

NATIONAL UNIVERSITY OF IRELAND, GALWAY

DOCTORAL THESIS

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The Economics of Higher Education Participation in  
Ireland: Essays on Geographic Accessibility and  
Student Preferences

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## *Declaration of Authorship*

I, Sharon Walsh, declare that this thesis, submitted to the National University of Ireland, Galway for the degree of Doctor of Philosophy (Ph.D.) has not been previously submitted as an exercise for a degree at this or any other University. All research herein is entirely my own.

Signature:

Date:

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# Abbreviations and Acronyms

AIC	Akaike Information Criterion
AIT	Athlone Institute of Technology
ASC	Alternative Specific Constant
AVC	Asymptotic Variance Covariance
BIC	Bayesian Information Criterion
BMW	Border, Midlands and West
CIT	Cork Institute of Technology
CL	Conditional Logit
DIT	Dublin Institute of Technology
DCE	Discrete Choice Experiment
DCU	Dublin City University
DEIS	Delivering Equality of Opportunity In Schools
DKIT	Dundalk Institute of Technology
ED	Electoral Division
GDP	Gross Domestic Product
GIS	Geographic Information System
GMIT	Galway-Mayo Institute of Technology
GMNL	Generalised Multinomial Logit
HEA	Higher Education Authority
HEI	Higher Education Institution
IADT	Institute of Art, Design and Technology
IIA	Independence of Irrelevant Alternatives
IoT	Institute of Technology
ITB	Institute of Technology, Blanchardstown
ITC	Institute of Technology, Carlow
ITS	Institute of Technology, Sligo
ITT	Institute of Technology, Tallaght
ITTRA	Institute of Technology, Tralee
LC	Latent Class
LIT	Limerick Institute of Technology
LYIT	Letterkenny Institute of Technology

MXL	Mixed Logit
MNL	Multinomial Logit
MU	Maynooth University
NUIG	National University of Ireland, Galway
NUTS III	Nomenclature of Territorial Units for Statistics III
RPL	Random Parameters Logit
SE	South and East
TCD	Trinity College Dublin
UCC	University College Cork
UCD	University College Dublin
UK	United Kingdom
UL	University of Limerick
WIT	Waterford Institute of Technology
WTP	Willingness to Pay

## *Abstract*

Higher education has a range of important benefits for individuals and societies. As a result, increased participation in higher education is a stated policy goal in many countries. Understanding the economics of higher education is valuable in attempting to address issues related to higher education participation. In this context, the objective of this thesis is to expand our understanding of the economics of higher education participation in Ireland, with a particular focus on issues relating to geographic accessibility and student preferences.

Empirical studies investigating the factors influencing progression to higher education have identified geographic accessibility to higher education institutions (HEIs), through the associated transaction costs, as one important factor. Moreover, evidence from Ireland of 'localised' patterns of progression to higher education implies that proximity to a specific HEI is a key factor in a student's decision to study there. Despite this, no comprehensive measure of geographic accessibility to higher education has been developed for Ireland to date. Thus, the first aim of this thesis is to present an analysis of the extent and nature of geographic accessibility to higher education in Ireland. To this end, a range of GIS techniques are employed, while enrolment and mobility rates are also analysed to explore the association between proximity to different types of HEIs and the type of education pursued by individuals. Spatially-based accessibility Gini indices are calculated to explore the likely implications of any inequalities in accessibility, while a detailed analysis of the impact of a recent proposed higher education reform on geographic accessibility to universities in Ireland is also presented.

Other non-spatial factors are of course also likely to be important, both in the decision to progress to higher education and in a student's choice of HEI. In order to understand what attributes of higher education provision are valued by students, the second aim of this thesis is to elicit student preferences for HEIs in Ireland using a discrete choice experiment methodology. To this end, a survey of 1,105 students in their final year of secondary school was conducted across 34 schools. In the analysis, a latent class model is first employed to model heterogeneity in preferences and willingness-to-pay (WTP) across both the attributes of HEIs and across socio-economic groups. Compensating surplus for bundles of HEI attributes is also estimated, which has not been done previously in the literature. This allows the welfare gain or loss from alternative HEIs to be isolated. To further the analysis of heterogeneity in preferences, this thesis also employs mixed logit and generalised multinomial logit (GMNL) models to provide an in-depth analysis of the scale and variation in WTP by region, academic ability and socio-economic status. In fact, this thesis makes a methodological contribution to the education economics literature as it represents the first empirical application of the GMNL model in the area. Examining this variation in WTP is useful to both policymakers and HEI managers, as it provides them with interpretable information on how much different students value the attributes of HEIs.

*To my family, Mark, Mary, Lorraine, Niamh and to Paddy*

# Chapter 1

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## Introduction

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### 1.1 Research context

The economics of education is concerned with the manner in which choices affecting the stock of skills, knowledge and understanding are made, both by the individuals who demand education and by the institutions which supply it (Johnes, 1993). It is often argued that the economics of education is rooted in the theory of human capital in which rational agents maximise utility based on current costs and expected future returns. In the short term, utility is derived from the consumption of education through expanding one's understanding of the world. However, given the productivity gains that are likely to result from higher levels of education, education may also be regarded as an investment by an individual or society. Thus, both the consumption and investment elements of education contribute to the discounted stream of utility experienced by the economic agent (Johnes, 1993).

