ireland can be explained in terms of factors such as human capital effects, job conditions/requirements, preferences, or the information held at the time of recruitment. The value of the ESJ survey is that it enables us to examine the importance of these various groups of variables, which not only allows us to draw relevant policy conclusions but also assess the extent to which the occurrence of overeducation in Ireland is consistent with one or more of the central theoretical frameworks. Thus, this chapter effectively replicates the EU analysis undertaken by McGuinness and Pouliakas (2015) on the Irish sample of the EJS survey.

The approach begins by estimating an OLS equation, using a forward stepwise approach, in order to determine the sensitivity of the estimated overeducation wage penalty to the inclusion of variables reflecting employee differences in human capital, job characteristics/skill requirements and motives/job search. The variability of the overeducation coefficient under the various specifications will give us a preliminary sense of the degree to which overeducation in Ireland is influenced by groups of factors related to the various theoretical frameworks. In order to formally measure the extent to which the proportion of the overeducation pay penalty is attributed to each set of theoretically based variables, the empirical analysis adopts a standard decomposition framework as outlined by Oaxaca (1973) and Blinder (1973).[5] The procedure first requires the estimation of separate earnings functions for individuals in paid

employment who are either overeducated or have a qualification level matched to the requirement of their job. The wage gap between the two groups is then deconstructed into a part that is attributable to differences in the mean productive characteristics (the explained part) and a part that is due to different returns to such characteristics (the unexplained part). In this manner, it becomes possible to detect the extent to which several observable characteristics contribute to wage differences between the overeducated and matched, and how much of the gap can be attributed to discriminatory practices or other unobserved influences.

More formally, Mincer-type earnings functions are first fitted for each group (overeducated and matched) as follows:

$$\ln \boldsymbol{W}_i = \boldsymbol{H}_i\beta + \boldsymbol{Z}_i\gamma + \boldsymbol{C}_i\delta + \varepsilon_i \tag{1}$$

where ln $\boldsymbol{W}_i$ are the log hourly earnings of individual i ($i = 1,\ldots, N$), $\boldsymbol{H}_i$ is a vector of individual human capital attributes[6] which affect earnings, $\boldsymbol{Z}_i$ is a vector of characteristics describing a range of other theory-consistent explanatory variables (such as job characteristics, job search information and preferences), $\boldsymbol{C}$ are country dummies (in the EU models) and ε_i is a Gaussian random error term. The terms $\boldsymbol{\beta}$, $\boldsymbol{\gamma}$, $\boldsymbol{\delta}$ are regression parameters that capture the marginal returns of the characteristics contained in the vectors $\boldsymbol{H}$, $\boldsymbol{Z}$, $\boldsymbol{C}$ and are estimated on the basis of the ESJ sample. Robust standard errors of the regression coefficients clustered at the country level are calculated for statistical inference purposes where appropriate.

The total difference in the mean wages of the two groups can then be decomposed in the conventional Oaxaca manner as follows:

$$\bar{W}_m - \bar{W}_{mis} = \left(\bar{H}_m - \bar{H}_{mis}\right)\hat{\beta}_m + \left(\bar{Z}_m - \bar{Z}_{mis}\right)\hat{\gamma}_m + \left(\hat{\gamma}_m - \hat{\gamma}_{mis}\right)\bar{Z}_{mis} + \left(\hat{\beta}_m - \hat{\beta}_{mis}\right)\bar{X}_{mis} \tag{2}$$

where the first part of Equation (2) (i.e. the 'explained' or 'endowment' part) reflects the component of the average wage difference between the two groups attributed to differences in the means of the explanatory variables, which are in turn weighted by the estimated coefficients of the matched equation. It measures the relative importance of observable differences

in human capital, job characteristics, preferences and so on between the two sets of workers. The second term (i.e. the 'unexplained' part) refers to the part of the wage gap that arises because of the differential manner with which the labour market rewards the characteristics of overeducated and matched employees. In this respect, it provides an indication of the extent to which mismatched employment imposes productivity-related constraints on the return to observable characteristics.

7.4 The Incidence of Overeducation in Ireland

7.4.1 Descriptive Analysis

Figure 7.1 shows the incidence of overeducation in Ireland in 2014 within an EU 28 context. Under this measure, approximately 15% of employees were classified as overeducated in Ireland during the period, putting the country around the EU 27 average. At over 20%, the overeducation rates were highest in the UK, Slovakia and Spain. At less than 9%, overeducation was lowest in Malta, Belgium and Luxembourg. There is no clear pattern emerging from the data with core, peripheral and new EU states scattered throughout the distribution. Overeducation among graduates in Ireland was measured at just under 25%.

It is not clear why Ireland performs so poorly internationally when overeducation is estimated objectively (McGuinness et al. 2015; Flisi et al. 2014) and closer to the average when a subjective measure is used. One possibility is that many jobs in Ireland have entry-level requirements that lie above the qualification levels of most persons already working in the occupation, which could be explained by either: (i) increases in both the skill levels and entry requirements; or, (ii) static skill content and rising entry requirements (i.e. 'qualifications inflation'). With respect to overeducation measured in terms of education required to do the job, rates of mismatch were much higher with Ireland again at the upper end of the country distribution. Just over 21% of Irish employees were classified as overeducated in terms of what was required to do the job: under

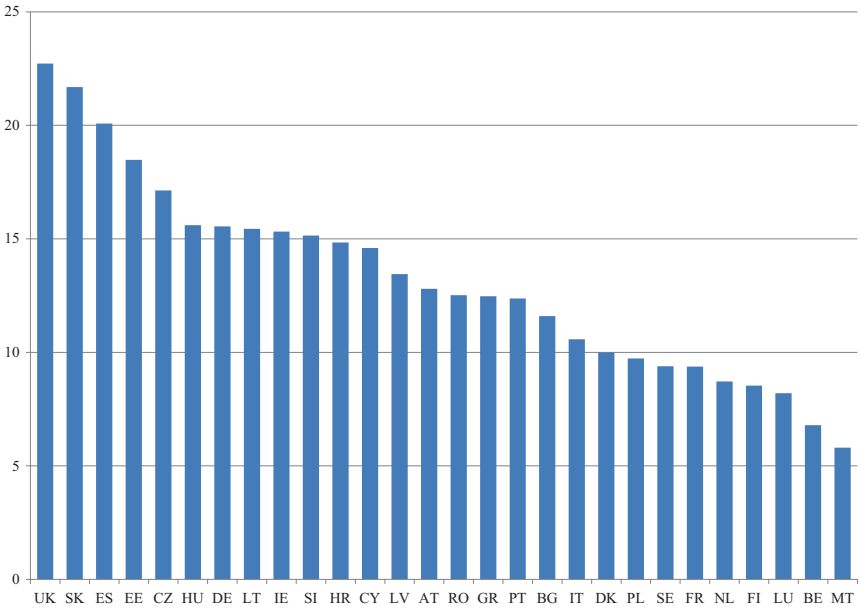

Fig. 7.1 Overeducated to get the job: Incidence by country, 2014 (%). *Source*: Analysis of European Skills and Jobs Survey data for 2014

this measure Ireland was ranked behind only the UK, Spain, Slovakia and Estonia. Furthermore, in terms of qualifications inflation, just under half of the 21% of employees who were overeducated in terms of the education required to do the job indicated that they were not overeducated in terms of the level of schooling required to get the job, suggesting that the skill content of many jobs does not equate with their entry requirements.

Figure 7.2 gives the average incidence of overeducation across personal and job characteristics and compares the results with the EU 28 average. Within Ireland and the EU generally, overeducation is higher among females, young people, persons who were previously unemployed, employees on temporary or informal contracts and those located in elementary, clerical or service occupations. However, the distribution of overeducation in Ireland does appear to deviate from the EU average in a number of important respects. Overeducation in Ireland appears to be more heavily concentrated among young people and those in elementary and clerical occupations relative to the EU average.

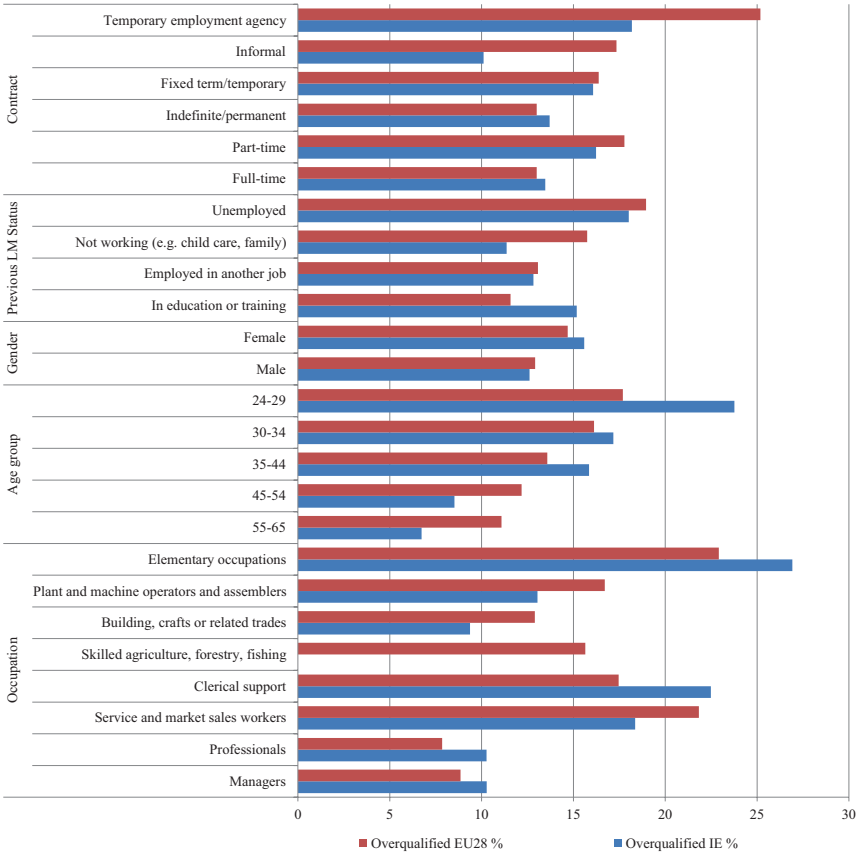

Fig. 7.2 Overqualification by population groups, % of adult employees, 2014, EU27 & Ireland. *Source*: Analysis of European Skills and Jobs Survey data for 2014

7.4.2 Multivariate Analysis

Table 7.1 presents the results from five OLS specifications for the Irish data (variable definitions are presented in the Appendix). Specification (1) is based around a standard Mincer equation whereby earnings variations are explained largely as a consequence of labour market experience (proxied here by age) and educational attainment; specification (2) adds in additional variables on training and employment tenure,

Table 7.1 OLS estimates of wage equation, all adult employees, 2014, Ireland

	(1)	(2)	(3)	(4)	(5)
	Basic HC	Augmented HC	Job	Skill needs	Motives
overqualified	**−0.27*** **	**−0.26*** **	**−0.23*** **	**−0.19*** **	**−0.14** **
	(0.062)	**(0.062)**	**(0.062)**	**(0.061)**	**(0.059)**
age	0.04**	0.02	0.02	0.02	0.02
	(0.020)	(0.021)	(0.021)	(0.021)	(0.022)
agesq	−0.00	−0.00	−0.00	−0.00	−0.00
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
male	0.17***	0.17***	0.15***	0.15***	0.08
	(0.044)	(0.044)	(0.047)	(0.048)	(0.049)
highisced	0.28***	0.27***	0.25***	0.21***	0.18***
	(0.043)	(0.044)	(0.045)	(0.047)	(0.048)
prevsemp	−0.05	−0.02	0.02	0.03	0.10
	(0.107)	(0.104)	(0.113)	(0.115)	(0.126)
preveduc	0.04	−0.03	0.00	0.01	−0.02
	(0.051)	(0.062)	(0.063)	(0.062)	(0.060)
prevunemp	−0.08	−0.03	−0.02	−0.02	0.02
	(0.070)	(0.072)	(0.075)	(0.074)	(0.081)
prevoth	−0.16*	−0.12	−0.11	−0.10	−0.12
	(0.092)	(0.090)	(0.090)	(0.094)	(0.095)
emptenure		0.02**	0.01*	0.01*	0.01*
		(0.008)	(0.008)	(0.008)	(0.009)
emptenuresq		−0.00	−0.00	−0.00	−0.00
		(0.000)	(0.000)	(0.000)	(0.000)
train_courses_in		0.03	−0.00	−0.01	−0.02
		(0.040)	(0.039)	(0.039)	(0.039)
train_courses_out		0.05	0.05	0.04	0.02
		(0.051)	(0.052)	(0.051)	(0.051)
train_ojt		0.01	0.01	0.00	0.01
		(0.038)	(0.038)	(0.038)	(0.040)
temporary			−0.00	−0.01	−0.05
			(0.086)	(0.087)	(0.074)
informal			0.04	0.05	0.10
			(0.110)	(0.112)	(0.126)
multisite			0.04	0.04	0.03
			(0.047)	(0.046)	(0.046)
private			−0.04	−0.04	−0.03
			(0.046)	(0.046)	(0.047)
size10to49			0.09	0.09	0.07
			(0.069)	(0.068)	(0.072)
size50to99			0.12	0.12	0.10
			(0.091)	(0.091)	(0.094)

Table 7.1 (continued)

	(1)	(2)	(3)	(4)	(5)
	Basic HC	Augmented HC	Job	Skill needs	Motives
size100to249			0.21***	0.21***	0.19**
			(0.082)	(0.081)	(0.085)
size250to499			0.20**	0.20**	0.16
			(0.099)	(0.099)	(0.097)
size500			0.22***	0.22***	0.22***
			(0.076)	(0.076)	(0.079)
jobnrout			–0.02	–0.04	–0.04
			(0.051)	(0.053)	(0.057)
joblearn			0.02	0.01	0.02
			(0.058)	(0.058)	(0.060)
jobaut			0.08	0.08	0.04
			(0.054)	(0.055)	(0.054)
jobteam			–0.05	–0.05	–0.07
			(0.042)	(0.043)	(0.046)
role_ promoted			0.03	0.01	–0.01
			(0.040)	(0.040)	(0.043)
advlit				0.08	0.08*
				(0.047)	(0.048)
advnum				0.04	0.01
				(0.044)	(0.044)
modict				0.02	0.03
				(0.068)	(0.067)
advict				0.02	0.03
				(0.082)	(0.082)
highiskill				0.10**	0.13***
				(0.045)	(0.051)
factor_ suitskills					0.01
					(0.012)
factor_ experience					–0.01
					(0.008)
factor_security					–0.03**
					(0.013)
factor_career					0.02*
					(0.011)
factor_ reputation					–0.01
					(0.011)
factor_ benefits					0.02**
					(0.011)
factor_ closehome					0.01
					(0.009)

(*continued*)

Table 7.1 (continued)

	(1)	(2)	(3)	(4)	(5)
	Basic HC	Augmented HC	Job	Skill needs	Motives
factor_intrinsic					−0.00
					(0.016)
factor_ worklife					−0.01
					(0.012)
Constant	1.66***	1.94***	1.84***	1.76***	1.87***
	(0.421)	(0.435)	(0.451)	(0.438)	(0.479)
Observations	790	789	789	789	696
R-squared	0.12	0.14	0.16	0.18	0.18

Notes: Robust standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source: Analysis of European Skills and Jobs Survey data for 2014

which are designed to reflect the human capital view of overeducation. Specifications (3) and (4) incorporate information on employer and job characteristics, such as firm size, contract type and job-skill requirements, and measure the influence of factors stressed by both assignment theory and the job competition model. Finally, specification (5) includes variables that measure job search information and reasons for job selection and is motivated by theories of job mobility, signalling and competing wages. As previously stated, overeducation is measured in terms of the level of educational attainment necessary to get the job. As wage and some other data is not available for all observations, the sample size falls across the OLS estimations.

In the most basic model, the overeducation pay penalty stands at 27%: that is, after controlling for age and levels of educational attainment, being overeducated in Ireland reduces earnings by 27 percentage points (ppts) relative to matched employees with similar levels of schooling. The inclusion of the human capital variables in specification (2) adds little to the model and the overeducation penalty falls only marginally. Employer and job characteristics, such as firm size and high-level soft skill requirements of the job, were more important with respect to both earnings and overeducation, with the pay penalty falling by 7 ppts in specifications (3) and (4). Finally, with respect to specification (5), earnings were higher for employees who stated that the benefits package and

career progression were important reasons for job selection, indicating that they had acquired a good level of prior information on the job before accepting. Consistent with theories of competing wages, earnings were 3 ppts lower in the instance where respondents indicated that job security was an important factor in job choice.[7] Following the inclusion of the additional variables in specification (5), the overeducation pay penalty fell by a further 5 ppts from 19% to 14%. Therefore, within the OLS framework, the overeducation pay penalty was found to vary from 14% to 27%, depending on the model specification adopted. It is clear from the models that the magnitude of the overeducation effect is sensitive to the inclusion of variables related to some theoretical framework, in particular those associated with assignment, job competition and signalling theory.

We can also use the ESJ survey to compare the wage impact of overeducation in Ireland relative to the EU average. Table 7.2 replicates the models for the EU 27,[8] which is the EU 28 sample excluding Ireland. Overall, while the overeducation pay penalty adjusts in a pattern similar to the Irish case, declining by approximately half between specifications (1) and (5), some important differences are apparent. First, the overeducation pay penalty is typically higher in Ireland. Furthermore, within the EU model, the overeducation coefficient was much more sensitive to the inclusion of job characteristics and skill requirements relative to the Irish case, suggesting that the assignment and job competition frameworks, and their associated policy conclusions, may be of less relevance within an Irish context. Conversely, the variables capturing preferences/job search appear more relevant to explaining overeducation in Ireland relative to the EU average. Finally, it is worth pointing out that the R^2 statistic implies that the wide range of variables included in the models account for over 50% of the variance in earnings within the EU data while, for Ireland, the comparable statistic lies below 20%, even for the most complete model (specification (5)). The reason behind the poor relative performance of the data in explaining Irish earnings is due to the fact that most of the variance in the EU 27 model is attributable to country-level fixed effects that are omitted from the Irish model.

To explore the matter further, we estimate Oaxaca decompositions using specification (5), in order to ascertain the relative importance of human capital, job characteristics, preferences, motives and so on in

Table 7.2 OLS Estimates of wage equation, all adult employees, 2014, EU27 (excluding Ireland)

	(1)	(2)	(3)	(4)	(5)
	Basic HC	Augmented HC	Job	Skill needs	Motives
overqualified	**−0.19*** **	**−0.18*** **	**−0.17*** **	**−0.12*** **	**−0.11*** **
	(0.012)	**(0.012)**	**(0.012)**	**(0.012)**	**(0.013)**
Age	0.03***	0.02***	0.02***	0.02***	0.02***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
agesq	−0.00***	−0.00***	−0.00***	−0.00***	−0.00***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
male	0.10***	0.10***	0.08***	0.08***	0.07***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
highisced	0.26***	0.26***	0.24***	0.19***	0.19***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.010)
prevsemp	−0.02	−0.00	0.01	0.01	0.01
	(0.023)	(0.023)	(0.023)	(0.023)	(0.024)
preveduc	0.06***	−0.01	−0.01	−0.01	−0.01
	(0.010)	(0.012)	(0.012)	(0.012)	(0.013)
prevunemp	−0.13***	−0.11***	−0.10***	−0.09***	−0.08***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)
prevoth	−0.07*	−0.07**	−0.06*	−0.05	−0.06
	(0.034)	(0.033)	(0.033)	(0.033)	(0.037)
emptenure		0.01***	0.01***	0.01***	0.01***
		(0.002)	(0.002)	(0.002)	(0.002)
emptenuresq		−0.00***	−0.00**	−0.00**	−0.00**
		(0.000)	(0.000)	(0.000)	(0.000)
train_courses_ in		0.07***	0.05***	0.04***	0.03***
		(0.008)	(0.008)	(0.008)	(0.009)
train_courses_ out		0.03***	0.03***	0.02*	0.02
		(0.011)	(0.011)	(0.011)	(0.012)
train_ojt		0.02**	0.01	−0.00	0.00
		(0.008)	(0.008)	(0.008)	(0.009)
temporary			−0.06***	−0.05***	−0.06***
			(0.016)	(0.016)	(0.017)
informal			−0.05	−0.04	−0.03
			(0.035)	(0.035)	(0.041)
multisite			0.03***	0.03***	0.03***
			(0.009)	(0.009)	(0.010)
private			0.02**	0.01	0.01
			(0.009)	(0.009)	(0.010)
size10to49			0.07***	0.07***	0.06***
			(0.013)	(0.013)	(0.014)

Table 7.2 (continued)

	(1)	(2)	(3)	(4)	(5)
	Basic HC	Augmented HC	Job	Skill needs	Motives
size50to99			0.09***	0.08***	0.07***
			(0.016)	(0.015)	(0.017)
size100to249			0.13***	0.12***	0.11***
			(0.015)	(0.015)	(0.016)
size250to499			0.16***	0.15***	0.14***
			(0.017)	(0.017)	(0.018)
size500			0.19***	0.18***	0.17***
			(0.015)	(0.015)	(0.016)
jobnrout			–0.01	–0.02**	–0.01
			(0.010)	(0.010)	(0.011)
joblearn			–0.02	–0.03***	–0.04***
			(0.012)	(0.012)	(0.013)
jobaut			0.03***	0.02**	0.01
			(0.009)	(0.009)	(0.010)
jobteam			–0.01	–0.00	–0.01
			(0.009)	(0.009)	(0.010)
role_ promoted			0.08***	0.06***	0.06***
			(0.009)	(0.009)	(0.010)
advlit				0.06***	0.06***
				(0.010)	(0.011)
advnum				0.03***	0.02**
				(0.010)	(0.011)
modict				0.09***	0.09***
				(0.011)	(0.012)
advict				0.14***	0.13***
				(0.015)	(0.016)
highiskill				0.03***	0.02
				(0.009)	(0.011)
factor_ suitskills					0.01***
					(0.002)
factor_ experience					–0.01***
					(0.002)
factor_security					–0.01**
					(0.003)
factor_career					0.00*
					(0.003)
factor_ reputation					–0.00
					(0.002)

(*continued*)

Table 7.2 (continued)

	(1)	(2)	(3)	(4)	(5)
	Basic HC	Augmented HC	Job	Skill needs	Motives
factor_ benefits					0.01*** (0.002)
factor_ closehome					–0.01*** (0.002)
factor_intrinsic					0.00 (0.003)
factor_ worklife					0.01*** (0.002)
Country dummies	YES	YES	YES	YES	YES
Constant	1.87*** (0.078)	2.05*** (0.082)	1.95*** (0.082)	1.85*** (0.082)	1.85*** (0.090)
Observations	35,105	35,002	35,002	35,002	31,004
R-squared	0.52	0.53	0.53	0.54	0.55

Notes: Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source: Analysis of European Skills and Jobs Survey data for 2014

explaining the overeducation wage effect. In the decompositions, consistent with approaches that adopt the technique to examine gender and race differentials, we take matched individuals as the reference category and are, therefore, decomposing the wage premium experienced by matched employees. It should be noted that this premium has been estimated using a model that controls for the various blocks of key variables that influence the impacts of overeducation. It is obvious from the OLS models that the overeducation pay penalty is related to factors such as job characteristics, preferences, motives and so on, suggesting that mismatched workers tend to have deficits in such key variables. The decomposition analysis measures the degree to which the premium that remains after all relevant factors are considered can be explained by variations in the levels of particular attributes, related to the various theoretical frameworks, held by matched and mismatched workers.

The results from the decompositions for both Ireland and the EU 27 are reported in Table 7.3. The results for Ireland indicate that the raw differential between matched and overeducated workers equated to a 19.7% advantage for the matched. After controlling for differences in observable characteristics, the premium to being matched fell to 13.5%, which

Table 7.3 Decomposition analysis of wage differences between matched and overeducated employees, adult employees, 2014, Ireland and EU27

	Overqualified IE	Overqualified EU 27
Amount attributable:	−162.4	−33.2
– due to endowments (E)	6.2	9.4
– due to coefficients (C)	−168.6	−42.5
Shift coefficient (U)	182.1	52.4
Raw differential (R) {E+C+U}	19.7	19.2
Adjusted differential (D) {C+U}	13.5	9.9
Endowments as % total (E/R)	31.5	48.2
Discrimination as % total (D/R)	68.5	51.8

Source: Analysis of European Skills and Jobs Survey data for 2014

is in line with the OLS results for specification (5) that measured the wage effect in terms of an overeducation wage penalty. The decomposition indicates that the superior attributes held by matched workers (the endowment effect (E)) led to a 6.2 ppt wage advantage, implying that just under a third of the observed raw wage differential can be explained by differences in the attributes of matched and overeducated workers. The remaining elements of the decomposition are largely uninformative, suggesting that the unexplained gap is accounted for by lower rates of returns for given attributes among matched workers (the coefficient effect (C)), which is more than counteracted by positive wage effects related to factors not captured in the model (the shift coefficient element (U)). The C and U terms suggest that while overeducated workers appear to enjoy higher returns for holding pay-related attributes, this advantage is more than eradicated by a higher pay premium to matched workers that is unrelated to the observable traits that determine pay. This finding is consistent with that of McGuinness (2003) who argued that much of the matched pay premium was associated with a non-productivity-related 'sheepskin effect' that arose merely as a consequence of acquiring a graduate-level job. As there is little further interpretive value we can place on these aspects of the results, we will focus on the more policy-relevant endowment effects.

Table 7.3 also provides the results for the EU 27. While the raw differential between matched and overeducated workers is almost identical to the Irish case, the share of the gap that can be explained by the data

(48.2%) is considerably higher than the Irish case (31.5%). Table 7.4 investigates this issue further by comparing the relative contribution of the various blocks of variables in explaining the gap. Generally speaking, the reference case (matched workers) will experience a positive endowment effect as a result of having a higher amount of an attribute that increases wages or less of a factor that decreases earnings. Conversely, a negative endowment effect will be generated if the reference groups have more of an attribute that reduces earnings or less of a factor that increases earnings. The sign of the coefficients in the OLS models gives a strong indication of whether a factor has a positive or negative impact on earnings.

The results from the decomposition reveal that the human capital endowments of matched workers were slightly inferior relative to their overeducated counterparts and that these differences actually reduced the matched premium by 1.7 ppts. A more detailed examination of the results revealed that while matched workers tended to be older and have longer tenure, which raised their expected wage, they were also somewhat less likely to be graduates and it was this factor that generated the overall negative effect relating to human capital differences. Such a result is again supportive of the existence of qualifications inflation, whereby matched workers tend to be older and non-graduate, while the overeducated are more likely to be younger workers with third-level qualifications. The results from the decomposition do not support the human capital hypothesis of overeducation, given that they suggest that matched workers should actually earn less than overeducated workers based on their levels of accumulated formal and informal human capital.

Table 7.4 Endowment effect broken down by category (%), 2014, Ireland and EU27

	Ireland	EU27
Human capital	–1.7	0.5
Job	0.5	1.6
Skill needs	2.8	4.5
Motives	4.6	2.8
Endowment effect	**6.2**	**9.4**

Source: Analysis of European Skills and Jobs Survey data for 2014

Differences in job characteristics also accounted for a very small amount of the raw wage gap. While matched workers had higher expected earnings as a consequence of a greater prevalence in larger firms, this was counteracted by negative wage effects associated with a higher presence in jobs that were team orientated or involved routine operations—see Table 7.5. Job skill requirements appear to be of high relevance in the Irish context, accounting for 14% of the raw gap: specifically, matched workers were more likely to be employed in posts requiring higher-level soft skills and advanced literacy skills. These results provide some support for the assignment theory explanation for overeducation, which stresses the importance of job characteristics in earnings determination. Job motives/job search factors proved to be of most importance in Ireland, with matched employees more likely to state that they accepted their current post because it: (i) suited their qualifications and skills; (ii) offered good career development; or, (iii) had good pay and fringe benefits. These combined factors resulted in a pay advantage to matched workers of 8.3%, accounting for 42% of the raw wage differential. The most important single variable was that the job suited their qualifications and skills, which resulted in an increase in matched workers' pay by 4 ppts (which equates to +25% of the total raw gap). While one could argue that such an effect also supports assignment theory, in that lower pay arises as a consequence of a high prevalence of jobs that constrain workers' capacity to utilise their abilities, the finding is also consistent with a signalling hypothesis. These decomposition results show that matched workers were much more likely to possess quality information on job-skill requirements, prospects and conditions before accepting their current posts, highlighting the importance of effective job search in avoiding overeducation. Interestingly, the finding that matched workers were more likely to accept jobs with good career progression runs contrary to the proponents of career mobility theory, which suggests that overeducation is a deliberate strategy adopted to achieve career progression at the cost of initial lower earnings. However, part of the career mobility motive might be related to the objective of gaining work experience, which is more likely to be undertaken by overeducated workers; nevertheless, the wage effects were minor accounting for a very small share (−3%) of the total raw gap. Finally, there is some

Table 7.5 Contribution of endowments in wage differences between matched and overqualified adult employees, 2014, Ireland and EU27

	Overqualified IE (%)	Overqualified EU27 (%)
% of total raw difference		
Human capital	–8.6	2.6
Job	2.5	8.3
Skill needs	14.2	23.4
Motives	23.4	14.6
Total endowment	31.5	48.2
% total raw difference (selected coefficients)		
Human capital		
Quadratic age	10	7
Quadratic employer tenure	12	14
High education	–32	–22
Past unemployment	–2	1
Training in work	1	3
Job		
Temporary contract	0	2
Size of workplace: 100+	6	1
Promoted	–1	2
Private	0	11
Learning in job	2	3
Skill needs		
Advanced literacy	4	–4
Advanced numeracy	–2	–3
Moderate ICT	1	4
Advanced ICT	2	0
High level of soft skills	10	3
Motives		
Information		
Suits qualifications & skills	25	24
Pay & benefits	7	–7
Career concerns		
Gain work experience	–3	–2
Career prospects	11	8
Job attributes		
Employer reputation	–3	–5
Close to home	–1	–6
Intrinsic satisfaction	–5	–12
Work-life balance	–2	11
Job security	–6	–3

Source: Analysis of European Skills and Jobs Survey data for 2014

evidence to support compensating wage effects in the Ireland sample, with matched workers forgoing earnings of around 2 ppts (−40% of the total raw gap), as a consequence of having a higher prevalence of jobs offering more security and increased intrinsic value.

An obvious technical concern affecting both the OLS models and the decompositions is that our measures of motives and job search are endogenous, that is, respondents' views for choosing their current jobs will be influenced, or wholly determined, by their experiences in them. Nevertheless, respondents to the survey were asked "*Before you started working for your current employer, how important, if at all, were the following factors in your decision to accept the job*" and is, therefore, specifically framed in order to reflect their thinking prior to job entry. While we cannot rule out the existence of subjective bias, we are confident that the question is sufficiently clear to support our interpretation of the variables as pre-entry measures of motives and job search. Furthermore, since we do not have a complete measure of people's skills, and such skills are likely to be endogenous with the skill requirements (i.e. a skilled person is likely to be employed in a job where she says that it required high skills to be performed), this may lead to some underestimation of the effect of human capital and some overestimation of the impact of job requirements.

Finally, Tables 7.4 and 7.5 also compare the outputs from the Irish decomposition with those from the EU 27. Within the EU 27 the largest driver of the explained gap relates to the skill requirements of jobs, with the higher incidence of matched employees in jobs with advanced literacy and ICT requirements representing the most important influences. The endowment effect relating to job characteristics was predominantly driven by a firm size effect, which equated to a pay advantage of 1.5 ppts (+8% of the total raw gap). Finally, the impact of motives/job search on the explained gap was lower despite some similarities, that is, matched workers had a higher incidence of being in jobs which had good career prospects and benefits (security), which tended to boost (reduce) their relative earnings. The results indicate that intrinsic satisfaction and work/life balance are more important within an EU context; however, as they move in opposite directions in terms of explaining the raw wage gap, they provide no consistent support for a strong compensating wage effect. In

summary, job characteristics are an important driver of the overeducation pay penalty within the EU 27; however, there is support for the role of signalling, while the evidence on compensating wage effects is more limited.

7.5 Conclusion

This chapter represents the first comprehensive analysis of overeducation in Ireland. We attempt to assess the phenomenon in terms of its incidence, impacts and determinants within a comparative framework using the European Skills and Jobs survey. When overeducation is assessed in terms of having surplus schooling relative to that required to 'get current job', approximately 15% of employees were classified as overeducated in Ireland during 2014, putting the country around the EU 28 average. Under this measure, overeducation among graduates in Ireland stood at just below 25% in 2014. With respect to overeducation measured in terms of education required to 'do current job', 21% of workers were deemed overeducated, which was one of the highest rates in the EU. Furthermore, just under half of those who were overeducated in terms of the education required to do their current job indicated that they were not overeducated in terms of the level of schooling required to get their current job, suggesting that the skill content of many Irish jobs does not equate with their entry requirements.

The overeducation pay penalty, based on the education level required to get the job, was found to vary from 14 to 27 ppts depending on the model specification adopted. It was clear from the models that the magnitude of the overeducation effect is sensitive to the inclusion of variables such as job characteristics and job search motives which, in turn, are related to a number of theoretical frameworks such as assignment, job competition and signalling theory. While the overeducation pay penalty within the remaining EU 27 countries adjusted in a pattern similar to the Irish case, declining by approximately half as additional variables were added to the model, some important differences are apparent. The wage impacts of overeducation are typically higher in Ireland; furthermore, within the EU model, the overeducation coefficient was much

more sensitive to the inclusion of job characteristics and skill requirements relative to the Irish case. Conversely, the variables capturing preferences/job search appear more relevant in explaining overeducation in Ireland relative to the EU average.

The decomposition indicates that the superior attributes held by matched workers (the endowment effect) lead to a 6.2 ppt wage advantage, implying that just under a third of the observed raw wage differential can be explained by differences in the attributes of matched and overeducated workers. Crucially, despite having a rich dataset, two-thirds of the overeducation pay penalty remained unexplained, suggesting that we remain a long way off from a position whereby a comprehensive policy response to overeducation in Ireland can be formulated.

From the perspective of theory, the results from the decompositions do not strongly support the human capital hypothesis of overeducation, given that they suggest that matched workers should actually earn less than overeducated workers based on their levels of accumulated formal and informal human capital. Therefore, while there were positive endowment effects for age, tenure and training, all supportive of a human capital explanation, the findings with respect to formal education limit the relevance of the framework. We find that matched workers tend to be older and non-graduate, while the overeducated are more likely to be younger workers with third-level qualifications. Such a result is again supportive of the existence of qualifications inflation, whereby employers are raising entry requirements in response to rising levels of educational attainment. Job skill requirements appear to be of more relevance in the Irish context, accounting for 14% of the raw gap: specifically, matched workers were more likely to be employed in posts requiring higher-level soft skills and advanced literacy skills.

These results provide some support for the view that overeducation is, at least in part, determined by job-skill requirements, which suggests that jobs with lower skill components place a productivity constraint on worker output that, in turn, results in lower wages. The role of job characteristics is consistent with an assignment theory-based explanation for overeducation and runs contrary to the central assumption of human capital theory that labour markets will adjust in order to enable

all workers to earn their marginal product. The largest component of the explained earnings premium enjoyed by matched workers related to them possessing good quality information on the skill requirements, career prospects and benefits of jobs prior to accepting them. This result is likely to reflect two influences: (i) an assignment/job competition interpretation whereby lower pay arises as a consequence of a low prevalence of jobs that enable workers to utilise their abilities and that matched workers were at the top of the queue for these jobs; and, (ii) the individuals who invested the most effort in establishing what the job's conditions and prospects were before accepting it reap the highest rewards, a finding consistent with a signalling hypothesis. It is impossible to say what the relevant balance between the two effects is likely to be: however, taken as a whole, the results of the study support the view that any policy response to overeducation in Ireland should focus on improving the productive flexibility of both existing and new jobs and improving labour market mechanisms that facilitate more informative methods of job search.

With respect to educational policy, crucially, the analysis at hand can only address the role of preferences, job characteristics and individual attributes in explaining the wage effects of overeducation. It cannot, however, measure the role of educational policy in determining the overall incidence of overeducation. Thus, while we can describe the wage determination process of workers in mismatched jobs, we cannot explain the rate of mismatch in Ireland or why it varies from the EU average, particularly in the case of the level of education required to do the job. Much more research is required to understand the extent to which the incidence of overeducation in Ireland is related to policy-relevant variables. The evidence here does suggest that at least some of the overeducation observed relates to qualifications inflation which, in turn, is potentially linked to graduate over-supply. The role of a range of factors related to educational policy such as (i) failures to account for demand side factors in educational planning, (ii) a lack of viable vocational options, and (iii) education funding arrangements, all need to be examined in this context. The research presented here does support the view that reducing informational asymmetries is a key factor

in alleviating the impacts of overeducation and, clearly, the provision of quality careers services within higher education institutions with strong links to employers is likely to be a vital component in this. Finally, it is worth reiterating that any policy response to overeducation cannot be limited to supply-side factors: the demand side of the economy is equally important and policy should also focus on ways of improving the quality and flexibility of jobs offered by both existing and new employers.