According to Johnes and Johnes (2004), a key argument in favour of this human capital view of education relates to the impact of education on economic growth. From a societal point of view, education plays a critical role in economic growth, as it leads to greater productivity which subsequently results in higher incomes and output (Solow, 1956; Schultz, 1961; Lucas, 1988; Romer, 1990; Barro and Lee, 1993; Newman, 2011). Related to this, education can result in improved labour market outcomes for individuals, as higher productivity resulting from education tends to result in higher lifecycle earnings (Psacharopoulos and Patrinos, 2004; Psacharopoulos and Patrinos, 2008). Education is also associated with a number of non-market benefits. At a macro level, Topel (1999), Appiah and McMahon (2002) and McMahon and Oketch (2013) find that the social benefits of education are substantial. Non-monetary societal returns from education include reduced crime, better public health and increased political participation (McMahon, 2004; Lochner, 2011). There are also important environmental and distributional implications associated with higher education. According to Appiah and McMahon (2002), an increase in education can be linked with lower levels of water

pollution but higher levels of air pollution. In addition, they show that income inequality can be reduced as education levels rise, if participation in education includes those from low income backgrounds. At an individual level, higher levels of education can contribute to improved health outcomes through, for example, increased life expectancy and healthier lifestyles (Grossman, 2006), as well as a stronger sense of wellbeing (Schuller et al., 2001; Castriota, 2006).

Given the numerous potential benefits of education, increased participation in higher education has become a stated policy aim in Ireland and internationally. This has provided the context for much empirical work investigating the key factors influencing higher education participation.<sup>1</sup> These include socio-economic background, parental education, additional private tuition and positive teacher engagement. Another important factor is geographic accessibility to higher education institutions (HEIs). Previous research in Ireland suggests that travel distance impacts not only on the decision to progress to higher education, but also the type of education pursued, along with the field of study chosen (Cullinan et al., 2013; Flannery and Cullinan, 2014). Thus, students living in relatively isolated areas are at a disadvantage in terms of geographic accessibility to higher education. Related to this, recent research by Cullinan and Halpin (2017) points to the presence of ‘localised’ patterns of progression to HEIs in Ireland. In other words, proximity to a specific HEI is a major factor in a student choosing to study at that institution. If geographic accessibility is limited, these localised patterns of progression will mean that proximity to a certain type of HEI will have a strong influence on the type of higher education an individual receives. Despite this, no comprehensive measure of geographic accessibility has been developed for Ireland and so the first aim of this thesis is to fill this gap in the literature and shed some light on variations in geographic accessibility to higher education in Ireland.

There are a number of reasons why travel distance or accessibility to HEIs might impact on participation decisions. According to Spiess and Wrohlich (2010), transactions costs may play a role as the greater the distance to a HEI, the higher the transaction costs of higher education and the lower the associated probability of participation. Such transaction costs may include direct financial costs (e.g. commuting), search costs (e.g. finding a place to live), indirect financial costs (e.g. forgone economies of scale

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<sup>1</sup> These studies will be discussed in detail in Chapter 2.

associated with living at home), information costs, as well as possible emotional costs associated with leaving home. They argue that distance effects may also be driven by ‘neighbourhood effects’ as the presence of a local university can generate ‘spill-over effects’ whereby young people in the vicinity of the HEI consider university education a natural goal. Overall, their basic argument is that students who live closer to a HEI will be more likely to participate in higher education. Given this, it is important to examine the extent of geographic accessibility to higher education in Ireland.

However, other factors are also likely to play a role in a student’s decision to participate in higher education. In order to encourage students to progress to higher education, it is important to understand what aspects of higher education provision are valued by students. This is also important when considering the HEI a student will choose, once they have decided to proceed to higher education. In this context, the second (and main) part of this thesis employs a discrete choice experiment (DCE) methodology to elicit student preferences for the attributes of HEIs. An examination of such factors should help to inform public policy with regard to higher education provision by providing a deeper insight into student preferences for the different characteristics of HEIs. In other words, an understanding of what students value may allow for policies to be better attuned to the needs of students which in turn may affect participation rates. From a service provision and marketing perspective, HEI managers also need to be aware of what students value, in order to deliver quality services that will serve the needs and expectations of prospective students. In the context of localised patterns of progression to higher education, it is also valuable to consider the importance of travel time relative to other aspects of higher education service provision. Indeed, this issue links the essays on geographic accessibility and student preferences.

As outlined above, a number of studies have explored the impact of socio-economic and geographic factors on participation in higher education. However, studies that aim to investigate the views and preferences of potential entrants directly are less common in an economics context. In a time where the higher education sector is becoming increasingly competitive, and where debates surrounding financing structures and equity of access are more and more in focus, policy debate and analysis is plentiful. However, much of this tends to take a top-down approach without significant consideration of the views of students. Therefore, a robust analysis of student preferences for higher education

will likely prove valuable within these discussions and help to inform the efficient allocation of scarce education resources. Accounting for heterogeneity in preferences also allows for differences across the population of prospective students to be identified, which should be useful in designing policy improvements aimed at increasing participation in higher education.