Notes

1. Matched employment refers to the situation whereby a worker's level of acquired education is in line with the level of schooling required to either get or do their current job.
2. A second objective approach based on the use of occupational dictionaries has also been applied in the literature—see McGuinness (2006) for details. However, this approach is now rarely adopted.
3. Cohort effects reflect a situation whereby job entry requirements vary between older and younger workers within the same occupation.
4. This is in contrast to McGuinness and Pouliakas (2015) which was based on the qualification necessary to do the job.
5. The analysis was replicated using the amended methodologies proposed by Neumark (1988) and Oaxaca and Ransom (1994), showing very similar results to the ones discussed in the paper.
6. We do not control for field of study differences as this information was collected only for workers with third-level qualifications; the third-level sample is not sufficient to allow for a separate analysis controlling for field of study effects.
7. The job choice variables are not mutually exclusive, that is, respondents could select more than one response.
8. Following advice to Cedefop, these estimates have been adjusted to take account of the use of employee survey data using the svy command in Stata.

7.6 Appendix: Variable Definitions

Variable	Definition
overeducated	D: 1 if respondent's highest level of education attained is greater than the qualification level needed to get current job; 0 otherwise
Human capital characteristics	
age	C: Age of respondent derived as difference between year of survey and declared date of birth in survey
agesq	C: Quadratic age term
male	D: 1 if male; 0 if female
highisced	D: Higher level of educational attainment (ISCED 5–6)
preveduc	D: Main activity before start of work with current employer was 'In education or training'
prevunemp	D: Main activity before start of work with current employer was 'Unemployed'
prevoth	D: Main activity before start of work with current employer was 'Other-not working (e.g. child care, family responsibilities, injury, disability)'
prevemp (reference)	D: Main activity before start of work with current employer was 'Employed in another job'
emptenure	C: years of tenure with current employer; derived as difference between year of survey and answer to the question: 'how many years in total have you been working for your current employer?'
emptenuresq	C: years of employer tenure squared
train_courses_in	D: In the last 12 months (since started your job if tenure less than 12 months) respondent has undergone 'training courses attended mostly or only during work hours'
train_courses_out	D: In the last 12 months (since started your job if tenure less than 12 months) respondent has undergone 'training courses attended mostly or only outside of work hours'
train_ojt	D: In the last 12 months (since started your job if tenure less than 12 months) respondent has undergone 'training courses whilst performing your regular job (e.g. instruction by supervisor/co-worker; job rotation; peer support; quality circles)'
train_no (reference)	D: In the last 12 months (since started your job if tenure less than 12 months) respondent has 'Not undergone any training'

(continued)

Variable	Definition
Job characteristics	
temporary	D: Type of employment contract in current job: 'A fixed-term/temporary contract'
informal	D: Type of employment contract in current job: 'No formal contract'
indefinite (reference)	D: Type of employment contract in current job: 'Indefinite/permanent contract'
multisite	D: 1 if respondent works for organisation with more than one workplace (e.g. a branch or local unit); 0 otherwise
private	D: 1 if respondent works in a private company or partnership; 0 otherwise
size1to9 (reference)	D: 1 if number of people who work in the respondent's workplace is: 1–9
size10to49	D: 1 if number of people who work in the respondent's workplace is: 10–49
size50to99	D: 1 if number of people who work in the respondent's workplace is: 50–99
size100to249	D: 1 if number of people who work in the respondent's workplace is: 100–249
size250to499	D: 1 if number of people who work in the respondent's workplace is: 250–499
size500	D: 1 if number of people who work in the respondent's workplace is: 500 and over
jobnrout	D: 1 if respondent's job involves, if at all, 'responding to non-routine situations during the course of the daily work'
joblearn	D: 1 if respondent's job involves, if at all, 'learning new things'
jobaut	D: 1 if respondent's job involves, if at all, 'choosing him/herself the way in which to do the work'
jobteam	D: 1 if respondent's job involves, if at all, 'working as part of a team'
role_promoted	D: 1 if respondent was promoted to a higher level position since he/she started working for the current employer; 0 otherwise
Job-skill needs	
advlit	D: 1 if the highest level of literacy skills required for doing the respondent's job is: advanced literacy (e.g. writing long documents such as reports, handbooks, articles or books); 0 if basic literacy (e.g. reading manuals, procedures, letters or memos)

(*continued*)

(continued)

Variable	Definition
advnum	D: 1 if the highest level of literacy skills required for doing the respondent's job is: advanced numeracy (e.g. calculations using advanced mathematical or statistical procedures; 0 if basic numeracy (calculations using decimals, percentages or fractions, understanding tables or graphs)
basicict (reference)	D: 1 if the highest level of Information, Communication and Technology skills required for doing the respondent's job is: Basic ICT (e.g. using a PC, tablet or mobile device for email or internet browsing)
modict	D: 1 if the highest level of Information, Communication and Technology skills required for doing the respondent's job is: Moderate ICT (e.g. word-processing; using or creating documents and spreadsheets); 0 otherwise
advict	D: 1 if the highest level of Information, Communication and Technology skills required for doing the respondent's job is: Advanced ICT (e.g. developing software, applications or programming; using computer syntax); 0 otherwise
highiskill	C (0–10 scale): an additive scale ranking the importance of a set of skills (communication, team-working, foreign language, customer handling, problem solving, learning to learn, planning and organisation) for doing the respondent's job based on question: 'How important are the following skills for doing your job?':
Job motives	
factor_suitskills	C (0–10 scale): Importance of factor in respondent's decision to accept the current job: 'The job suited your qualifications and skills'
factor_experience	C (0–10 scale): Importance of factor in respondent's decision to accept the current job: 'You wanted to gain some work experience'
factor_security	C (0–10 scale): Importance of factor in respondent's decision to accept the current job: 'The job provided security'
factor_career	C (0–10 scale): Importance of factor in respondent's decision to accept the current job: 'The job offered good career progression and development'
factor_reputation	C (0–10 scale): Importance of factor in respondent's decision to accept the current job: 'The company/ organisation was well known/respected in its field'

(continued)

Variable	Definition
factor_benefits	C (0–10 scale): Importance of factor in respondent's decision to accept the current job: 'The pay and package of fringe benefits (e.g. health insurance, bonuses) was good'
factor_closehome	C (0–10 scale): Importance of factor in respondent's decision to accept the current job: 'The job was close to home'
factor_intrinsic	C (0–10 scale): Importance of factor in respondent's decision to accept the current job: 'You were interested in the nature of the work itself'
factor_worklife	C (0–10 scale): Importance of factor in respondent's decision to accept the current job: 'The job had a good work-life balance'

Notes: D = dummy variable, C = continuous variable
Source: Created by authors

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Part IV

Benefits & Financing

8

The Economic Impact of Higher Education Institutions

Qiantao Zhang, Charles Larkin, and Brian M. Lucey

8.1 Introduction

From a historical perspective the economic way of thinking has not been prevalent in the development of, or policymaking decisions within, the Irish higher education sector. There is a lack of economic analysis underlying government decisions to expand the size of the sector, to cut exchequer funding, or to strengthen the role of the sector in building the knowledge-based economy. Nevertheless, we argue that greater importance should be placed on understanding the economic impact of students, institutions and the higher education sector as a whole, especially in the current period of funding crisis, as termed by some scholars as well as media. Without such understanding, the relevant policies

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and practices that are intended to address challenges faced by the sector would probably be unable to achieve their full potential.

Since the establishment of Trinity College Dublin in 1592, the higher education sector in Ireland has grown significantly in size. The rapid expansion of third-level education, however, did not begin until the 1960s, when the founding of institutes of technology (ITs) remarkably increased the number of higher education institutions (HEIs) in the country. Meanwhile, Ireland has seen its HEIs evolve from being concentrated in a few large cities to being dispersed throughout the country. In 1960, a total of 11 institutions were situated within five Irish counties, while within the next two decades the number of HEIs more than doubled to 24, spanning across 12 counties. Formerly known as Regional Technical Colleges (RTCs), ITs were created to provide courses mainly aimed at filling gaps in the industrial manpower structure, particularly in the technician area.

Along with the size expansion of the sector, the increase in student numbers was to continue from the early 1970s to the present day. The latest data show that 214,694 students enrolled at Irish HEIs in 2014–15 and the sector employed 17,000 core staff, including over 9000 academic staff (Higher Education Authority [HEA] 2015). Following the milestone event of introducing free higher education in 1996 by the Minister for Education, the amount of government funding in the sector increased considerably during the Celtic Tiger years. The economic crisis in 2008 overturned the trend, with state grant income to the sector dropping by 25% in the five-year period to 2011 and tuition fees now overtaking state grants as the highest source of income (Grant Thornton 2014).

Universities and ITs in Ireland began to be considered as part of a national innovation, research and development industrial policy from the 1990s. Over a decade, the Universities Act 1997 and the Institutes of Technology Act 2006 were passed. Science Foundation Ireland (SFI) was established with the passage of the Industrial Development Act 2003. In 2006, the Department of Enterprise, Trade and Employment published the Strategy for Science, Technology and Innovation aimed at placing research and higher education at the core of Irish economic policy (Department of Jobs, Enterprise and Innovation 2006). This was

followed by the Innovation Task Force, which reported in 2010, again placing the role of higher education in research and development (R&D) at the core of the Irish industrial policy.

Despite all these developments in the sector, little in the way of economic analysis has been undertaken. Presumption and inference were the norm—a presumption of more being better and inference from other jurisdictions, notably the UK. The expansion of the sector across regions was largely driven by the need for more technical and commercially linked training and upskilling, but we have not seen much analysis of the impact of those institutions on the regional economy. Similarly, few studies have examined the potential of a massive increase in the number of students attending HEIs leading to a crisis in higher education funding. National policies which call for greater contributions from universities and ITs to the economy have, to a large extent, not been supported by robust economic analysis. As Irish HEIs currently form an important part of the economic infrastructure and generate substantial economic activity, now is the time to undertake detailed economic analyses of the sector.

While there are many levels at which research could be focused, in this chapter we examine the economic impact of Irish HEIs. We incorporate both individual institutions and the university and IT sectors and aim to provide a broad overview of the impact of the sector. In the history of impact studies, two main methodological strands have been used, often concurrently—one relies on the use of input-output analysis, the other on a Keynesian multiplier approach. There is little existing modelling in the public domain in Ireland on university multipliers, except for the reports on the social and economic impact of two Irish HEIs (Viewforth Consulting 2014, 2015) and the study by Zhang et al. (2015) on the economic impact of the whole higher education sector. In contrast to these previous studies, this chapter instead adopts a Keynesian multiplier approach and is organised as follows: the methodology for the empirical estimation of our model is described in Sect. 8.2, followed by Sect. 8.3 which outlines the dataset collected for the analysis. Next, the results are presented in Sect. 8.4 and are compared with those of other international and national studies. Section 8.5 offers some concluding remarks.

8.2 Methodology

Our analysis is undertaken using the model originally defined by Bleaney et al. (1992) and later by Armstrong et al. (1994), Huggins and Cooke (1997), and more recently by Sen (2011), all of which measured the economic impact of individual universities on the local and regional economy. It is confined to a single base year, 2010–11, which reflects the latest year for which *comprehensive* comparable accounting data are available for Irish universities. This also facilitates comparison with the Zhang et al. (2015) analysis of Irish HEIs which uses the same data period. As Sen (2011, p. 29) has stated, "the full impact of any expenditure injection is likely to occur over a number of years", and therefore the results should be interpreted with caution. In the analysis it is necessary to make a number of assumptions, which are noted throughout the chapter wherever needed.

At the outset, the model involves estimating the size of an initial monetary injection into the local economy. This expenditure base is given as:

$$E = L + G \tag{1}$$

where E = expenditure base, L = labour services bought by the HEI, and G = goods and services bought from outside by the HEI. E excludes pensions (though not employees' pensions contributions) and depreciation. Given this, first-round gross local output (GLO) is defined as:

$$Y_1 = L + A + hG \tag{2}$$

where Y_1 = first-round GLO, h = the proportion of G generated locally, and A = the additional labour incomes of HEI employees. Similarly, we can describe first-round local disposable income (LDI) as:

$$D_1 = (1 - t)(Y_1 - hiG) \tag{3}$$

where D_1 = first-round impact on disposable incomes of local residents, i = the indirect tax rate (e.g. Value Added Tax (VAT)), and t = a direct tax

rate (which allows for reduced unemployment benefits as well as income taxation).

In the second round, the impacts of student expenditures on the local economy are included, and second-round GLO is given as:

$$Y_2 = vZ + wcD_1 \tag{4}$$

where Z = total spending by students, v = the proportion of student expenditures made on locally produced goods and services, w = the proportion of staff spending on locally produced goods and services, and c = the proportion of staff income consumed (the remainder being saved)—the marginal propensity to consume (MPC). In the same way as above, we can then get second-round LDI as:

$$D_2 = (1-t)(1-i)Y_2 \tag{5}$$

Assuming once more a rate of local re-expenditure of w, a third round of expenditure is obtained as:

$$Y_3 = wcD_2 \tag{6}$$

$$D_3 = (1-t)(1-i)Y_3 \tag{7}$$

while again assuming a rate of local re-expenditure of w, a fourth round of expenditure is obtained as:

$$Y_4 = wcD_3 \tag{8}$$

$$D_4 = (1-t)(1-i)Y_4 \tag{9}$$

and so on.

After all rounds of the multiplier process we obtain the final GLO Y_f and the GLO multiplier is given as:

$$\begin{aligned}\frac{Y_f}{Y_1} &= \frac{\left(Y_1 + Y_2 + Y_3 + \cdots\right)}{Y_1} \\ &= 1 + \frac{\left(1 + wc\left(1-t\right)\left(1-i\right) + \cdots\right)Y_2}{Y_1} \\ &= 1 + Y_2 \,/\left[1 - wc\left(1-t\right)\left(1-i\right)\right]Y_1\end{aligned} \tag{10}$$

In the same way we can also obtain final LDI D_f and the LDI multiplier is given as:

$$\begin{aligned}\frac{D_f}{D_1} &= \frac{\left(D_1 + D_2 + D_3 + \cdots\right)}{D_1} \\ &= 1 + \frac{\left(1-t\right)\left(1-i\right)\left(1 + wc\left(1-t\right)\left(1-i\right) + \cdots\right)Y_2}{D_1} \\ &= 1 + \frac{\left(1-t\right)\left(1-i\right)Y_2}{\left[1 - wc\left(1-t\right)\left(1-i\right)\right]D_1}\end{aligned} \tag{11}$$

8.3 Data and Parameters

8.3.1 Data

Our analysis draws on a number of data sources, both secondary and primary. Ireland's higher education is provided mainly by seven universities, 14 ITs, including Dublin Institute of Technology (DIT), and seven colleges of education (CEs). Due to data limitations we exclude the CEs and private HEIs such as the Royal College of Surgeons in Ireland. There are also a number of third-level institutions which provide specialist education in such fields as art and design, medicine, business studies, rural development, theology, music and law. Thus, the main focus of our analysis is on the seven universities and the 14 ITs, where the bulk

of third-level public and private spending and students are located. We report the results for the university sector and the IT sector respectively.

Data on HEI income and expenditure in 2010–11 was sourced from the HEA, the statutory planning and policy development body for higher education and research in Ireland. Both the university and IT sectors include institutions which vary significantly in terms of size as measured by expenditure.

In order to analyse the regional impact of institutions, it is key to understand what a 'region' means in this context and how to define it. Our initial choice of regional classification followed the geographical locations of institutions, which in Ireland are defined as local authorities. In that sense, there are three universities situated in Co. Dublin, with the remaining four universities situated in Co. Galway, Co. Kildare, Co. Cork and Co. Limerick respectively. However, this classification may not be the best way to capture the expenditure linkages of universities in Ireland, which itself is a rather small country with the majority of its economic activities concentrated in a few city-regions. To capture this, and for consistency with other data sources, we instead use Nomenclature of Territorial Units for Statistics (NUTS) III regions. Thus, we run the analyses with the Dublin and Mid-East regions being combined, covering four universities—Dublin City University (DCU), Maynooth University (MU), Trinity College Dublin (TCD) and University College Dublin (UCD)—and four ITs—Blanchardstown, Dublin, Dún Laoghaire and Tallaght. We refer to this as the Greater Dublin Area (GDA). We use NUTS III region Mid-West for the University of Limerick (UL), covering Co. Clare and Co. Limerick, and so forth.

Based on the above classification, we calculated the proportion of goods and services purchased by universities from regionally based businesses and from nationally based businesses. Unfortunately, this information was not available from either individual institutions or the HEA. Data underlying this calculation was instead based on analysis of 'top supplier' information in 2010–11, which was kindly provided by the Irish Universities Association (IUA). The IUA analysis includes the top 150 suppliers, measured as the expenditure made to each supplier, for each of the seven universities. The Financial Analysis Made Easy (FAME) database was accessed to geo-locate the businesses. Additional web searching

was undertaken when it was difficult to determine the address of a business based on the results from the FAME database. Companies that were not accurately located after the two steps were excluded from the analysis, which results in the fact that the number of top suppliers varies from one university to another.

To be more specific, the number of top suppliers examined in our analysis varies from 96 for UL to 124 for TCD. The total expenditure made to this small band of top suppliers is substantial, ranging from over €15 million for MU to more than €43 million in the case of UCD. The value of expenditure covered in our list of firms represents 30% of the total expenditure of UL on goods and services, and this number increases to 40% for University College Cork (UCC) and over 51% for MU. It should be highlighted again that it is top supplier expenditure only that we consider in the model, probably leaving out a large number of small suppliers. As suggested by the findings of Armstrong et al. (1994) and Huggins and Cooke (1997), universities tend to make a substantial number of small purchases from local businesses. It is reasonable for one to argue that our selection of top suppliers only could lead to an underestimation of the impact of universities on the local economy.

We have no comparable detailed information on the supplier base of ITs, but it was considered reasonable to use the university data as proxies for them. In particular, as we have found out, universities in GDA tend to report a much higher value of h than those situated elsewhere, a pattern we consider would also hold for the ITs. Therefore, we use the average value of h reported by the four GDA-based universities in the calculation of ITs Blanchardstown, Dublin, Dún Laoghaire and Tallaght, and the average value of h reported by the other three universities in the calculation of ITs located outside the GDA.

8.3.2 Parameters

To implement the model we require a number of parameters. As is common in this area of research we find ourselves using parameters from different data sources across a number of years, and these years do

not necessarily align to the accounting data. The implicit assumption therefore is that the parameters are constant, or slowly changing, across time. Given the relatively short time frame across which data are sourced in this study, this seems a reasonable assumption.