A DCE is an economic method used to assess preferences and is 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 on the nature and levels of these characteristics (Ryan et al., 2001). The technique involves presenting individuals with choices of scenarios described in terms of characteristics and associated levels, and for each choice respondents are asked to choose their preferred scenario. An advantage of DCEs is that they encourage respondents to carefully consider 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 (Flannery et al., 2013). Therefore, a DCE is an appropriate framework within which to analyse stated preferences in response to hypothetical choices (Louviere et al., 2000; Ryan et al., 2008). Analysis of DCE data allows for an examination of whether or not the attributes are important, the relative importance of attributes and the extent to which individuals are willing to trade between attributes. The inclusion of a price proxy also allows for a monetary value of each attribute to be estimated, which is its marginal willingness to pay (WTP) or implicit price. Furthermore, this methodology allows for estimation of the compensating surplus for varying bundles of HEI attributes. Overall then, DCEs provide a rich array of information which can enable those responsible for setting policy in the area to prioritise the attributes that are most highly valued.

However, as with all methodologies, it is important to be cognisant of the limitations of DCEs. The cognitive burden of a DCE study can be significant, particularly when respondents are unfamiliar with the subject area. Respondents are required to process a large amount of information in the choice sets and consider trade-offs between all of the attributes. If the cognitive burden is too high, it can result in processing heuristics such as attribute non-attendance. Thus, there is a trade-off between the amount of information obtained from the experiment and the cognitive burden placed on the respondent. This necessitates the need to carefully pilot the survey to detect any imbalances between cognitive burden and respondent efficiency. In addition to this, another criticism of DCEs

is that choices are made in a ‘hypothetical situation’. The difference between choices made by individuals in a hypothetical setting as opposed to those made in real life circumstances results in hypothetical bias. This means that preferences for certain attributes may be inflated since respondents are not required to substantiate their choices with real commitments. Despite this, the use of DCEs in this context is valuable given the paucity of available revealed preference data, and the findings of the study should allow HEI managers to make informed choices about the allocation of scarce resources in an effort to attract students.

## 1.2 Institutional context

In order to provide further context for the thesis, this section presents an overview of the institutional setting in the higher education sector in the Republic of Ireland. As some of the analysis in subsequent chapters relates to the island of Ireland, the section also provides a brief overview of the institutional context in Northern Ireland. In both the Republic of Ireland and Northern Ireland there are three main tiers to the education system as summarised in Table 1.1: primary, secondary and third level.

**Table 1.1:** Structure of educational system in the Republic of Ireland and Northern Ireland

Republic of Ireland			Northern Ireland		
	<i>Typical Ages</i>	<i>Status</i>		<i>Typical Ages</i>	<i>Status</i>
Primary (8 years)	5-12	C	Primary (8 years)	4-11	C
Lower Secondary (3 years)	13-15	C	Lower Secondary (4 years)	12-16	C
Upper Secondary (2-3 years)	16-18	NC	Upper Secondary (2-3 years)	16-18	NC
Institutes of Technology (2-3 years)	18-20	NC	Further Education Colleges (1-2 years)	18-20	NC
Universities (3-4 years)	18-22	NC	Universities (3-4 years)	18-22	NC

*Note:* C denotes compulsory education and NC denotes non-compulsory.

*Source:* Department of Education and Skills (ROI) and Department of Employment and Learning (NI).

Unsurprisingly, both jurisdictions have very similar education systems with schooling up to the lower secondary level compulsory for all. However, there are some differences at tertiary level. The following sections outline the structure and features of the higher education sector within the two jurisdictions, focusing mainly on the institutional context in the Republic of Ireland.

### **1.2.1 Republic of Ireland**

The higher education sector in the Republic of Ireland is comprised of 7 universities, 14 institutes of technology (IoTs) and a small number of other public and private colleges. The Higher Education Authority (HEA) is the statutory body responsible for the governance and regulation of HEIs and the higher education system. In addition, it is the funding authority for the universities, IoTs 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. Admission to higher education is predominately based on grades achieved in the Leaving Certificate examination which is the final exam in upper secondary education in Ireland. Over the past number of years, Ireland's higher education sector has experienced rapid growth, with full-time student numbers increasing from 115,696 in 1999/2000 to 176,632 in 2015/2016 (Department of Education and Skills, 2000; Department of Education and Skills, 2016b). In terms of the sectoral composition, 56% of full-time students in higher education in 2015/16 were in the university sector, 39% in IoTs, with the remaining 5% in other colleges (Department of Education and Skills, 2016b).