The additional labour income of HEI employees (A) was set at 0, partly because of a lack of valid data. We contend that it is likely to be low in any case. Irish revenue data suggest that employees on Pay As You Earn (PAYE) taxation (which includes all staff covered here) have a typical additional income of approximately 1% per annum. To this extent, there is additional income uncaptured by this measurement, meaning that our results represent the economic impact of Irish HEIs in a conservative way.

Data on the direct tax rate (t) and indirect tax rate (i) was sourced from the Nevin Economic Research Institute (NERI). Collins and Turnbull (2013) used data from the most recent Household Budget Survey (HBS), which was published in 2012 covering data for the period 2009–10, to estimate both the direct and indirect taxation contributions of households. According to the authors, Irish households contribute, on average, 13.7% of their gross income in direct taxes and 10.3% of their income in indirect taxes, which values we use in our analysis.

To determine the total spending by students (Z) and the proportion of student expenditures on goods and services in the locality (v), a student expenditure survey was designed and circulated to students enrolled at two Irish universities, namely the National University of Ireland, Galway (NUIG) and TCD. This was undertaken in late spring 2013 and we were able to elicit 758 responses from TCD students and 482 responses from NUIG students, all of whom indicated their weekly expenditure during term time of 2013–14. For the purpose of this study part-time graduates were excluded when analysing the responses, as they were assumed to be from the locality and to already be in residence. It was found that average weekly spending was €149.60 for a TCD student and €151.04 for a NUIG student, suggesting no significant difference between the expenditure of Dublin-based and non-Dublin-based students. Our results appear to be comparable to those of the fifth Irish Eurostudent survey 2013 published by the HEA and Insight Statistical Consulting, which claimed the average monthly expenditure met by

the students themselves was €607—see Harmon and Foubert (2014). In the absence of information for other institutions, we therefore used the TCD student results for the other Dublin/Kildare institutions and applied the NUIG student results in the analysis of institutions situated outside the GDA. On examination of the academic calendars of Irish HEIs we decided to include 30 and 38 weeks in the calculation of total spending by undergraduates and full-time postgraduates respectively. The number of students enrolled at the universities was sourced from the HEA. Of total spending by TCD students, it was estimated that 86% took place within the Greater Dublin Area and 96% took place in Ireland. From the NUIG student survey, 83% of expenditure took place within the same region, while only 2% of expenditure took place outside Ireland.

Alongside the student survey we also carried out a staff expenditure survey to measure the spending pattern of employees in Irish universities (w). In total the survey generated 383 usable responses from TCD staff and 176 from NUIG staff. Survey results indicated that 77% of TCD staff expenditure took place inside the GDA and a further 12% of expenditure was spent in other Irish regions. For staff working at NUIG, around 73% of their expenditure was spent within Co. Galway, with only 10% of expenditure taking place outside Ireland. Similar to the student survey results, the TCD staff results were used for the other institutions situated within the GDA, while the NUIG staff results were applied when examining the case of those HEIs located outside the Dublin/Kildare area.

The MPC (c) in Ireland was estimated as 0.31, based on the findings of an International Monetary Fund (IMF) study. Bhattacharya and Mukherjee (2010) used data from 18 Organisation for Economic Co-operation and Development (OECD) countries and showed a wide variation in the MPC across countries. Furthermore, the value of c in Ireland is, as we would expect for a small open economy which has very significant imported consumption, much smaller than that undertaken in the other studies: for example, c was estimated as 0.65 in the Izmir study by Sen (2011) and 0.90 in the Cardiff study by Huggins and Cooke (1997).

8.4 Results

8.4.1 Results for the University Sector

The analysis above was applied to estimate a number of multipliers. In particular, we used an output approach and an expenditure approach to calculate multipliers of GLO and LDI. To clarify, in the output approach the two multipliers are given as Y_f/Y_1 and D_f/D_1, while in the expenditure approach they are given as Y_f/E and D_f/E. These results are summarised in Table 8.1.

In 2010–11 Irish universities had the effect of generating a GLO nationally of €2.12 billion, with a concomitant generation of LDI nationally of €1.71 billion. Overall, the GLO multiplier on an output basis was estimated as 1.75 so that every €1 of initial increase (decrease) in the expenditure base would result in a rise (fall) of €1.75 in GLO in Ireland.

Table 8.1 Multipliers of Irish universities

		Output approach		Expenditure approach	
		GLO-O-M	LDI-O-M	GLO-E-M	LDI-E-M
All	Ireland	1.75	1.70	1.69	1.36
DCU	Regional	1.66	1.62	1.60	1.29
	National	1.77	1.72	1.72	1.38
NUIG	Regional	1.81	1.75	1.33	1.08
	National	1.83	1.78	1.80	1.44
MU	Regional	1.81	1.75	1.68	1.35
	National	1.91	1.85	1.87	1.50
TCD	Regional	1.58	1.53	1.45	1.18
	National	1.67	1.62	1.57	1.29
UCC	Regional	1.70	1.63	1.29	1.06
	National	1.74	1.69	1.72	1.39
UCD	Regional	1.61	1.56	1.53	1.24
	National	1.70	1.65	1.66	1.34
UL	Regional	1.84	1.77	1.21	0.98
	National	1.85	1.80	1.64	1.32

Notes: GLO-O-M refers to GLO multipliers from an output approach. GLO-O-E refers to GLO multipliers from an expenditure approach. LDI-O-M refers to LDI multipliers from an output approach. LDI-E-M refers to LDI multipliers from an expenditure approach

Source: Authors' own calculations

For income, the LDI multiplier on an output basis was estimated as 1.70 so that every €1 of initial increase (decrease) in the value of disposable income from universities would lead to a rise (fall) of €1.70 in LDI. To compare with the results of input output analysis, we will concentrate on the GLO multiplier from output approach measures (GLO-O-M).

Turning to the individual universities, we note that in all cases the impact nationally is greater than regionally. This is as we would expect—the footprint of any industry or unit is diffused geographically, and in a small country such as Ireland this diffusion is likely to be almost nationwide. People in the south-west and in Donegal are suppliers to and consumers of the Dublin-based universities, people in Dublin similarly for the western universities. There is a quite evident negative relationship in the estimated multipliers with universities with lower spends having the greatest multipliers—see Fig. 8.1. One possible explanation for this would be if universities exhibited decreasing returns to scale. The three largest universities in terms of expenditure (UCD, TCD and UCC) also show GLO-M metrics lower than the national average, across all measures.

8.4.2 Results for the IT Sector

This section presents the results for the IT sector, for which we also calculated sectoral and individual multipliers—see Table 8.2. In 2010–11, ITs had the effect of generating a GLO nationally of €1.33 billion, with a concomitant generation of LDI nationally of €1.08 billion. Overall, the GLO multiplier on an output basis was estimated as 1.90. Every €1 of initial increase (decrease) in the expenditure base would result in a rise (fall) of €1.90 in GLO in Ireland. For income, the LDI multiplier on an output basis was estimated as 1.86. Every €1 of initial increase (decrease) in the value of disposable income from universities would lead to a rise (fall) of €1.86 in LDI. These two multipliers in the IT sector are both larger than those in the university sector.

Figure 8.2 shows the association between the estimated multipliers and expenditure bases of ITs. In comparison to the university sector, the IT sector shows a more complicated pattern. With the largest expenditure

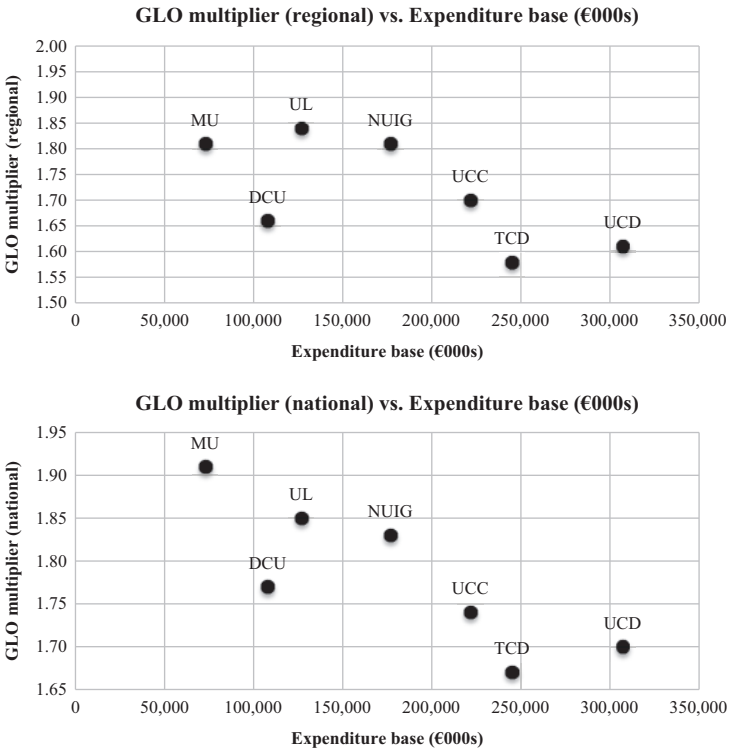

Fig. 8.1 Relationship between the GLO multipliers of Irish universities (Regional and National) and their expenditure bases. *Source*: Authors' own calculations

base, DIT has the smallest multipliers, a finding in line with the university sector that implies decreasing returns to scale. But there are many exceptions in the IT sector to this phenomenon. IT Carlow, for example, is in the middle range in terms of expenditure base, but it exhibits the largest multiplier across all ITs, significantly higher than those shown by a few ITs which are much smaller in scale. Except DIT, all ITs are much smaller than their university counterparts and closely clustered. It is possible to think that part of the reason for a complicated pattern of the association between the multipliers and expenditure bases of ITs is their similar size. Without a significant difference in 'scale', there is a less obvious pattern of decreasing returns to scale.

Table 8.2 Multipliers of Irish ITs

		Output approach		Expenditure approach	
		GLO-O-M	LDI-O-M	GLO-E-M	LDI-E-M
All	Ireland	1.90	1.86	1.86	1.50
Athlone	Regional	1.83	1.76	1.49	1.21
	National	1.92	1.85	1.86	1.51
Blanchardstown	Regional	1.89	1.82	1.83	1.48
	National	2.03	1.95	1.99	1.61
Carlow	Regional	2.06	1.96	1.72	1.40
	National	2.18	2.08	2.12	1.71
Cork	Regional	1.84	1.76	1.49	1.22
	National	1.92	1.85	1.87	1.51
Dublin	Regional	1.67	1.62	1.60	1.30
	National	1.78	1.72	1.73	1.41
Dundalk	Regional	1.80	1.73	1.54	1.26
	National	1.91	1.84	1.87	1.52
Dún Laoghaire	Regional	1.82	1.76	1.72	1.39
	National	1.94	1.87	1.88	1.51
Galway-Mayo	Regional	1.87	1.79	1.56	1.27
	National	1.97	1.89	1.92	1.55
Letterkenny	Regional	1.77	1.70	1.55	1.27
	National	1.89	1.82	1.86	1.51
Limerick	Regional	1.87	1.79	1.56	1.27
	National	1.98	1.90	1.93	1.56
Sligo	Regional	1.86	1.78	1.57	1.28
	National	1.97	1.89	1.92	1.56
Tallaght	Regional	1.89	1.81	1.82	1.47
	National	2.02	1.94	1.98	1.60
Tralee	Regional	1.72	1.66	1.41	1.15
	National	1.81	1.75	1.76	1.43
Waterford	Regional	1.75	1.68	1.46	1.19
	National	1.85	1.78	1.80	1.46

Notes: GLO-O-M refers to GLO multipliers from an output approach. GLO-O-E refers to GLO multipliers from an expenditure approach. LDI-O-M refers to LDI multipliers from an output approach. LDI-E-M refers to LDI multipliers from an expenditure approach

Source: Authors' own calculations

8.4.3 National and International Comparisons

In this section we undertake two sets of comparisons. First, we benchmark our results with those from studies which also use a Keynesian multiplier approach. To our best knowledge, there is no previous study that has

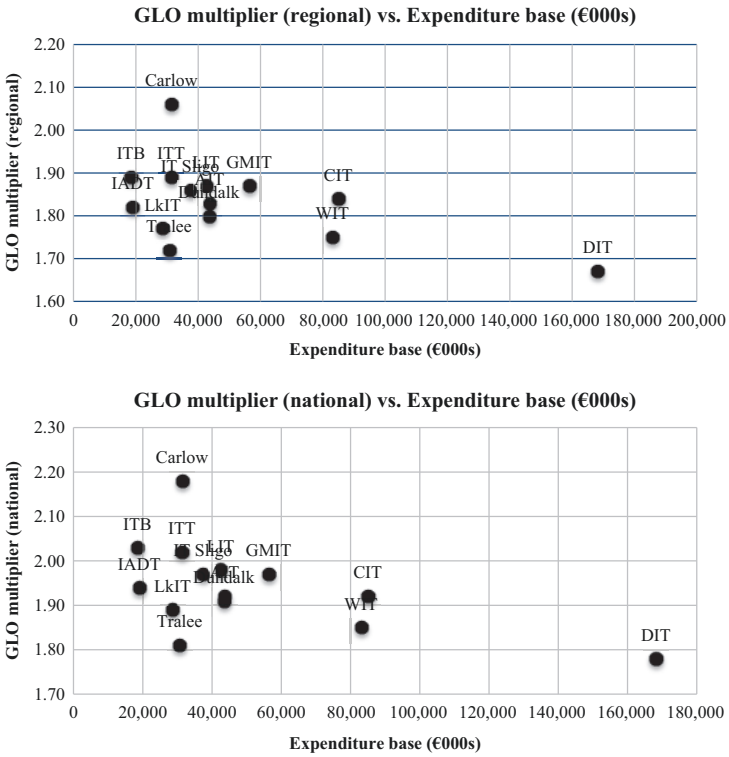

Fig. 8.2 Relationship between the GLO multipliers of Irish ITs (Regional and National) and their expenditure bases. *Source*: Authors' own calculations

examined Irish universities using this approach, although some research has adopted this approach to analyse the impact of other industries in Ireland. We compare our results with studies examining universities in countries such as the United Kingdom (UK) and Turkey. Second, we compare our results with those from Zhang et al. (2015), which examines the economic impact of Irish HEIs but uses input-output analysis.

Hermannsson et al. (2012) examine multipliers for a number of Scottish universities derived from both Keynesian and input-output models. Those multipliers range from a high of 2.15 to a low of 1.24, with the majority in the 1.5–1.75 range. In Hermannsson et al. (2015) a series of multipliers for London-based HEIs are given, which tend to be in the region of 3. Sen (2011) gives a range of 2.5 to 3 for multipliers

calculated on a comparable basis to here. Huggins and Cooke (1997) provide a set of UK comparable multipliers, ranging from 1 to 3, with the majority in the 1.5–2 region. Bleaney et al. (1992) calculate a multiplier set of between 1.2 and 1.7 for their study. We can thus see that the multipliers found here are in broad agreement with the findings of other research that also uses the Keynesian multiplier approach, with the exception of the London universities. London, however, is a very concentrated market with over 50 HEIs in a very concentrated area. Thus, it is highly probable that factors such as economies of co-production across the city are at play in the generation of these high multipliers. A number of the London institutions are also both highly specialised and high in expenditure given this specialisation. With the arguable exception of the Royal College of Surgeons in Ireland, Irish HEIs, and especially those covered here, are broad in nature. Most ITs have small elements of arts, humanities and social sciences, as an example, despite their STEM and technology focus.

We should also note that, although not strictly comparable, these multipliers are higher by a significant margin than the overall national fiscal multiplier of 0.5 as used by the IMF and the Irish Fiscal Advisory Council (IFAC) and those of the Economic and Social Research Institute (ESRI) (IFAC 2013; Kearney et al. 2013). The ESRI multipliers range from 0.3 to 1.2. Our estimates here are closer to, but in most cases greater than, the overall expenditure multipliers in O'Farrell (2013), which range from 1.06 to 1.76.

The comparison between our results and those from studies which also adopt a Keynesian multiplier approach is essential, but it is also of interest to compare our results with previous research that focuses on the Irish higher education sector. As already indicated, there is little such evidence existing in the Irish context, with a few notable exceptions. Although the reports by Viewforth Consulting reveal insightful results for two individual universities, we would ideally like to compare results at both institutional and sectoral levels. Zhang et al. (2015) in their input-output analysis examine the economic impact of the whole higher education sector in Ireland, including both the seven universities and 14 ITs. Thus, it is more pertinent to compare our results with those of Zhang et al. (2015).

It is beyond the scope of this chapter to explain in great detail the methodology employed for input-output analysis. A comprehensive review of some of the methodological and interpretational challenges can be found in Siegfried et al. (2007). Simply put, there are a variety of multiplier effects one could derive from the input-output analysis, including output, income, employment or gross domestic product (GDP). The output multiplier for each sector refers to "the change in total output for the economy as a whole resulting from a unit change in the final demand for that sector" (Hermannsson et al. 2015, p. 9). The Type I output multiplier for a particular industry is defined to be "the total of all outputs from each domestic industry required in order to produce one additional unit of output" (Scottish Government 2011, p. 26), while the Type II output multiplier incorporates "not only the increase in demand for intermediate inputs but also induced household consumption effects" (Hermannsson et al. 2015, p. 9). In other words, the Type I multiplier can be defined as direct and indirect effects, and the Type II multiplier can be defined as direct, indirect and induced effects.

As this chapter considers the economic impact of the spending made by HEIs, students and staff, it is more suitable to compare our results with the Type I output multipliers found in Zhang et al. (2015). However, it should be noted that analyses of this type miss out on 'downstream' effects but have the advantage of providing a clean 'sectoral' impact. While we think that the comparison should be made with great caution due to the significant differences between the two methodologies, it is still of interest to show whether HEIs perform similarly or differently in the two approaches. In other words, in this comparison we are more interested in the patterns of institutional performance than in the exact multipliers shown by institutions, as the multipliers are determined by the exact methods used for analysis. For example, we would like to know if decreasing returns to scale still exists in input-output analysis, as appears to be the case in the Keynesian multiplier approach.