Significant heterogeneity exists across the different types of HEIs in Ireland, particularly between universities and IoTs. Undergraduate provision in universities is at honours bachelor degree level, while IoTs provide both ordinary degrees and honours bachelor degrees (McCoy and Smyth, 2011). Compared to universities, IoTs offer more part-time and flexible provision, with a larger proportion of mature and disadvantaged students. On the other hand, universities offer more postgraduate opportunities and have a stronger engagement in international education with a large share of national and international research funding (HEA, 2013b). There is also variation with regard to field of study across HEI type, with courses in the areas of health and humanities more common in the university sector, while engineering, construction and care courses are more common in

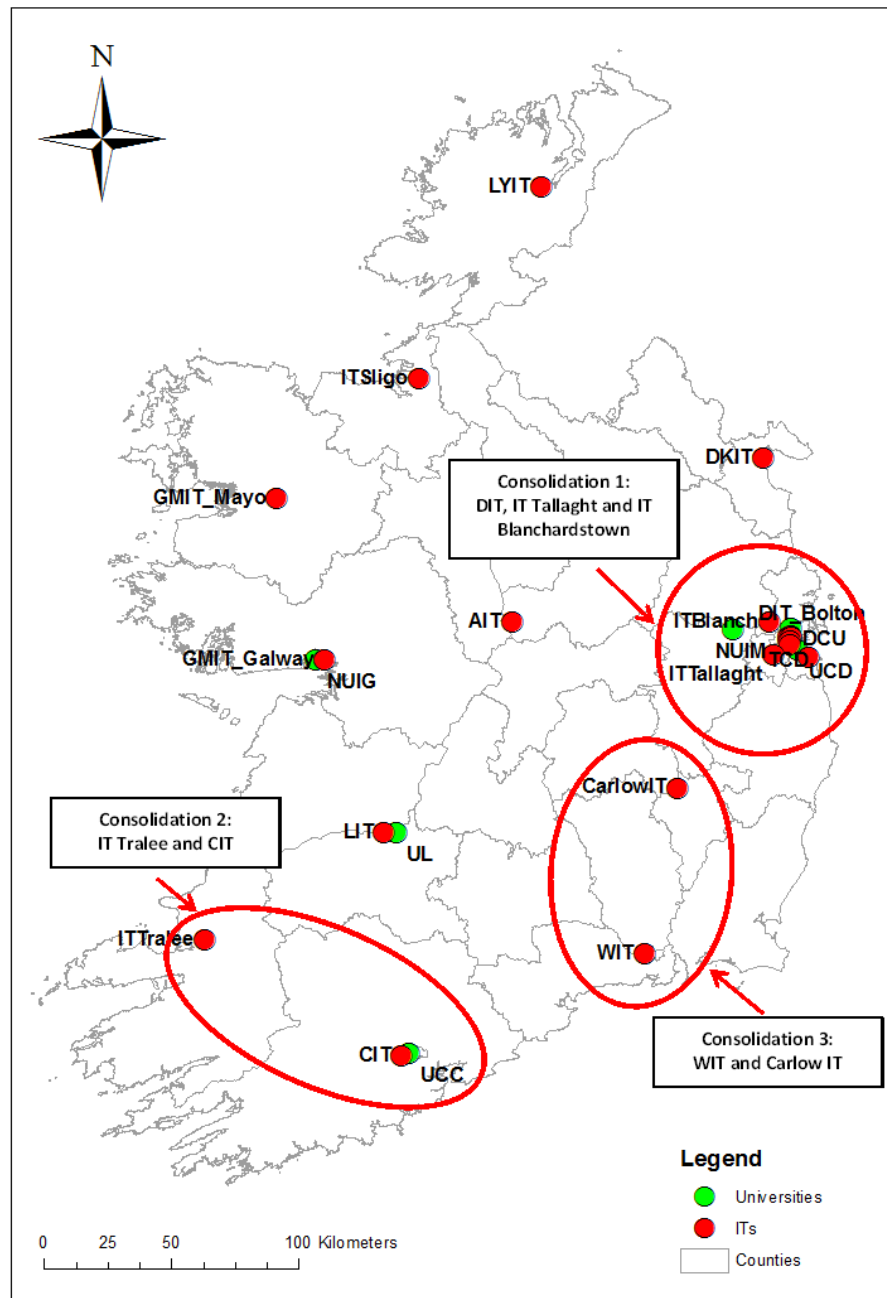
IoTs. With regard to institution rank, NUI Galway, Royal College of Surgeons in Ireland, Trinity College Dublin and University College Dublin are ranked in the top 250 universities in the world with the remaining universities ranked lower than this (Times Higher Education, 2016). While IoTs are not included in the world rankings, domestic rankings generally assign a lower rank to IoTs relative to universities (Ninth Level Ireland, 2016).

In terms of the spatial distribution of HEIs, universities in Ireland are concentrated in the main urban centres, whereas IoTs are more spatially dispersed across the country. Under a proposed policy reform, the Irish Government plans to re-organise this higher education sector and to create a number of technological universities through the consolidation of a number of IoTs (HEA, 2013b). 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. It is also intended that they will have regard for the social and economic needs of the region in which they are located and will engage in applied, problem orientated research (HEA, 2013b). While there are a number of other proposed changes relating to increased collaboration amongst HEIs and changes in governance (HEA, 2013b), the proposed establishment of technological universities is of most relevance to this thesis, particularly the analysis presented in Chapters 2 and 3. As illustrated in Figure 1.1, the three proposed consolidations are:

1. Dublin Institute of Technology; Institute of Technology, Tallaght and Institute of Technology, Blanchardstown.
2. Cork Institute of Technology and Institute of Technology, Tralee.
3. Waterford Institute of Technology and Carlow Institute of Technology.