In Fig. 8.3 we show the comparisons between the results of the two methods for the university and the IT sector respectively. For Irish universities, there seems no clear evidence of decreasing returns to scale in the input-output analysis. UCD, the largest HEI in Ireland measured by expenditure, shows the highest value of Type I output multiplier. MU,

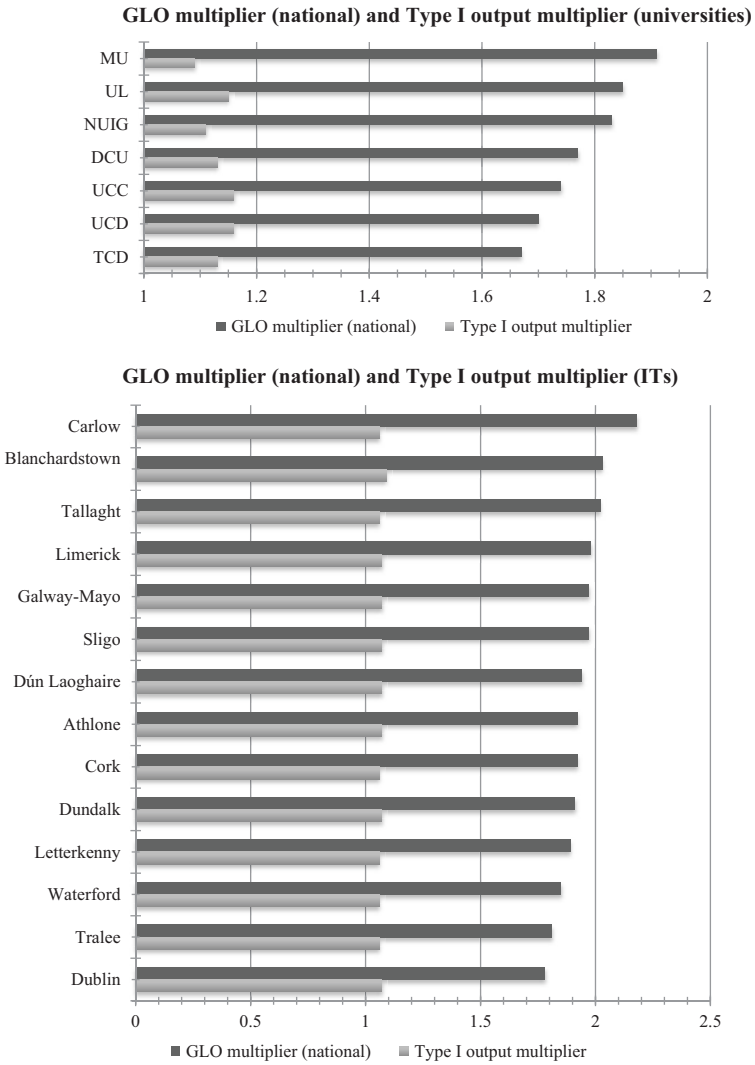

Fig. 8.3 GLO multipliers (national) and Type I output multipliers of Irish universities and ITs. *Source*: Authors' own calculations

the institution which exhibits the largest Keynesian multiplier, falls at the bottom of the rankings in the input-output analysis. While the Type I output multipliers of Irish universities are in general smaller than the Keynesian ones, they are still larger than 1, indicating a positive impact of the institutions. In the IT sector, most institutions show Type I output multipliers between 1.06 and 1.08, and the difference between institutions is really minor. What this comparison tends to suggest is that although each methodology has its own advantages and disadvantages, different methods lead to quite different results in many ways. We would thus suggest that, as is good practice, great care should be taken with using any one model and a triangulation is more likely to yield sensible results.

8.5 Conclusion

In Ireland the higher education sector has increasingly been considered by policymakers to be a crucial component of the national economic strategy. From the late 1990s onwards, Ireland has seen the release of a series of national policies targeting investment in science and technology, in particular in its HEIs. Despite the strong commitment of state resources to the sector, little in the way of formal economic impact analysis has been undertaken. There is however a need to do so from both theoretical and practical perspectives. This chapter aims to address this gap and provides some evidence of the economic impact of seven Irish universities and 14 ITs, the two main types of HEIs in Ireland that provide third-level education and conduct research activities.

There have been two main methodological strands used in the examination of economic impacts of a wide range of actions. In this chapter we use a Keynesian multiplier approach, used by most early studies of university impact, as more recent work has tended to concentrate on input-output modelling. The reason for us to choose this more conventional approach over input-output analysis is that there exists no modelling of university multipliers using this approach, while a few notable exceptions undertake input-output analysis of the Irish higher education sector.

Our chapter measures the economic impact of Irish HEIs through two main channels: (1) purchases of goods and services from external organisations; and, (2) expenditure of staff and students. In 2010–11, the Irish higher education sector generated a gross output of €3.45 billion to the Irish economy, of which €2.12 billion was from the university sector and €1.33 billion from the IT sector. The picture painted overall is of a higher education sector which adds considerable gross value to the economy, in line with the findings of previous studies.

The sector is now faced with a funding gap while taking in a growing number of students, which could inevitably undermine the quality of education Irish HEIs provide. In an era of global competition for staff, international students and research funding, these difficulties may result in undesirable outcomes for the Irish higher education sector as a whole. As argued, the economic way of thinking has not been prevalent in policymaking in the sector, but there is now an urgent need to do so. Along with those few existing studies, this chapter contributes in forming an evidence base for policy decision.

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9

The Returns to Third Level Education

Darragh Flannery and Cathal O'Donoghue

9.1 Introduction

The human capital framework indicates that education improves an individual's productivity and so results in increased earnings. While both Adam Smith [1776] (1979) and Alfred Marshall [1890] (1961) alluded to the relationship between the accumulation of human capital and earnings in their seminal works, the formal theoretical modelling began with the work of Mincer (1958), Schultz (1961) and Becker (1964). Subsequently, this relationship has formed the basis for much of the empirical work produced in the past 50 years within the economics of education literature, which has mainly focused on estimating the returns in the labour market to investing in education.

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Specifically, the private return to education is commonly measured by comparing the private benefits of extra education in the shape of higher life-cycle earnings against the private cost to the individual of education. Moreover, those with higher levels of education may also accrue non-monetary returns such as higher levels of happiness and better health. As noted in Chap. 2 of this book, the human capital framework suggests that like any investment, higher private returns to education will lead to higher levels of participation. Varying demand for education has important policy implications due to the association between higher education levels and economic growth. Furthermore, an examination of the private returns to third level education helps inform the debate around the financing of the sector, since high private returns may justify placing a higher cost burden upon students themselves. The public/fiscal return to education is also significant within this context. This can determine the return to government from expenditure on education and can be useful from a policy perspective. For example, it may be compared to the return from other areas of public expenditure to help gauge the best use of resources. This may also help assess the recent policy of declining public investment in higher education in Ireland.

Different techniques are available when calculating these returns, notably the internal rate of return (IRR) measure and the earnings function method. These have been used extensively to illustrate a positive private return to education, mainly using gross earnings variations as the main measurement of the benefit of extra education (Psacharopoulos and Patrinos 2004). However, some variations of the basic specification of these methods have been highlighted, particularly when estimating the private return to education. For instance, higher gross earnings from education may alter taxes/benefit liabilities (Heckman et al. 2008) and extra education may affect labour supply decisions (Booth and Coles 2007; Trostel and Walker 2006), both of which may alter the estimated return to education from a private viewpoint. Some studies, such as Harmon et al. (2001), Trostel et al. (2002) and Harmon et al. (2002), have incorporated the influence of the tax system on the private returns

to education through the use of net earnings as the outcome variable. However, this methodology does not allow the analysis of the impact of specific tax/benefit policies on the private returns and ignores the possible employment effect of additional education. This framework, like much of the literature in this area, also ignores the measurement of public returns.

Some of the few studies to explicitly estimate the net private and public returns to education include De La Fuente and Jimeno (2009) and OECD (2015). The former estimates these returns for 14 European countries, while the latter provides estimates for the majority of OECD countries. However, both these studies use average national wages to estimate the impact on gross earnings and average national tax data to simulate tax liabilities and so the estimates may be flawed. This is in contrast to using more micro-level data to provide more robust estimates of these relationships. With this in mind, Flannery and O'Donoghue (2016) attempted to bridge this methodological gap in estimating the net private and fiscal returns to education for Ireland by using micro-level data techniques. However, the data used in that study was quite dated (from the year 2000) and the analysis was confined to exploring the impact of increasing education in a marginal sense, that is, each individual was simulated to gain an extra year of education. Therefore, it cannot tell us about the specific return to completing third level education, for example. In this context, this chapter aims to utilise the methodology outlined by Flannery and O'Donoghue (2016) to both update and refine the estimates of the fiscal and private returns to tertiary education in Ireland. It also explores some non-pecuniary returns to higher education by looking at how happiness and health indicators vary with level of education.

The chapter is structured as follows: the next section provides a more detailed understanding of how the returns to education are typically measured. We then describe the alternative methodology undertaken for Ireland in this chapter. Next we present the results of our empirical estimations of the net private, public and non-pecuniary returns to tertiary education in Ireland. The final section concludes.

9.2 Approaches to Estimating the Returns to Higher Education

9.2.1 The Traditional Approach

The positive relationship between the education level an individual attains and the earnings they accrue across their life-cycle is evident in every developed economy in the world. Table 9.1 illustrates this in its simplest form by presenting the relative earnings of those working with a degree or equivalent, compared to workers with upper secondary education across a selected group of OECD countries. It shows that an individual with an undergraduate degree earns significantly more than someone with upper secondary as their highest level of education achieved. This trend is consistent for both males and females and across all countries shown. In an Irish context, we see a particularly pronounced earnings premium

Table 9.1 Relative earnings premium for workers with bachelor's degree over workers with upper secondary education for selected OECD countries

Country	Males	Females
Australia	142	160
Canada	152	167
Chile	302	293
Czech Republic	151	141
Denmark	124	114
France	146	145
Greece	199	205
Ireland	209	202
Israel	181	148
Korea	141	159
Portugal	173	172
Sweden	123	120
United Kingdom	150	170
United States	171	167
OECD average	164	160
EU21 average	161	153

Notes: Estimates based on adults with income from employment. Upper secondary education = 100

Source: Created by authors using data from OECD (2015)

attached to having a third level degree; the wage gap between these levels of education for both males and females in Ireland is significantly larger compared to the OECD or EU21 average.

While this measure provides some useful insight into the potential return to pursuing third level education, it is a simple summary calculation and does not control for observed and unobserved differences in individuals with varying levels of education. Numerous studies have utilised more comprehensive measures in estimating the returns to education. Early examples of these focused upon using the IRR method, specified as:

$$\sum_{t=c}^{n}\left(Y_s - Y_o\right)_t \left(1+r\right)^{-t} = \sum_{t=0}^{c-1} C_t \left(1+r\right)^{-t} \tag{1}$$

where the left-hand side of the equation represents the discounted benefits to extra education, while the right-hand side is the discounted costs to extra education. The discounted benefits to the individual measure the difference in net earnings from education level o and level s, while the costs are both the direct costs to the individual, in the form of tuition fees, and the indirect costs represented by the earnings foregone while in education. The private rate of return is the value r which equates the two sides. Subscript t signifies the year referred to by the variable to which it is associated. Psacharopoulos and Patrinos (2004) provide a summary of the empirical studies that have used this method.

The earnings function approach (also known as the Mincerian approach) as outlined in Becker and Chiswick (1966) and Mincer (1974) has become more common in estimating the returns to education. This is formally represented by:

$$LnY_i = \beta_o + \beta_1 S_i + \beta_2 T_i + \beta_3 T_i^2 + \beta_4 X_i + \nu_i \tag{2}$$

where Y is an earnings measure (typically gross earnings) for individual i, S is years of schooling, T is the potential labour market experience after education, X is a vector of the individual's personal characteristics and ν is unobserved characteristics. Using ordinary least squares (OLS)

techniques and the above specification, the coefficient β_1 can be interpreted as the average percentage increase in earnings per year of schooling (partial derivative of earnings with respect to years of schooling), and is generally accepted as a valid estimate of the private marginal rate of return to education. To distinguish between different levels of schooling, Equation (2) can be modified to include dummy variables corresponding to discrete education levels, such that:

$$LnY_i = \beta_o + \beta_p D_p + \beta_s D_s + \beta_u D_u + \beta_2 T_i + \beta_3 T_i^2 + \beta_4 X + \mu_i \qquad (3)$$

where D is the dummy for the subscripted level of education.

The earnings function specification has a number of advantages over the IRR method. It provides the basis for controlling for the influence of other factors besides education on earnings and also has the advantage of greater simplicity, as it does not require a large number of observations in a given age-education level to construct accurate age-earnings profiles.[1] It is thus the focus of this chapter, though with some adjustments. Card (1999), Trostel et al. (2002), Harmon et al. (2001), Harmon et al. (2002) and Dickson and Harmon (2011) all provide summaries of the many studies that have adopted this method. Generally, it is shown that there is considerable variation across countries in the rate of return to education, with an overall trend of higher marginal private returns for females over males.

In an Irish context, Callan and Harmon (1999), Barrett et al. (2002) and McGuinness et al. (2008) have used the gross earnings of workers in Ireland to estimate the private returns to education using the earnings function approach. The first found a marginal rate of return to schooling of between 7–10% using data from 1987. The second study looked at rates of return broken down by separate education levels over the period 1987–97. They specifically found an earnings gap of close to 50% in moving from upper secondary education to having completed a third level degree that remained relatively constant across the time period studied. McGuinness et al. (2008) found a similar gap examining the period 1994–97 but also found that this wage premium decreased to just above 40% by 2001.

9.2.2 An Alternative Approach

As alluded to earlier, it is important to further explore a number of potential adjustments to the typical earnings function approach of measuring returns to education. Firstly, if gross earnings are used in estimating Equations (2) or (3) for the private return to education, the interaction of increasing gross earnings and the tax/benefit system is ignored. In a progressive tax/benefit system, higher gross earnings will lead to more taxes and contributions and fewer benefits for an individual. Therefore, if we incorporate the tax/benefit system in measuring the marginal returns to education, rather than solely gross earnings, we may find that the redistributive nature of the tax/benefit system may create varying benefits to education to different individuals across the income distribution. From a fiscal viewpoint, this would suggest that as an individual's income rises with education, government revenue should also see an increase, while its expenditure should fall. It also suggests that the net private benefit from education may not be as pronounced as when changes in gross earnings are solely taken as the measure of benefit.

The specification of the returns to education in both Equations (2) and (3) assumes that changes in earnings capture the full benefit of investing in education. This ignores the possible employment effect of education. Britton et al. (2015) and Oreopoulos and Petronijevic (2013) show, for Great Britain and the US respectively, that higher levels of education reduce the probability of being unemployed. Therefore, it can be implied that an individual that makes the transition from unemployment to employment due to extra education will see a high return to that education. Conversely, the return may be close to zero if an individual does not enter or leave the labour market post-education.

Integrating such factors in measuring the return to the individual may also help facilitate measurement of the fiscal returns. The possible interaction of education and tax/benefit liabilities implies that analysing the changes in taxes and benefits from a change in education relative to the public cost of this extra education can provide an estimate of the return the government receives from investing in education.

With respect to studies that have utilised the Mincerian approach, the role of the tax system has been incorporated in some studies by using net earnings in place of gross earnings in their estimations.[2] For example, this has been undertaken in an Irish context by Denny and Harmon (2001) using data from 1987. They found that marginal returns to education were 2% lower for males and 3% lower for females using net rather than gross earnings as their dependent variable. However, this and other international estimates using net earnings ignore the role of labour force participation effects in measuring the net return to the individual from extra education. Furthermore, this framework does not facilitate the measurement of fiscal returns to education.

As mentioned in Sect. 9.1, a small number of studies have attempted to explicitly incorporate both a more detailed impact on overall gross income levels and the tax/benefit system into the measure of returns to education. In this chapter we follow the methodology outlined in Flannery and O'Donoghue (2016). Specifically, the net private return to third level education is:

$$r_{private} = \frac{\left[\left(1 - \mathrm{ss}_{\mathrm{ee}} - t\right) \times \left(\mathrm{p\_e}_{\mathrm{w}} \times \left(\mathrm{Y}_{HE} - \mathrm{Y}_{\mathrm{Upp\,Sec}}\right)\right)\right] + \left(\mathrm{bY}_{HE} - \mathrm{bY}_{\mathrm{UppSec}}\right)}{\left[\left(1 - \mathrm{ss}_{\mathrm{ee}} - t\right) \times \left(\mathrm{p\_e}_{\mathrm{s}} \times \mathrm{Y}_{\mathrm{n}}\right)\right] + E_p + \mathrm{bY}_{\mathrm{n}}} \quad (4)$$

Here, the numerator sums the net benefits to the individual from a change in education while the dominator reflects the costs to the individual from the same change. Specifically, $\mathrm{Y}_{HE} - \mathrm{Y}_{\mathrm{UppSec}}$ is the change in gross earnings in moving from upper secondary education to gaining a third level degree (or above). If we assume that gross wages increase as this change is made, this should be positive. However, this may be related to whether an individual is in work or not, which is accounted for with the probability term $\mathrm{p\_e}_{\mathrm{w}}$.

The term $\mathrm{ss}_{\mathrm{ee}}$ is the employee rate of social insurance contributions while t is the income tax rate, all of which are conditional on gross earnings and the probability of being in work. bY_{HE} represents the benefits received if the highest level of education attained is a third level degree or above, while $\mathrm{bY}_{\mathrm{UppSec}}$ signifies the benefits that one might receive with

upper secondary education. These benefits (such as unemployment benefit) are generally dependent on gross earnings. Therefore, benefits with a higher level of education may be expected to be lower in a progressive tax/benefit system, and thus the term $bY_{HE} - bY_{UppSec}$ is expected to lower the return to the individual.

On the cost side, $Y_n = Y_1' - Y_0'$ and is the net wage foregone during schooling (Y_1' is the foregone wage while in education and Y_0' is the wage while a student) and p_e_s is the probability of being employed while in education. The term ss_{ee} is the employee social insurance contribution, t is the income tax rate, both of which will be dependent on Y_n. bY_n are the benefits foregone while in education and may include benefits such as unemployment assistance. E_p is the direct private costs involved in moving from one level of education to another. The net private return is therefore the value $r_{private}$ takes when the ratio of the marginal benefits and marginal costs is calculated.

In terms of the fiscal return to education, this is specified as:

$$r_{fiscal} = \frac{\left[\left(ss_{ee} + ss_{er} + t\right) \times \left(p\_emp_w \times \left(Y_{HE} - Y_{UppSec}\right)\right)\right] - \left(bY_{HE} - bY_{UppSee}\right)}{\left[\left(ss_{ee} + ss_{er} + t\right) \times \left(p\_e_s \times Y_n\right)\right] - bY_n + E_g} \tag{5}$$

Net benefits to the state are now the numerator of our equation while costs to the state constitute our denominator. In summary, Equation (5) illustrates that higher employment probabilities and higher earnings from a change in education levels may induce higher tax and social insurance revenues while lowering benefits. This may then represent a positive return to the state. There are some common terms across Equations (4) and (5) and their description remains the same. However, some of the terms change sign compared to Equation (4) to reflect the fiscal viewpoint. For instance, the term $bY_{HE} - bY_{UppSec}$ is now subtracted within the numerator, as the expected drop in benefits received from increasing education will now create a positive fiscal return to the state. We also add the term ss_{er} to the numerator to capture *employer* social insurance contributions.

The cost element in the denominator of the fiscal return to education is similar to Equation (4). However, they are again adjusted to reflect the measurement of the return to the state rather than the individual. Higher levels of social insurance and income tax amounts foregone due to extra education now reduce the return, while the term E_g replaces the direct private cost of education and represents the public cost of varying education levels. The fiscal return is the value r_{fiscal} when the ratio of the marginal benefits and marginal costs of education to the state are calculated.

9.2.3 The Non-Pecuniary Returns to Education

In addition to any monetary return an individual may receive from extra education, there are also potential non-pecuniary returns. For example, those with higher levels of education have been shown to have higher levels of self-reported health (SRH) measures, job satisfaction and general happiness (Hartog and Oosterbeek 1998; Oreopoulos and Salvanes 2011). The work of Grossman (1972) forms the basis for exploring the relationship between health and education. This suggests that individuals with higher levels of education are more efficient producers of health; they make better choices regarding diet and exercise habits and avail of medical interventions when required. As Hartog and Oosterbeek (1998) noted, this relationship may be muddied somewhat by a variety of endogeneity and reverse causality issues, but they summarised that existing empirical evidence does suggest that the positive relationship between health and education is a direct result of the latter. Eide and Showalter (2011) provide a useful summary of the more recent literature to explore this topic, with Siles (2009) and Oreopoulos (2006) examples of studies that have found a causal link between education and health outcomes for the UK and US respectively.

Early empirical studies that explored the topic of happiness in an economic context include Easterlin (1974) and Scitovsky (1975). These focused upon the link between income and happiness at a country level, with the former giving rise to the 'Easterlin Paradox'; the concept that

rising income levels do not increase happiness. Ferrer-i-Carbone and Frijters (2004) provide a more recent summary of studies that have followed. These have generally involved a move towards using more micro-based measures of subjective well-being to explore the relationship between a variety of factors such as education, income, health and happiness. Specifically from an education viewpoint, Castriota (2006) reviewed the main literature to empirically test its impact on subjective measures of happiness. The overriding conclusion was a positive link between the two.

In an Irish context, there are numerous studies that have attempted to explain variations in measures of health and happiness. These have used different indicators of health and happiness such as levels of mental stress, rates of suicide, macro-level data, as well as subjective well-being measures. Madden (2014) provides a useful summary of these with the most relevant studies to this chapter including Madden (2011), Madden (2015) and Walsh (2011). The latter used a macro-level dataset to show well-being in Ireland has not increased as incomes have risen. The other two studies used more micro-level data (European Union Survey on Income and Living Conditions [EU-SILC]) to explore variations in happiness, health, and subjective well-being measures. However, none of these studies explicitly explored the relationship between education, and in particular third level education, and health or happiness. Other studies such as Cullinan and Gillespie (2016) have used Growing Up in Ireland survey data to investigate the impact of being overweight on SRH in Ireland, while using education levels as a control variable. However, they do not report the impact of the education estimates. In other studies, Oreopoulos (2007) used Northern Irish data to show the positive impact of additional upper secondary education on health and happiness outcomes. O'Sullivan (2012) found a positive link between higher levels of education and health outcomes in later life using a sample of men aged 50–65 years. In summary, studies that explicitly investigate the potential link between health and happiness outcomes and higher education for Ireland are rare and none have utilised the dataset to be used in this analysis.

9.3 Data and Methods

As noted in Flannery and O'Donoghue (2016), the main data requirements for calculating the net private and fiscal returns as specified in Equations (4) and (5) are a detailed micro-level dataset and an associated tax-benefit microsimulation model.[3] The data for our analysis comes from the Irish component of EU-SILC. This is a cross-sectional and longitudinal micro dataset containing income, social, demographic and labour market variables at the individual and household levels. The data has been collected on an annual basis since 2003 with the estimates in this analysis using the information from the 2014 wave. The data is collected from a representative population sample from across Ireland and is weighted to reflect independent population estimates and to correct for possible attrition. The data is collected on an annual basis with the 2014 wave having over 12,000 observations, over 9000 of which are aged over 16 years.

This data specifically includes information on an individual's highest level of education attained across six categories, namely primary education, lower secondary, upper secondary, post Leaving Certificate, third level non-degree and third level degree or above. Flannery and O'Donoghue (2016) provide a helpful step-by-step guide to estimating Equations (4) and (5) and an adapted version of these steps is outlined here:

1. The SILC dataset for the year 2014 was used as an input in a static tax/benefit microsimulation model to estimate the taxes and benefits that accrue to each individual for that year, based on their reported income and employment status;
2. Using the SILC dataset, simple OLS/logistic regression models estimated the 'market' returns to third level education by quantifying the impact of gaining a third level degree (or above) on labour market outcomes and gross earnings, compared to only having upper secondary education as one's highest level of education;
3. From these estimations, we held all other controls constant and simulated an increase in the level of education to third level degree (or

above) for those with upper secondary education only in the sample. We then predicted new labour market outcomes, earnings and other income amounts from this simulation;
4. With the new labour market outcomes and earnings levels we recalculated the new taxes and benefits for each individual using the tax/benefit microsimulation model;
5. This provided a 'before and after' picture of earnings and labour market outcomes, as well as the change in government taxes and benefits from a change in education level from upper secondary to tertiary. When both the direct and indirect costs of education were included (details below), the net private and fiscal returns to higher education as outlined in Equations (4) and (5) were calculated.

The private (E_p) and public (E_g) costs of education are also required to calculate our private and fiscal returns to third level education. To facilitate this we use expenditure per student at tertiary level education from HEA (2014). To separate the burden of this cost across private/public contributions we multiply by the public/private share as outlined in HEA (2014).[4] The annual private and public cost figures are then multiplied by 3.5[5] to obtain the costs in changing education levels from upper secondary to tertiary.

The indirect costs of education for the private returns ($p\_e_s \times Y_n$) is measured using the cross-sectional weighted averages of earnings (Y_n) of those aged 18–22 years with upper secondary as their highest level of education attained, in work and not in education. To obtain our finalised foregone earnings measure, this is then multiplied by an employment probability (p_e_s), calculated as the probability of being employed when aged 18–22 years and having upper secondary as one's highest level of education attained.

For the indirect costs relating to the public returns to education, a similar methodology is used. However, it is the foregone taxes, benefits and social contributions that are needed. To this end, the tax and social contribution rules to the level of foregone earnings calculated above are applied and used in Equation (5). The foregone benefit term bY_n is specified as the average benefit received from those in work reduced by the

average benefit received by individuals while in education and in work. This completes the terms required to calculate each of the cost elements of the fiscal and net private returns to education.

The estimation of the non-pecuniary returns to education follows a more simplified approach. The data used comes from the Irish module of the European Social Survey (ESS) for 2014. Much like the SILC data, the ESS is cross-sectional microdata. However, unlike the SILC dataset it contains detailed information on a variety of subjective well-being measures, such as indices of happiness and health. It also collects information on education, demographic and income variables at the individual level. The data has been collected on a bi-annual basis since 2002 and samples just over 2000 (2390 for 2014) representative individuals in Ireland for each wave.

The subjective indicator of happiness[6] within the ESS is segmented into 11 categories (0–10), ranging from extremely unhappy (0) to extremely happy (10). To explore the possible correlation between level of education and self-reported happiness, we estimate an ordered probit model with the 11 indicators of happiness as the dependent variable. This is regressed against highest level of education attained, with other factors such as income group, gender, age and parental education level included as control variables.

The indicator of health[7] is broken into five categories (1–5) within the ESS, ranging from very bad (1) to very good (5). However, few people indicated that their health status is within the bottom two categories—only 2.7% of the sample cumulatively. Therefore, for our analysis we follow the approach of Oreopoulos and Salvanes (2011) and make the distinction between only those that indicate very good health and those that do not indicate that they are in very good health. We then use a binary probit model to estimate the correlation between whether an individual indicates they are in very good health and level of education. Other explanatory variables include income group, gender, age, parental education level and a measure of body mass index based upon self-reported height and weight measurements within the ESS.

9.4 Empirical Results

9.4.1 Net Private and Fiscal Returns

Table 9.2 presents the results of the average net private and fiscal marginal returns to third level education for Ireland in 2014. The overall average results, as well as the breakdown across gender, are shown. We see that with an average rate of return of 37.6%, there is a significant private benefit to obtaining a third level degree in Ireland. Given that this figure accounts for the variations in taxes and benefits, as well as the employment effects of such a change in education, the net effect of completing third level education in Ireland offers a significant labour market premium. This figure is slightly below those found in previous years by Barrett et al. (2002) and McGuinness et al. (2008). Given the differences in methodologies employed and datasets used between these studies and the one presented here, it is difficult to know the exact reasons for this. However, we may conjecture that as both these previous studies used gross returns in their estimations, our results may indicate that positive employment and negative tax/benefit and private cost effects of gaining a third level degree lower the private return to higher education compared to the more standard Mincerian estimations.

While not presented here, it is important to note that the breakdown of our private return estimate shows that the particularly low opportunity cost to third level education in 2014 is one reason for this high private return. This reflects the relatively poor labour market conditions for young people in Ireland at the time. For instance, if we include the

Table 9.2 Average net private and fiscal returns to third level education for Ireland for 2014

	Private	Fiscal
Overall average (%)	37.6	69.1
Male (%)	43.5	82.3
Female (%)	32.7	53.9

Note: This sample includes all those aged over 16 years and not in full time education

Source: Authors' calculations based on EU-SILC data for 2014

foregone earnings figure (as specified in Sect. 9.3) using the 2008 SILC wave, rather than 2014, we find that the private return to education decreases to 25%. The role of low opportunity costs in the scale of these may help explain the growth in participation in third level education in Ireland across the period 2008–14. It also suggests that these returns may fall as the Irish labour market recovers.

Our results also show a significant return to the state from investing in third level education, with an estimated public return of 69.1%. This is higher than the net private return and can be explained by a number of factors. Firstly, changes to the income tax and social insurance system in Ireland in the years preceding 2014 resulted in relatively high marginal tax rates (51%) in Ireland for incomes above €32,000. Given that over the life-cycle many graduates would earn above this amount, the public return to third level education investments would be expected to be significant. Secondly, as mentioned earlier, the sample year coincided with a weak labour market for young people in Ireland. This implies that both the low taxes foregone and high benefits saved by the state in having young people in third level education helped create a high public return to this investment. If these factors are not accounted for in the calculation of public returns, the estimate falls to 44%. Finally, the high public return for 2014 is a function of the decreased public contribution to the costs of higher education, combined with a decreasing expenditure total. For example, if we include the 2007 figure for public expenditure per student in our calculations we find that the public return decreases significantly to 38%. In summary, our results illustrate that due to changes in government taxes and expenditure during the recent economic crisis in Ireland, the 2014 estimate for the fiscal return to third level education is exceptionally high. This suggests that investment in higher education during times of recession derives a particularly high return for the state.

Table 9.2 also segments the net private and fiscal return for 2014 by gender. McGuinness et al. (2008) previously found higher returns to third level education for females compared to males. However, similar to Flannery and O'Donoghue (2016), our results indicate that when other market effects and the tax/benefit system are accounted for, the private returns to education to males are higher than to females. The same is also

true for the fiscal return to third level education with returns of 82% and 54% respectively for male and females. This reflects the fact that men are more likely to be in the higher tax bands and so face higher marginal tax rates on average compared to females. It is also explained by the fact that males were more affected by Ireland's weak labour market compared to females and so low taxes foregone and high benefits saved are greater for males in our estimations.

9.4.2 Happiness and Health Status

Table 9.3 shows the relationship between self-reported happiness and level of education, having controlled from a variety of socioeconomic factors. These are presented as the predicted probabilities for each happiness category by education level and are derived from the estimated ordered probit models. Overall, the distribution of happiness indicators suggests that an individual is more likely to be in the upper end of the distribution as they accrue higher levels of education. However, the results in Table 9.3 indicate that this relationship may not be monotonic in nature, as we find that those with the lowest educational attainment are more likely to report higher levels of happiness compared to those with a lower secondary education. This would seem a somewhat counter-intuitive finding but must be viewed in the context of the reduced-form specification used here. Nonetheless, this does raise some interesting questions about the non-pecuniary returns to lower levels of education.

Given the main focus of the chapter relates to higher education, we next compare the distribution of happiness indicators for those with lower or upper secondary education with those with third level education. We find that the latter are more likely to be in the higher end of the distribution of the self-reported happiness indicator. Specifically we see that given the same level of income, gender, age and parental education level, those with third level education are about 4 percentage points (ppts) more likely to be in the highest happiness category and 3 ppts more likely to be in the second highest category, compared to those with upper secondary education. Given the rather simple model used to estimate this relationship, it is important not to draw any causal inference.

Table 9.3 Predicted probabilities of happiness categories by education level

Highest education attained	Happiness index										
	Extremely unhappy										*Extremely happy*
	0	1	2	3	4	5	6	7	8	9	10
Primary education or below	0.005	0.003	0.012	0.023	0.034	0.095	0.104	0.194	0.304	0.132	0.091
Lower secondary	0.006	0.004	0.013	0.025	0.037	0.100	0.107	0.197	0.299	0.126	0.084
Upper secondary (including post-secondary non-tertiary)	0.004	0.003	0.011	0.022	0.032	0.091	0.101	0.192	0.307	0.136	0.095
Third level degree or beyond	0.002	0.002	0.007	0.015	0.024	0.071	0.086	0.177	0.319	0.162	0.133

Note: These are the predicted probabilities of each happiness category by education level from an ordered probit model estimated with a range of socioeconomic controls

Source: Authors' calculations based on European Social Survey data for 2014

Table 9.4 Predicted probability of indicating very good health by education level

Highest education attained	Probability of indicating very good health
Primary education or below	0.165
Lower secondary	0.332
Upper secondary (including post-secondary non-tertiary)	0.413
Third level degree or beyond	0.443

Note: These are the predicted probabilities of responding as being in very good health in a subjective health measure by education level from a binary logit model estimated with a range of socioeconomic controls
Source: Authors' calculations based on European Social Survey data for 2014

However, the results do hint at some potentially important non-pecuniary returns to obtaining a third level qualification in Ireland.

Table 9.4 shows the predicted probabilities of reporting being in very good health by education level, derived from the binary probit model, and we find evidence of a strong positive association. This relationship is particularly pronounced when comparing those with primary education to individuals with a third level qualification; the predicted probability of reporting being in very good health more than doubles. There is also an appreciable increase of 3 ppts in the probability of reporting being in very good health for those with a third level qualification compared to those finishing education at upper secondary level.

Overall, these results show evidence consistent with some non-pecuniary returns to tertiary education in Ireland. Self-reported measures of happiness and health for those with a third level qualification are higher than for those with lower levels of education. Although the former relationship does not appear to be monotonic in nature, the results generally fit with the international trend of higher happiness and health for higher levels of education.

9.5 Conclusion

The main focus of empirical estimation of the private return to education has been based upon the relationship between gross earnings and education. The incorporation of the tax/benefit system, labour market

transitions and other possible interactions that may impact the returns to education have largely been ignored. The return to the state from this relationship between education, gross income and the tax/benefit system has also rarely featured in the literature. Furthermore, an explicit analysis of the non-pecuniary returns to third level education is lacking in an Irish context. In this chapter we build upon a previously used microsimulation methodology to estimate the net private and fiscal return to third level education for 2014. We also explore the relationship between higher education and subjective well-being measures related to happiness and health.

Our results show a large private return to obtaining a third level degree in Ireland, even after adjusting for unusually low opportunity costs within the labour market. In the policy context of higher education financing (as discussed in Chap. 10), these results show that despite increases in the student contribution to the cost of financing third level education in Ireland, there are still large returns for graduates. This finding may provide some justification for placing more of the financial burden upon the individual in the future. This is supported by the estimated non-monetary returns; we find tentative evidence that individuals with a third level qualification report higher measures of happiness and health compared to those at lower levels of education, controlling for income and other factors.

Our results also show evidence of a significant return on state investment in third level education. This leads to the understandable policy recommendation of increased educational investment, particularly in times of a depressed labour market. The transition of people from being unemployed and drawing down state benefits to being in third level education is found to be a significant driver of the high estimated public return. In terms of the debate surrounding higher education financing, the high fiscal return and possible happiness/health effects of increased education may lead to the suggestion that the state should invest more in third level education. However, given that both the public and private returns are quite large, the argument could be framed that both the individual and the state should both increase their contributions. The more macro-level contribution of higher education investment discussed in Chap. 8 of this book also lends support to this argument.

The results must be viewed in the context of some limitations however. Firstly, the estimated market effects of having a third level degree

on earnings uses a simple OLS framework rather than an instrumental variable (IV) approach. This was due to data constraints in finding a suitable instrument and may imply some endogeneity bias in the estimation of this relationship. However, Card (2001) and Harmon et al. (2002) acknowledge that some caution must be shown in relying on IV estimates, mainly due to choice of instrument. In an Irish context, Callan and Harmon (1999) suggest that OLS estimates for Ireland are not significantly biased downwards when compared to IV estimates. Also, given the large net private return estimated in our analysis, we are confident that any potential bias in the relationship between education and earnings would not skew the general trend observed.

It is also important to highlight that the estimates presented are averages. There may be heterogeneity within these figures driven by factors such as field of education and type of third level education received that we are unable to capture. Also, we do not explore the wider social returns to higher education. These include increased political stability, reduced crime levels, lower population growth, knowledge spill-overs and reduced income inequality (McMahon 2004, 2009). These are notoriously difficult to estimate and beyond the scope of this chapter. However, they present an opportunity for future research in the area and are important to acknowledge in the context of higher education financing. Finally, the results presented in this chapter only take one sample year in looking at the various estimated returns. Future work in the area may expand this analysis beyond 2014 to obtain the emerging trend in these estimates. It may also be helpful to expand the analysis outside of Ireland to provide an international context. Nonetheless, despite these possible limitations, the analysis presented here provides important evidence in relation to the public, private and non-pecuniary returns to third level education in Ireland.

Notes

1. See Psacharopoulos and Patrinos (2004) for a detailed discussion.
2. See Harmon et al. (2001, 2002) and Trostel et al. (2002) for a description of some of the international studies that have used net earnings in their estimations.