Overall the aim of this reform is to re-cast the higher education sector in order to advance system capacity and performance, as well as to create the scale and coherence needed to improve quality (HEA, 2013b). This is expected to result in a consolidated but diverse sector comprised of institutions with distinctive and complementary missions attuned to the needs of the region (Lillis and Lynch, 2014). Based on these broad objectives, the statutory functions of a university and a technological university will be broadly similar. However, a technological university will focus on facilitating skills development for the

labour force at regional and national level and will promote enterprise-focused research and innovation, consultancy and development work (Houses of the Oireachtas, 2014). At present, the institutions involved in the proposed consolidation are collaborating with the prospect of finalising the process for designation as technological universities, while the relevant legislation (Technological Universities Bill) that will provide for IoTs to merge is awaiting approval at Committee stage (Ryan, 2017).



**Figure 1.1:** Spatial distribution of universities and IoTs in the Republic of Ireland

Another important feature of the education system is the structure of higher education grants and fees. At present, the Irish Government provides grant assistance to students attending higher education based on parental income and distance to the chosen HEI. Students who meet the income-related criteria receive either a full or partial maintenance grant, depending on whether they live within or outside the distance threshold of 45 kilometres (kms) from the HEI. This distance threshold was 24kms until the 2011/12 academic year. A non-adjacent maintenance grant (€3,025 in 2016/17) is provided to those eligible who live more than 45kms to their chosen institution, while an adjacent grant (€1,215 in 2016/17) is provided to those eligible and living within this threshold (Citizens Information, 2016). In general, students who qualify for a maintenance grant will also qualify for a fee grant which covers all or part of the student contribution fee. The proportion of students in receipt of a grant fell from 63 per cent in 1992 to 32 per cent in 2007, rising to 46 per cent in 2013. However, McCoy et al. (2009) found some evidence of progressivity within the system with those from lower social classes representing a higher proportion of those in receipt. Higher education fees were abolished in Ireland in 1996 and were replaced by registration fees which have been rising steadily since their inception. For example, the registration fee for the academic year 1997/98 was €17, compared to a registration fee of €3,000 for the academic year 2016/17 (HEA, 2010a; Citizen Information, 2016).

A number of so-called 'access programmes' are in place in Ireland which seek to increase participation in higher education by socioeconomically disadvantaged students and other individuals that are under-represented in higher education. For example, the Higher Education Access Route (HEAR) is a national scheme that offers places on reduced entry points and extra college support to school leavers from socioeconomically disadvantaged backgrounds. In order to qualify for this scheme, a range of financial, social and cultural indicators such as family income are considered (HEAR, 2014). The Disability Access Route to Education (DARE) is a similar scheme aimed at school leavers whose disability has had a negative impact on their educational outcomes. 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 Delivering Equality of Opportunity In Schools (DEIS) system which focuses on addressing the educational needs of children and young people from disadvantaged communities. 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 as part of this scheme (Department of Education and Science, 2005).

### **1.2.2 Northern Ireland**

The higher education sector in Northern Ireland is comprised of 3 universities, 2 university colleges and 6 further education colleges. University colleges represent a niche element of the higher education sector, focussing mainly on teacher training courses. While the further education colleges offer limited foundation degree courses, these institutions mainly offer diploma and certificate level courses with the vast majority of degrees being offered at university level. The Department for the Economy has responsibility for formulating policy and administering funding to support education and research in the higher education sector in Northern Ireland. Similar to the Republic of Ireland, Northern Ireland has seen a significant rise in enrolment in recent years, with full-time student numbers increasing from 53,640 in 1999/00 to 64,370 in 2014/15 (Department of Employment and Learning, 2016a). In terms of the sectoral distribution of these students, 82% of those enrolled on higher education courses were in universities, while 18% were in college of further education (Department of Employment and Learning, 2016a). However, in response to a growing funding crisis in the higher education sector, universities in Northern Ireland have recently reduced their intake of students (Department of Employment and Learning, 2016b). According to the Department of Employment and Learning (2016b), this reduction in student places has come at a time when skills forecasts point to an undersupply of degree level skills in the Northern Ireland workforce.

With regard to the structure of higher education grants and fees, a new system of financial support was introduced by the Government in Northern Ireland in 2006. At present, a non-repayable maintenance grant of up to £3,475 is available to full-time students who have a household income of £19,203 or less. An equivalent grant is available to full-time students who are in receipt of an income or housing supplement (Student Finance Northern Ireland, 2017). An important difference in the provision of grants between the Republic of Ireland and Northern Ireland is that in Northern Ireland eligibility for the grant depends only on household income and not on distance to a HEI. Student loans are also made available to full-time students to cover the cost of tuition fees (Student Finance

Northern Ireland, 2017). These tuition fees were introduced in 2006 and are currently £3,925 (The Complete University Guide, 2017). The majority of higher education funding in Northern Ireland comes from a combination of public investment in the form of grants paid by the Government and private investment in the form of tuition fees from students (Department of Employment and Learning, 2016b). Despite this, structural under-investment in higher education provision in Northern Ireland has emerged in recent years, which has led to the consideration of alternative funding methods. Similar to the Cassells Report in the Republic of Ireland (discussed in Section 1.4), increasing state investment, increasing student contribution and/or a mixed model of state investment and student contribution have been proposed as potential alternative models for funding higher education (Department of Employment and Learning, 2016b).

### **1.3 Policy context**

In this section, the current higher education policy context in the Republic of Ireland is examined, with particular emphasis on the issues of direct relevance to the thesis. Education policy in Ireland places higher education at the centre of future economic growth. Indeed, the new *National Skills Strategy to 2025* aims to underpin Ireland's economic and societal growth over the coming years by delivering more flexible, innovative and interdisciplinary skills provision (Department of Education and Skills, 2016a). According to the strategy, "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, 2016a: 68).

While these policy objectives aim to increase the human capital stock in order to facilitate economic growth, there are a number of more specific issues that lie at the core of higher education policy in Ireland. Higher education policy in Ireland is motivated by the desire to achieve equity and efficiency in higher education provision and is centred on the dual aim of increasing participation and promoting equity of access. The pursuit of equality has been a mainstream concern of Irish education policy since the 1965 *Investment in Education* report (Department of Education, 1965). One source of such inequality lies in the socio-economic background of prospective students. The free fees scheme, introduced in 1996, was seen as a key step towards achieving equity of access. However, research to date suggests that social inequality in higher education participation continues to persist in Ireland (Denny, 2014). Using data on college entrants, Clancy (1995) found

large disparities by socio-economic group in access to higher education. Although the admission rates for those from lower social classes has improved in recent times, it is still low relative to higher social classes. In 2014/15, 16.7% of new entrants to higher education in Ireland came from the Employers and Managers group, compared to 5.3% from the semi-skilled and 4.6% from the unskilled group (HEA, 2015a). Such inequalities in progression to higher education may have implications for income inequality in Ireland. In addition to this, the private benefits of higher education through higher lifecycle incomes will accrue to those with already high incomes, while low income individuals are less likely to experience such gains. Also, the persistent socio-economic disparity in participation rates means that the free fees system has resulted in a situation in which lower income households are effectively subsidising the education of higher income individuals (Strategy Group for Higher Education, 2011).

In the current *National Strategy for Higher Education to 2030*, the Government acknowledges that substantial inequalities persist in the extent to which young people from different socio-economic backgrounds access and derive benefit from higher education. Given this, it outlines plans to widen access to higher education by people from lower socio-economic backgrounds or other under-represented groups (Strategy Group for Higher Education, 2011). Additionally, The *National Plan for Equity of Access to Higher Education 2015-2019* outlines a number of policies to tackle this problem by setting specific targets to increase participation by those in socio-economic groups that have low participation in higher education as well as students with disabilities, mature students, part-time/flexible learners, further education award holders and Irish travellers (HEA, 2015b). This National Access Plan is set in the context of a range of other national anti-poverty and social inclusion measures in Ireland, including for example, the *National Action Plan for Social Inclusion 2007-2016* (Department of Social and Family Affairs, 2007). Geographic factors may also play a role in achieving equity of access to higher education. The recent *National Plan for Equity of Access to Higher Education 2015-2019* highlights the variation in participation across counties and districts within Dublin and outlines a plan to review data in order to better understand the relationship between geographic location and higher education participation.

On the supply-side, the *National Strategy for Higher Education to 2030* along with the HEA's *Higher Education System Performance Framework 2014-2016* have indicated that the successful progression of students enrolled in higher education is an important

measure of the effectiveness of the institutions (Strategy Group for Higher Education, 2011; HEA, 2014b). In fact, the concept of ‘successful completion’ is a core element of Ireland’s National Framework of Qualifications, which aims to ensure that learners can successfully complete a programme, or series of programmes, leading to an award, or series of awards, in pursuit of their learning objectives (Government of Ireland, 2012). The HEA have also shown that the proportion of new entrants to higher education not present one year later lies between 15% and 16% (HEA, 2010b; HEA, 2016c). They highlight significant variation in non-progression across institution type, discipline studied, gender and prior educational attainment.

Related to this, the HEA stress that successful progression within higher education is an important part of ensuring that the resources available to the higher education sector are utilised with maximum efficiency (HEA, 2010b). This emphasis on system performance and accountability is highlighted in the *Higher Education System Performance: Institutional and Sectoral Profiles* (HEA, 2014b; HEA, 2016b) which aim to provide an evidence base on which to evaluate institutional and sectoral performance. These reports facilitate monitoring of trends in higher education provision in terms of student numbers, fields of study, participation metrics, and the financial and human resource-base for the sector (HEA, 2013c).