3. Static microsimulation models have been developed to primarily investigate the impact of tax and social benefit systems on individuals and households—see Merz (1991) and Gupta and Kapur (2000) for useful descriptions.
4. See Tables 10.1 and 10.2 of Chap. 10 in this book for more details.
5. A figure of 3.5 was chosen as different degree programmes have a length of three or four years in Ireland.
6. The question asked in the survey is: "Taking all things together, how happy would you say you are?"
7. The question asked in the survey is: "How is your physical and mental health in general?"

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10

Student Financing of Higher Education

Darragh Flannery, Aedín Doris, and Bruce Chapman

10.1 Introduction

Given the increasing numbers participating in, and substantial state subsidisation of, higher education in Ireland, the financing of the sector has become an important point of policy debate. The current funding mix of state support and upfront student fees[1] without a loan option is widely accepted to be unsustainable. The need for further investment, competition with other areas of public spending and concerns about accessibility and affordability have turned the main focus of this debate away from

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the current financing system and towards the possible introduction of a student loan system.

Heavy state spending on higher education is prevalent across mainland Europe and other countries; however, some countries such as England and Australia have moved towards placing some of the financial incidence on the direct beneficiaries, the students/graduates themselves, rather than on the public purse, with the use of student loan schemes. Government figures reveal that in Australia the shift towards placing more of this burden on the individual through a student loan system has resulted in over $32 billion Australian dollars (equivalent to about €18 billion) being raised from students/graduates over the period 1989–2015.[2]

In an Irish context, the OECD (2006) and the Department of Education and Skills (2011) both recommended that Ireland consider the implementation of alternative funding structures for undergraduate higher education. More recently, the report of an Expert Group on Future Funding for Higher Education (Expert Group) has been published (Expert Group 2016), which recommends that an income contingent student loan system is one of the three options that should be considered.[3]

To inform public policy it is helpful to have an understanding of the likely impact on graduates of different forms of student loan systems. To assess the implications of alternative arrangements, this chapter builds upon existing methodologies and previous studies in the area to present an analysis of the fiscal and redistributive implications of introducing alternative financing systems in Ireland. Because of their prominence in the current policy debate, we particularly focus on income contingent loans (ICLs).

The chapter is structured as follows: in the next section we provide a discussion of the rationale for government intervention in higher education funding and outline various funding options typically proposed. We then provide a more detailed summary of the Irish policy context. Finally, we present the results of two separate studies that have investigated ICLs and other financing schemes for Ireland.

10.2 The Rationale for Government Funding of Higher Education

From a theoretical perspective, the concepts of efficiency and equity are important considerations when the funding of higher education is being considered. An examination of the private and social benefits and costs of higher education can help us understand the arguments as to the appropriate extent of government funding for third level education. Chapter 9 of this book suggested that graduates of higher education typically extract a private benefit due to higher lifecycle earnings and/or better employment prospects. This would suggest that the individual should contribute towards the costs. However, it is also established that both society and the public sector derive benefits from having a population with more highly educated individuals. As a result, it can be suggested that the government (or society through the government) should play a part in influencing numbers in higher education through subsidising the costs.

It can also be argued that the burden of who pays what amount should be informed by the relative balance of these private and social returns. However, this division is not easy to implement because, as noted by Psacharopoulos and Patrinos (2004), the precise estimation of both private and social returns to higher education is complicated. This leads to a degree of ambiguity as to the optimal level of government funding of higher education but, as Barr (2000) notes, it remains the case that students who benefit from higher education should bear some of the cost.

McMahon (2009) attempts to put a monetary value on the social benefits produced by higher education and to weigh those against the individual returns gained through higher earnings. Using data from the United States (US), he calculates that 52% of the benefits from higher education are private non-market (e.g. better individual health and happiness) and social (e.g. greater political stability, reduced crime and less poverty) benefits, with 48% taking the form of higher earnings. On that basis, he argues that the split between public and private funding for higher education should be 52:48.

In a novel empirical exercise Chapman and Lounkaew (2015a) use calculations of the fiscal externalities (the increased tax revenue as a result of the attainment of higher education) as a template by which to organise the valuation of other spillovers, such as those noted in McMahon (2009). For the Australian case, results similar to those of McMahon (2009) were estimated, although a considerable range of plausible values were presented. Further, Chapman and Lounkaew (2015a) argue that their results understate the true external benefits of higher education because they take no account of the GDP growth consequences made possible by technological change and innovation that are in turn the result of higher education graduates being more able to foster and initiate productivity improvements.

Several countries, including Sweden, Germany and Denmark, have taken the decision that the appropriate level of state funding of higher education is 100%. Under this approach, the public financing for progression to third level education bears no relation to parental income levels and individuals face no upfront charges. From an equity viewpoint, such extensive government subsidies may result in two different outcomes. On the one hand, it could be argued that increasing the government subsidy reduces or removes the credit constraints faced by all individuals in entering education, potentially leading to more from lower income backgrounds taking on this level of education. On the other hand, any government subsidy towards education (especially higher education) may instead increase income inequalities rather than alleviating them, as it represents the use of tax resources to subsidise the children of higher income individuals to invest in higher education.

Indeed, it is becoming increasingly accepted that funding higher education fully through the taxpayer is regressive in an overall sense (Barr 1993; Chapman 1997). This is because in systems with no tuition charges, the burden of funding falls on non-graduates who derive no private benefit from third level education. Furthermore, as those from higher social classes (and consequently higher incomes) constitute a disproportionate number of those in higher education in most countries, public funding through a no fees scheme can be seen as a mechanism through which

those from lower income backgrounds subsidise the richest in society to participate in higher education (Callan et al. 2008). Barr (2004) makes the additional point that having higher education solely (or substantially) financed through the tax system leads to competition with other areas of public spending. This leaves higher education funding too open to political pressures, particularly in times of economic downturns when student numbers may rise.

The current financing system in Ireland combines state support with upfront student fees of €3000 for each year of study for those whose parents are in the upper half of the income distribution.[4] This has mixed outcomes in terms of both efficiency and equity. It may be regarded as somewhat efficient as it does place some of the cost of education on those who derive the benefit, that is, the students. However, it can also be seen as inefficient as the upfront nature of the fee may entail some under-investment in education due to credit constraints. While the current means-tested grant system for those in the lower half of the parental income distribution may alleviate some of this market failure, the size of the upfront contribution still makes it a potential source of inefficiency, particularly for those whose parental income is just above the qualifying threshold for grants. In terms of equity, the 100% subsidy to those whose parents' incomes are low may seem equitable, but to the extent that these graduates go on to earn substantial private returns the system still entails subsidisation by non-graduates of educational investment from which they derive no direct benefit.

Although no studies have yet analysed the effect of the reintroduction of student fees in recent years on progression to higher education, research on the abolition of fees in the 1990s has been conducted by Clancy (1997, 2001), Sweetman (2002), O'Connell et al. (2006) and Denny (2014). All of these studies demonstrate that the social class mix of those participating in higher education remained almost unchanged before and after the Irish government introduced the 'free' fees scheme in the 1990s. However, given the changed macroeconomic circumstances in recent years this does not necessarily imply that the reversal of this policy will have had a similarly benign effect.

10.3 Options for Student Financing of Higher Education

10.3.1 Introduction

To help achieve the goals of efficiency and equity and provide adequate funding to higher education institutions, a wide range of financing options for higher education is available that entail student contributions. A critical—arguably the *most* critical—issue for governments' approaches to higher education financing relates to the provision of credit. The essential point is that uncertain future gains from higher education and the lack of saleable collateral in the event of default can result in an inefficient under-investment in higher education (Barr 2001; Chapman 1997). Capital market imperfections also lead to questions about equity as they can help perpetuate income inequalities; if people from lower income groups are excluded from capital markets to a greater extent, their lower lifecycle earnings from being excluded from higher education are likely to lead to greater wealth inequalities than would otherwise occur.

While options such as grant schemes, education vouchers and varying tuition fee schemes arise from different approaches, in this section we focus upon the advantages and disadvantages of graduate taxes, government guaranteed bank loans and ICL options, with a brief summary of other types of relevant financing systems.[5]

10.3.2 The Rationale for Student Loans

An alternative to the full state funding discussed in the previous section involves the charging of tuition accompanied with student loans, an argument which can be traced to Friedman (1955) and supported by Johnstone (1972). Loans are a way to remove the credit constraint problem from individuals with the ability to participate in higher education but without the necessary resources; they also address the inequalities and regressivity arising from heavy state funding of higher education.

The basic feature of a student loan system is that students defer payment for higher education until they are in the labour force. Students borrow to cover the cost of their education; the loan is then repaid as the individual moves through his/her lifecycle, with the repayments ending once the loan has been repaid in full or upon retirement, although the last aspect is dependent on the exact specification of the system. Given the prominence of student loans in the Irish debate around higher education financing, we next provide a more detailed description of the basic tenets of both mortgage-style and ICL systems, with a focus on the latter.

10.3.3 Mortgage-Style Loans

A mortgage-style student loan system typically involves the individual borrowing a certain amount to cover their tuition, maintenance or both, after which there is an obligation to repay this debt in fixed instalments over a set period of time. To mitigate the risk for the lender, mortgage-style systems involve governments providing a guarantee of payment on behalf of borrowers who default and are thus known as government guaranteed bank loans (GGBLs); they are a feature of higher education financing systems in, for example, the US, Canada and Japan.

With GGBLs, individual debtors with low future incomes and who thus cannot meet their repayments will suffer repayment hardships. These particular individuals will, in many cases, default on the loan. As a result they will incur the associated costs of default, such as damage to their credit reputation and thus their future eligibility for other loans, such as a home mortgage (Chapman and Ryan 2002). While such a system would help place more of the financial burden of third level education on the individual, Barr (1993) notes that this involves a high degree of risk for the student, possibly acting as a deterrent to those from disadvantaged backgrounds from availing of such a scheme.

Arguably the most significant problem for students with GGBLs concerns possible consumption difficulties associated with fixed repayments which, by design, are not related to a borrower's capacity to pay. If future incomes experience variation due to changes in the labour market, for

example, the fixed level of debt repayment will be associated with changes in disposable (after debt repayment) incomes. This issue is captured by the repayment burden (RB) measure, which expresses the loan repayment amount as a proportion of an individual's income. The RBs of mortgage-style loan systems are particularly important as the higher the proportion of a graduate's income that is needed to service their fixed loan repayments, the more likely hardship and default will be.

Studies such as Chapman et al. (2010) and Chapman and Liu (2013) show that graduates in the bottom 25% of the lifecycle graduate income distribution have particularly high RBs in developing countries such as Vietnam, Thailand and Indonesia. Similarly, for developed countries, Chapman and Lounkaew (2015b) estimate RBs ranging from 50 to 60% for low-income public sector lawyers in the US, while Chapman and Sinning (2014) simulate the RBs from a mortgage-style student loan scheme at 70% for female East German graduates in the bottom quarter of the relevant income distribution. Taken together, the evidence broadly suggests that GGBLs are associated with very high RBs for low-income young graduates and are thus likely to lead to a significant minority of graduates facing defaults.

Public sector intervention in mortgage-style loan systems usually takes two forms: interest relief on the debt while a student is still in higher education and the state acting as the loan guarantor in the event of default. There may also be government funding of temporary repayment suspensions conditional on the graduate's income level.[6] Loan remission programmes and interest relief programmes are also sometimes made available to students with lower incomes to help reduce the debt risk.[7] These measures may help reduce the risk of lower income students opting out of third level education due to the potential debt involved, while helping to maintain the steady flow of repayments, provided most borrowers in most years are above the threshold set (Usher 2005). However, Chapman and Lounkaew (2016) conclude that relief arrangements for mortgage-type loans are unable to fully resolve the problems of high RBs. It is also fairly clear that attempting to resolve repayment difficulties through the use of special arrangements built into mortgage-style loan systems can be administratively complex and poorly targeted (Chapman et al. 2014).

10.3.4 Income Contingent Loans

The key feature of an ICL system is that graduates borrow for the cost of their education from the state but do not make any repayments towards this debt until they reach a certain income threshold.[8] Once a graduate earns above this threshold they then start to make repayments, which might mean that some former students never pay back any of the debt. For example, if somebody leaves third level education and chooses not to work for the rest of their life, they repay nothing. In this instance, the taxpayer would fully subsidise the cost of the individual's education. From a risk viewpoint, an ICL has the benefit of providing a system where there is burden-sharing. Students who benefit from third level education through higher earnings pay back some of the cost of that education, and the public sector pays through taking on the default risk of those who do not repay fully. From an equity viewpoint, an ICL provides access to higher education without upfront fees.

The design of an ICL scheme involves numerous parameters, whose choice can have significant implications for the amount of revenue ultimately generated and for graduate RBs. These parameters include the debt level imposed on students, the first income threshold to be set, the interest rate attached to the loan and the percentage of income set for repayment. The debt a graduate is faced with upon leaving higher education must be large enough to provide adequate funding for third level institutions but small enough not to prove excessively burdensome for graduates. The fee charged can take the form of a blanket fee for all those attending higher education or there can be some variation across courses/disciplines reflecting the cost of educating the student. To be perceived as fair, an ICL needs an income-repayment threshold that ensures that only those who benefit from third level education should make repayments. The danger of setting the threshold too low is that it places an extra burden on those graduates who are not earning very much, despite spending several years in higher education. Australia initially set the threshold at which graduates begin to repay their debt at average earnings; an alternative may be to set the threshold at the average wage of those who have secondary education as their highest level of education. With regard to the interest rate, the level will help determine both how long it takes for

graduates to repay their debt and the overall state subsidy. An interest rate that is lower than the rate of inflation may significantly increase the subsidy the state provides on the loans by allowing graduates to 'inflate' away their debt. If the interest rate is set too high, the debt burden may increase rapidly for relatively low-income debtors and lead to longer repayment periods for graduates.

With regard to the rate at which loans are repaid, the issue of RBs was highlighted above in the discussion concerning GGBLs. The most important point is that by design ICL systems cap RBs. Such a mechanism limits the repayment amounts any one graduate may face in a particular year, no matter what their income level is, to help avoid issues of default and repayment hardship. In countries where ICLs have been introduced, such as Australia, New Zealand and England, the maximum RBs allowed with their ICL schemes are 8%, 10% and 9% of income per period respectively.

Finally, two additional points regarding ICLs are worth making. First, as highlighted by Chapman (2006) and Stiglitz (2014), an ICL scheme has the advantage of an efficient collection mechanism because it is made operational through income taxation or social insurance systems. Second, with respect to equity of access, the evidence from countries with ICLs such as Australia and England indicates that the proportion of new entrants from the lowest socioeconomic groups has not changed since the introduction of, or subsequent reform to, their ICL systems (Chapman and Ryan 2005; Kemp and Norton 2014; EU Commission 2014).

10.3.5 Other Financing Alternatives

Another form of an ICL is a graduate tax (GT) system. Similar to an ICL, with a GT students do not face an upfront charge for higher education, meaning that the credit constraint is removed; however, there is no loan aspect in the design. Instead, the GT acts as a supplementary tax on graduates throughout their working lives (or for a shorter pre-ordained period). In its simplest form, this system obligates graduates to pay a fraction of their taxable income, in addition to income tax, to the government until they retire (Barr 1993). As with ICLs, a GT system has the

advantage that it could be efficiently collected through the income tax system and it has scope to raise considerable revenue for the government. The key difference with the ICL stems from the fact that there is no cost recovery aspect to the GT system, with the likelihood that some individuals end up paying more than the cost of their education, implying that some graduates subsidise the education of others. The fact that a GT system has not been implemented anywhere in the world might suggest that this aspect of the scheme is perceived as unfair.

Similar to a GT is the idea of human capital contracts (HCCs), which are an attempt to bring the private sector into the financing of higher education (Palacios 2003, 2004). The most prevalent form involves a graduate paying a fixed proportion of his/her income to an investor who provides the individual the resources to finance his or her education. In basic terms it is an investment in the future earnings of that graduate; the investor will base the amount he/she will invest and the fraction of income which the graduate must pay back on expectations prior to labour market entry. However, evidence of the relevant merits of such a system is scarce as it has only recently been applied, and with respect to small numbers of students thus far.[9]

10.4 Higher Education Student Finance in Ireland

Since the introduction of the undergraduate free fees scheme in the mid-1990s the funding of higher education in Ireland has had significant reliance on the state. Here we provide more details on the funding structure in Ireland and how it has evolved in the last ten years. Table 10.1 provides a breakdown by funding source of the income to higher education institutions (HEIs) in Ireland for the years 2007–15. From this we see HEIs deriving income from three main sources.[10] The 'state grant and free fees' element is overridingly based upon the number of students within a HEI, with some small variation based upon subject studied. The 'income from student contribution' is the amount generated from the student contribution charge while the 'other fees and other income' is made up of postgraduate tuition fees, international student fees and fees

Table 10.1 Income/expenditure of publically funded higher education institutions by source of funding from 2007 to 2015

Year	Total recurrent income (€m)	State grant and free fees (€m)	Income from student contribution (€m)	Other fees and other income (€m)	State grant as % of total	State contribution as a % of total when indirect subsidy is included
2007/08	1,850	1,397	91	362	76	78
2008/09	1,829	1,318	104	407	72	75
2009/10	1,838	1,249	187	402	68	73
2010/11	1,771	1,179	195	397	67	72
2011/12	1,783	1,119	264	400	63	70
2012/13	1,717	1,012	302	403	59	68
2013/14	1,683	939	338	406	56	66
2014/15	1,686	895	382	409	53	64
2015/16	1,700	860	427	413	51	63

Note: The indirect subsidy of the state is calculated by adjusting for the fact that a proportion of the overall student contribution is paid for by the Exchequer through higher education grants

Source: Created by authors using data from HEA (2014)

generated from students repeating years. The 'state grant and free fees' category comprises the largest part of funding across all years, constituting a higher amount than the other two categories combined.

With regard to the income amounts presented in Table 10.1, we first note a decrease of 8% in total income over this period, from €1.85 billion in 2007 to €1.70 billion in 2015. Driving this decrease is a significant drop in state funding to HEIs, with the level falling by nearly 40% across this time period. This has been somewhat compensated by a large increase in income from students themselves but not enough to prevent an overall decline. The change in the student contribution to third level financing reflects the gradual increase in the student contribution charge from €900 in 2008 to €2750 in 2014 and €3000 by 2015. The 'other fees and other income' category has remained relatively constant across this time period after an initial 12% increase from 2007 to 2008. These changes have resulted in a steady reduction in exchequer funding as a proportion of total funding; this dropped from 76% to 51% from 2007 to 2015. When account is taken of the fact that approximately half of

the student charge income is indirectly paid by the Exchequer through student higher education grants, the decline in funding is from 78% of the total in 2007 to 63% in 2016. This compares with an OECD average of 68% and a EU21 average of 76% for 2010, the latest year for which figures are available.

As previously mentioned, the fall in income has come at a time of increasing student numbers. Table 10.2 provides a summary of how the combination of these forces has led to a significant decrease in expenditure per student from €11,783 in 2007 to €8997 in 2015. We also highlight the year-on-year percentage decreases of this figure across this period. Cumulatively, these changes have resulted in a 23% reduction in expenditure per student in higher education in Ireland from 2007 to 2015. For further context on the impact of the changes in funding described, Table 10.2 also highlights the falling academic staff to student ratio across the same period. This ratio reached 20:1 by 2014, compared to the OECD average of 14:1 in 2013 (OECD 2015).

Looking at the overall picture, it is evident that the Irish higher education system requires additional investment. The Expert Group (2016) report estimates that an extra €600 million per year is needed in core funding to meet the current demographic and quality challenges, a fig-

Table 10.2 Expenditure per student and academic staff/student ratios from 2007 to 2015

Year	Total recurrent income (€m)	Full-time equivalent students	Expenditure per student (€)	Year on year % change in expenditure per student	Academic staff/student ratio
2007/08	1,850	157,012	11,783	–	1:15.6
2008/09	1,829	163,149	11,211	–4.85	1:16.4
2009/10	1,838	172,917	10,629	–5.19	1:17.8
2010/11	1,771	176,780	10,018	–5.75	1:18.3
2011/12	1,783	178,522	9,988	–0.30	1:19
2012/13	1,717	180,461	9,515	–4.74	1:19.5
2013/14	1,683	181,694	9,263	–2.65	N/A
2014/15	1,686	185,226	9,102	–1.74	1:19.6
2015/16	1,700	188,943	8,997	–1.15	N/A

Note: The academic staff/student ratio for 2014/15 was sourced from Dáil Debates (2016)

Source: Created by authors using data from HEA (2014)

ure that rises to €1 billion per year by 2030. However, increases in the current (upfront) student contribution charge are not seen as politically desirable and also raise fears of exacerbating participation inequalities. Furthermore, although Ireland's public finances have recovered appreciably in recent years, the state is now bound by the EU Fiscal Treaty in relation to government borrowing and thus the necessary investment in higher education may not be forthcoming from the state alone. As a result, the introduction of a student loan scheme in Ireland has been considered. Various reports such as OECD (2006) and Department of Education and Skills (2011) have made such a recommendation. The Expert Group (2016) report has urged the consideration of an ICL scheme and the Minister for Education has referred its report to the Parliamentary Committee on Education so active assessment of the proposal is imminent. The analysis of alternative policy proposals that entail an element of student financing is the focus of the remainder of this chapter.

10.5 An Analysis of Alternative Financing Systems for Ireland

Two main studies exist that undertake *ex-ante*[11] empirical analyses of higher education financing alternatives for Ireland; these are Flannery and O'Donoghue (2011) and Chapman and Doris (2016). In conducting *ex-ante* analyses, the key challenge is to obtain valid predictions of graduate earnings for many years into the future. Moreover, these lifecycle earnings predictions must be obtained not just for the typical—or median—graduate but for graduates throughout the earnings distribution; this is important because graduate hardship and inability to repay are the result of low graduate earnings, so such earnings must be modelled carefully. Flannery and O'Donoghue (2011) and Chapman and Doris (2016) use different datasets and different econometric approaches to modelling graduate earnings. In addition, they differ in the scheme parameters that they model. It is therefore of interest to compare the result they obtain. In this section we first give an overview of the results contained in these

two papers. We then discuss some supplementary results regarding ICL schemes obtained using the Chapman and Doris (2016) methodology that may be of additional interest in the context of the Irish debate on higher education funding.

Flannery and O'Donoghue's (2011) paper compares a GT with an ICL. Here, lifecycle graduate earnings profiles are obtained from an Irish dynamic microsimulation model (The Life-cycle Income Analysis Model [LIAM]) based on data from the Living in Ireland Survey, which was the Irish component of the European Community Household Panel (ECHP) that ran from 1994 to 2001.[12] The alternative GT and ICL schemes are then applied to these earnings profiles.

The GT is modelled as either a 1% or a 2% increase in Pay-Related Social Insurance (PRSI) contribution rates, with real rates of interest of either 0% or 2%. It is assumed that 20% of graduates emigrate and, because the GT is collected only from earnings in Ireland, no repayments are made by these graduates. Assuming that the portion of government spending on higher education that is repayable by the GT is €10,000, the government subsidy can be calculated. Results for the version of the tax with a 2% real interest rate show that a small government subsidy of 4% would be required if a 2% surcharge on PRSI rates were imposed, whereas a 51% subsidy would be required if a lower surcharge of 1% were applied. The results indicate the importance of emigration to the yield from a GT, with smaller subsidies of 0% and 40% required for the 2% and 1% surcharges respectively in the absence of graduate emigration.

The ICL scheme modelled in Flannery and O'Donoghue (2011) assumes a loan of €10,000 repaid at a rate of 10% on marginal earnings over a threshold of €35,000 and 15% on earnings over €42,000. Two interest rate regimes are again modelled—one with a zero real rate and another with a 2% real rate. Again, it is assumed that 20% of graduates emigrate but since the ICL results in graduates owing a debt, it is not assumed that emigrants repay nothing; instead, these emigrating graduates repay 40% of their debt. Finally, any outstanding debt is written off at retirement. Applying this ICL scheme to the estimated lifecycle earnings profiles, the average subsidy is found to be 26% if a 2% per annum real interest rate is charged, and 40% if not. The analysis of the repayment patterns of the graduates does not include an explicit analysis of

RBs. However, it is found that those in higher lifecycle earnings deciles repay more of their loans than those in lower deciles. Moreover, the present value of repayments rises strongly with the earnings decile.

Table 10.3 summarises the Flannery and O'Donoghue (2011) results. It is notable that female graduates repay a much lower proportion of the €10,000 that is repayable, whether under the GT or the ICL. In addition, under the ICL, fewer women than men repay their loans in full, and those women who do repay in full take longer to do so than men who repay in full. These findings are all, of course, the result of lower earnings

Table 10.3 Revenue and repayment analysis of graduate tax and income contingent loan system for Ireland

Graduate tax system

Graduate tax revenue as % of total repayable (€10,000) with 2% real interest rate and 20% graduate emigration

	Yield of 1% graduate tax	Yield of 2% graduate tax
Females	42.7	81.6
Males	55.2	109.0
Total average	49.0	95.6

Income contingent loan system

Repayment patterns for graduates with two different interest rates and simulated graduate emigration with some repayment (debt of €10,000)

	% of borrowers who repay in full	Average repayment period in years	Average NPV of repayments (€)	Average subsidy as a % of loan
0% real interest rate				
Females	66	16.2	5328	46.7
Males	82	14.2	6482	35.2
Total average	75	15.1	5907	40.1
2% real interest rate				
Females	57	16.0	6652	33.5
Males	77	15.4	8167	18.3
Total average	67	15.6	7413	25.9

Notes: The average repayment period for the ICL system includes only those that had paid their loan in full. The NPV of repayments are repayments discounted to the year of graduation of each graduate

Source: Adapted from Flannery and O'Donoghue (2011)

by female graduates compared to males; the LIAM-simulated earnings streams indicate that the present value of lifecycle earnings for women with tertiary education are about two-thirds those of men educated to that level.

Chapman and Doris (2016) compare a mortgage-style GGBL with an ICL. In both cases the loan amount is €16,000, which would represent, for a four-year degree, a moderate increase in fees from the current level of €3000 per annum. The lifecycle earnings profiles in this case are provided by unconditional quantile regression analysis of 2006 National Employment Survey data. The resulting earnings profiles indicate that female graduate earnings are significantly lower than male earnings, particularly at the top of the earnings distribution; this echoes the pattern seen in the profiles estimated using the microsimulation model of Flannery and O'Donoghue (2011).

The GGBL that is modelled in Chapman and Doris (2016) is based on repayment over ten years, with a real interest rate of 2% applied from the date of graduation, and with repayments beginning two years after graduation. The analysis shows that although the RBs are moderate for a graduate with median lifecycle earnings, for working graduates at the bottom of the earnings distribution RBs are very high, particularly in the two or three years after repayments begin—as high as 83% for males at the 10th percentile of lifecycle earnings. When account is also taken of the fact that some graduates are not in employment and so have no earnings, the proportion of graduates for whom repayments are problematically high rises further. Even five years after repayments begin—and so seven years after graduation—over a quarter of graduates have RBs in excess of 18% of gross annual earnings, a conservative threshold that has been used to indicate excessively high RBs (Chapman and Lounkaew 2015b). These high RBs lead the authors to reject GGBLs as a feasible alternative for higher education funding in Ireland.

In their analysis of ICLs, Chapman and Doris (2016) model four alternative schemes by varying two parameters, the repayment rates and the interest rate. Two repayment schedules are modelled, one entailing a flat rate of 8% on marginal income above an earnings threshold of €26,000 and the other entailing rates of 2–8% on total income once this threshold is reached, starting at 2% and rising in increments of 1% for every

€5000 of additional earnings over €26,000, up to 8% on earnings above €56,000. In addition, two alternative interest rate regimes are modelled, one entailing a zero real rate of interest, and the other with a 2% real rate of interest in periods when income rises above the €26,000 threshold, but a zero real rate otherwise. A 20% rate of graduate emigration is also assumed: half of these emigrate permanently and it is assumed that no repayments are ever made by these graduates; the remaining 10% emigrate temporarily but recommence repayments once they return to Ireland. This is arguably a more pessimistic emigration scenario than that presented by Flannery and O'Donoghue (2011), since repayments are not made by any graduates living abroad. On the other hand, assuming that half the emigration is transitory does allow for some emigrant repayments.[13]

Various measures of graduate affordability are reported in the paper, as well as the government subsidy implied by non-repayments under the four alternative schemes. The affordability issue matters because it illustrates the repayment burdens of debtors as a proportion of their after-tax earnings. The authors conclude that all four schemes show reasonable levels of affordability for graduates, with repayments representing up to 8.6% of net earnings for men and up to 6.3% for women. The government subsidy required under the four schemes ranges from 26% to 37%, depending on the particular scheme, with the schemes that include a positive interest rate found to have subsidies at the lower end of this range. The importance of emigration patterns to the size of the subsidy is also noted, with emigration adding 10 percentage points to the subsidy required. It is noteworthy that, despite differences in the methodology used to simulate graduate earnings profiles, the estimated subsidies in these two papers are very similar for the schemes that are most alike.

We now report some additional results based on the data and methodology used by Chapman and Doris (2016)—see Table 10.4. Here, we focus on varying the loan amount: as well as results for a loan of €16,000, we show results for a loan of €20,000, equivalent to €5000 per annum for a four-year degree. This would entail a more substantial increase in higher education funding from the current fee level of €3000 per annum

Table 10.4 Repayment analysis for two alternative loan amounts: €16,000 and €20,000

	25th percentile	**50th percentile**	75th percentile
Loan amount: €16,000			
Males			
Number of years of repayments	12	**13**	8
Mean % net income	4.2	**4.0**	5.6
Mean monthly repayment	127	**119**	180
NPV of repayments	13,126	**14,208**	15,077
Females			
Number of years of repayments	22	**12**	11
Mean % net income	3.0	**4.3**	4.5
Mean monthly repayment	76	**127**	137
NPV of repayments	13,388	**13,929**	14,782
Loan amount: €20,000			
Males			
Number of years of repayments	14	**14**	10
Mean % net income	4.5	**4.5**	5.6
Mean monthly repayment	139	**141**	183
NPV of repayments	16,407	**17,759**	18,846
Females			
Number of years of repayments	25	**15**	13
Mean % net income	3.3	**4.3**	4.7
Mean monthly repayment	88	**130**	148
NPV of repayments	16,735	**17,411**	18,477

Notes: The mean monthly repayment is calculated only over years in which the repayment is positive. The discount rate used for NPV calculations is 2%
Source: Adapted from Chapman and Doris (2016), with additional results provided by Bruce Chapman and Aedín Doris

and may be more attractive to policymakers in light of the funding challenges that will result from demographic changes in the coming years. For both loan amounts, the results refer to a scheme based on repayments of 8% on marginal income over an earnings threshold of €26,000, and with interest charged at a real rate of 2% per annum when earnings exceed the threshold.

The results reported in Table 10.4 show clearly that increasing the loan amount has very little effect on the measures of affordability reported. The percentage of net income accounted for by loan repayments varies through the graduate earnings distribution to a similar extent for both

loan amounts. For men, the range for a loan of €16,000 is from 4.2% at the 25th percentile to 5.6% at the 75th percentile; for the €20,000 loan, the range is 4.5% to 5.6%. For women, the range is greater for both loan amounts, going from 3.0% of net income at the 25th percentile to 4.5% at the 75th percentile for the €16,000 loan, compared to 3.3% to 4.7% for the €20,000 loan. As was the case in Flannery and O'Donoghue (2011), the differences between men and women are entirely accounted for by the lower earnings of women, and in particular their flatter lifecycle earnings profiles. In all cases, the RBs are moderate.

The pattern in the figures for the average monthly repayments is similar to that for the RBs; average monthly repayments are generally lower for women than for men at corresponding points in their respective earnings distributions and higher the further up their lifecycle earnings distribution the individual lies.[14] However, the absolute figures are remarkably similar and as expected with ICL, mean monthly repayments are hardly affected by having incurred a bigger debt.

The differences for alternative loan amounts arise only in the number of years of repayment: since the amounts being repaid monthly do not differ according to the loan amounts, the impact of the increased loan burden falls on the number of years over which repayments are made. Whereas the female with median lifecycle earnings repays her €16,000 loan in 12 years, the €20,000 loan takes 15 years to repay. The difference for males with median earnings is an increase of just one year, from 13 to 14 years; at other points in the distribution, the increase in years of repayment is greater, at two years. For both loan amounts, the years of repayment are quite similar to those found in other countries. A final unsurprising point is that the net present value of the loan repayments is higher for the higher loan.

The analysis of the €20,000 loan also shows that the government subsidy implied by the ICL increases very little compared to the €16,000 loan; allowing for non-participation and for the emigration of 20% of graduates, the subsidy increases from 27% for the €16,000 loan to 28% for the €20,000 loan.

The careful simulation of graduate earnings profiles is central to the reliable assessment of any higher education funding scheme that is based on graduate earnings, and such simulations necessarily entail many

assumptions. The simulations used in Flannery and O'Donoghue (2011) and Chapman and Doris (2016) are quite different in their methodologies, and yet their conclusions in respect of ICLs—which is where the two papers overlap—are very similar. For ICLs based on positive real interest rates and repayments calculated on marginal income over some threshold, the estimated government subsidies are very close—26% versus 27%. It is noteworthy that both analyses find that the extent of non-repayment arising from graduate emigration is very important in driving the size of the government subsidy, with results in both exercises indicating that the subsidy rises by about 10 percentage points when emigration of 20% of graduates is allowed for.

10.6 Conclusion

Set in the context of increasing participation in higher education, a need for further investment and significant reliance on the state for funding, the introduction of an alternative finance system for Ireland has been mooted over the past number of years. In this chapter we have outlined the conceptual framework used by economists to think about the student financing of higher education. We have also provided a detailed description of the Irish higher education financing context and presented an analysis of the likely effects of the introduction of various alternative funding schemes from a distributional and fiscal viewpoint. Specifically, our discussion focused upon two *ex-ante* Irish studies that have attempted to investigate the impact of ICL, GT and GGBL systems. The main results indicate that the GT scheme may be attractive from a fiscal viewpoint but the revenue generated varies significantly depending on the scale of graduate emigration and the GT rate imposed. It is also found that a mortgage-style loan system results in RBs that are very high, implying clearly that this form of policy approach would likely result in major consumption difficulties and thus defaults for a minority of graduates.

In examining the ICL scheme for Ireland, we draw on the results of two separate analyses. Despite having been modelled using different approaches, the results are strikingly similar. Overall they show that the interest rate attached to the scheme can play a major role in the level

of government subsidy and total repayment amounts. The ICL schemes modelled are also shown to be quite progressive in nature, with the (net) RBs modest for all graduates, and particularly for low earners. It is also notable that both studies that examine the introduction of an ICL system in Ireland find that the extent of non-repayment arising from graduate emigration is very important. Therefore, in summary for the Irish higher education financing reform debate, if an ICL is to be implemented it is critical that careful consideration be given to the setting of interest rates and the issue of graduate emigration.

Notes

1. Fees are known as the student contribution charge and were previously called the student registration fee.
2. *HECS-HELP Basic Statistics*, Department of Education and Training, Australian Government.
3. The other two suggested options are the maintenance of the current system and a reversion to a fully taxpayer-funded system.
4. Grants that cover the student contribution are available to those whose parental income is below a threshold that varies with household size. At present, about 50% of undergraduate students fall into this category.
5. See Greenway and Haynes (2004) or Bekhradnia (2015) for more details on education vouchers, grant allocations and tuition fees.
6. This can be compared in some ways to the refinancing of a normal loan.
7. This is mainly seen in Canada and the US.
8. This is true for all existing ICLs except the system in operation in Hungary. In that country students repay 6% of their income and there is no income threshold for repayment.
9. There are two notable examples of this type of financing system. The first was a business known as MyRichUncle (MRU) which was set up in 2002 in the US to provide a HCC service. However, this company declared bankruptcy in 2009. The second is a company named Lunmithat that was founded in 2002 and mainly serves students in

Latin American countries. The company still exists but on a relatively small scale; since its establishment it has funded 7000 students. To the authors' knowledge, no comprehensive study has evaluated these programmes.

10. Clancy (2015) and HEA (2014) provide in-depth summaries of these three components. We provide a more concise description here.
11. *Ex-ante* studies such as these have been carried out for the UK (Glennerster et al. 1995; Goodman et al. 2002), Australia (Harding 1995) and the Netherlands (Jacobs 2002). See Flannery and O'Donoghue (2011) for a discussion.
12. Although the earnings projections are obtained from this microsimulation model, labour market participation responses are not simulated.
13. The emigration assumption here may be thought of as similar to 20% permanent emigration with 50% making repayments despite being abroad.
14. There are two exceptions to this, both related to a man with median lifecycle earnings and a loan of €16,000. Firstly, his mean monthly repayments are slightly lower than those of a woman with median earnings. Secondly, his mean monthly repayments are slightly lower than those of a man at the 25th percentile of lifecycle earnings. This is caused by the use of flexible functional forms, which result in simulated lifecycle earnings profiles for the median male that are relatively flat for several years. This leads to repayments that stay positive but fairly low for several years. These estimates are approximate but not significantly affected by alternative methods.

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