Concerns have also been raised as to the funding of higher education in Ireland, particularly given the likely increase in future demand for higher education. Indeed, McGuinness et al. (2013) estimate that based on current participation rates and demographic projections, the number of potential undergraduate entrants to higher education is expected to grow from 41,000 in 2010/2011 to 44,000 in 2019/20 and to just over 51,000 by 2029/2030. The current funding mix combines upfront student fees with substantial State support. However, the relative contribution that both parties make has undergone significant change recently. Since 2008, the level of State support has decreased by approximately 35%, while the annual upfront fee faced by students has risen from €900 to currently stand at €3,000 (Flannery et al., 2017). As outlined above, the Irish State does provide some element of financial aid as 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. In 2013, 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).

However, the recent economic downturn has led to significant fiscal constraints with a budget deficit of 2.3% of GDP in 2015, falling from 32.3% of GDP in 2010 (Central Statistics Office, 2016). Given this, the *National Strategy for Higher Education to 2030* suggests a move towards cost-sharing on the part of the student given the considerable private returns to higher education (Strategy Group for Higher Education, 2011). It highlights the persistent socio-economic disparity in participation rates despite the introduction of the free-fees system in 1996 which aimed to bridge the socio-economic gap in higher education participation. However, the policy stressed that any system of individual contributions “must be supplemental to the State’s investment and not a substitute for it” (Strategy Group for Higher Education, 2011: 113).

The Irish Government are in the process of considering such alternative funding models for the higher education sector to replace the current system of public funding. However, it has been acknowledged that a continued increase in Government spending in the higher education sector in Ireland may not be feasible (Expert Group, 2016). A recent report entitled *Investing in National Ambition: A Strategy for Funding Higher Education* by the Expert Group on the Future Funding of Higher Education (also known as the Cassells report) identified three alternative funding options. The first two involve increased State funding combined with either the removal of the student contribution fee or maintaining it at current levels, while the third option involves the introduction of an income contingent loan (ICL) system. The introduction of a financial contribution from employers was also recommended. The report also stressed 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 (Expert Group, 2016).

Finally, Britain’s exit from the European Union is likely to have a substantial impact on the higher education sector, both in the Republic of Ireland and Northern Ireland. According to HEA (2016a), cross-border student mobility and residency rules are likely to be impacted by Brexit, which is interesting given the research presented in Chapter 2 examining geographic accessibility to higher education on the island of Ireland. In light of this current policy context, a number of unexamined issues emerge which have the potential to inform the policy debate. In the following section, the research objectives of

this thesis are outlined. However, it should be noted that while a range of important issues of relevance to higher education participation are considered in this thesis, there are a number of issues that are not addressed that are also relevant for higher education policy in Ireland. These include, but are not limited to, student retention, teaching and learning, global competitiveness, as well as access and participation in postgraduate education.

## **1.4 Overview of research objectives**

The overarching objective of this thesis can be framed as follows:

*To expand our knowledge and understanding of the economics of higher education participation in Ireland, with a particular focus on issues relating to geographic accessibility and student preferences.*

Based on this broad research objective, there are two *specific* research objectives, which are outlined below:

1. To examine the extent of geographic accessibility to higher education in Ireland
  - What is the level of geographic accessibility to higher education on the island of Ireland, and does this matter for student enrolment and mobility?
  - What is the impact of the proposed higher education reforms on both the level of, and inequalities in, geographic accessibility to university education in Ireland?
  
2. To investigate the preferences of prospective students for the attributes of HEIs through the use of a DCE methodology
  - Which attributes of HEIs are valued by prospective students in Ireland, and what is relative ranking of preferences for HEI attributes?
  - What is the WTP for the attributes of HEIs and what is the compensating surplus for bundles of HEI attributes?
  - What is the extent and nature of heterogeneity in preferences and WTP for the attributes of HEIs?

Overall, the research seeks to address identified gaps in the literature relating to higher education participation in Ireland. In relation to the first objective, spatial analysis techniques are used to examine the level of, and inequalities in, geographic accessibility to higher education in Ireland. This provides a context for the subsequent research

objective, while also addressing important gaps in the literature relating to geographic accessibility to higher education in Ireland.

While the first research objective offers valuable insights into geographic accessibility to higher education in Ireland, other factors may also play a role in higher education participation decisions. Given this, the second research objective seeks to investigate the preferences of prospective students for the attributes of HEIs. The inclusion of travel time as an attribute in the DCE allows for an examination of the importance of travel time relative to other HEI attributes in a student's choice of institution. Thus, it links the two specific research objectives. In order to address the second research objective, primary data was collected specifically for this thesis from Leaving Certificate students in Ireland. The use of a survey instrument provides the foundation for a thorough investigation of the preferences of prospective students for the attributes of HEIs, a factor which has direct implications for higher education participation decisions.

## **1.5 Structure of thesis**

The remainder of the thesis is structured as follows:

*Chapter 2* presents the results from a study examining geographic accessibility to higher education on the island of Ireland. In particular, the chapter utilises GIS-based methodologies to measure the level of geographic accessibility to higher education both within and between the Republic of Ireland and Northern Ireland. The chapter also explores the enrolment rates and mobility of those attending higher education in both jurisdictions, as this serves to highlight the impact of poor accessibility on those wishing to pursue higher education.

*Chapter 3* extends on Chapter 2 by examining geographic accessibility to university education in Ireland using a wider range of techniques and measures, paying particular attention to analysing the effect of proposed higher education policy reforms. Utilising GIS-based methodologies, the chapter models the impact of the proposed reforms on both the level of, and inequalities in, geographic accessibility to university education in Ireland. This includes mapping and analysing a range of accessibility measures, as well as calculating spatially-based university accessibility Gini indices.

*Chapter 4* provides a detailed description of the stages involved in designing and implementing the DCE questionnaire used in this thesis. The chapter begins with an

extensive overview of the findings from a literature review which identified previous studies examining the factors influencing institution choice. Following this, the chapter outlines findings from qualitative research that was used to identify and refine the attributes and levels used in the survey. Details of the experimental design that was used to generate specific combinations of attributes and levels is then given. A further objective of Chapter 4 is to provide details on the main components of the questionnaire, as well as an overview of how the questionnaire was administered to the population of interest.

*Chapter 5* presents descriptive statistics on some of the key variables collected as part of the survey. This includes a socio-demographic profile of respondents, their plans for higher education, along with variables capturing their attitudes towards higher education. The chapter also presents descriptive statistics on a number of follow-up questions that were asked following the DCE to ascertain how the respondents found the exercise. Following this, the chapter provides a descriptive analysis of the importance of peer, sibling and parental influence on HEI choice. The factors associated with the decision to live at home while attending higher education are also explored.

*Chapter 6* analyses responses from the DCE to provide a detailed examination of the preferences of prospective students for the attributes of HEIs. A latent class model is employed to account for heterogeneity in preferences, and WTP is estimated for the different attribute levels. Given the debate surrounding the nature of higher education financing in Ireland, the scale and variation of WTP for various HEI attributes, and how these preferences may vary across groups, is explored. Related to this, compensating surplus for bundles of HEI attributes is also estimated.

*Chapter 7* extends on the analysis in Chapter 6 by examining heterogeneity in WTP for HEI attributes, by region, academic ability and socio-economic status. Specifically, the chapter employs both mixed logit and generalised multinomial logit models to provide an in-depth analysis of the scale and variation in WTP across the various groups. The chapter also makes a methodological contribution to the education economics literature as it represents the first empirical application of the GMNL model in the area.

*Chapter 8* aims to integrate the findings from the spatial and stated preference analysis. The objective of this chapter is to summarise the main conclusions and to provide a number of policy recommendations arising from the work.

## **1.6 Thesis outputs**

There have been a number of outputs from the research undertaken for this thesis, which are listed here for information. These include three peer-reviewed publications, as well as a book chapter. The research was also presented at a number of conferences and seminars, the most notable of which are listed below.

### **1.6.1 Peer reviewed journal articles**

Walsh S, Flannery D, Cullinan J, 2017. Analysing the preferences of prospective students for higher education institution attributes, *Education Economics*, DOI: 10.1080/09645292.2017.1335693.

Walsh S, Cullinan J, Flannery D, 2016. The impact of proposed higher education reforms on geographic accessibility to universities in Ireland, *Applied Spatial Analysis and Policy*, DOI: 10.1007/s12061-016-9193-3.

Walsh S, Flannery D, Cullinan J, 2015. Geographic accessibility to higher education on the island of Ireland, *Irish Educational Studies*, 34(1), 5-23.

### **1.6.2 Book chapters**

Walsh S. and Cullinan J, 2017. Factors influencing higher education institution choice. In: Cullinan and Flannery (Eds.) *Economic Insights on Higher Education Policy in Ireland: Evidence from a Public System*. London: Palgrave Macmillan.

### **1.6.3 Conference and seminar presentations**

Analysing the preferences of prospective students for higher education institution attributes, Irish Economic Association Annual Conference, Galway, 2016.

Analysing the preferences of prospective students for higher education institution attributes, *Discipline of Economics Seminar Series*, University of Limerick, 2016.

The impact of proposed higher education reforms on geographic accessibility to universities in Ireland, *Discipline of Economics Seminar Series*, NUI Galway, 2015.

Geographic accessibility to higher education on the island of Ireland, *Irish Society of New Economists Conference*, Galway, 2014.

Geographic accessibility to higher education on the island of Ireland, *JE Cairnes Doctoral Colloquium Poster Presentation*, NUI Galway, 2014.

#### **1.6.4 Research impact**

The research findings from this thesis were presented to the Chair of an Arts Review Group in NUI Galway in June 2016 and to the Dean of the College of Arts, Social Sciences and Celtic Studies in NUI Galway in May 2017. Notably, the research findings were used to inform emerging strategies regarding undergraduate recruitment by the College of Arts, Social Sciences and Celtic Studies.

## Chapter 2

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# Geographic accessibility to higher education on the island of Ireland <sup>2</sup>

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### 2.1 Introduction

As discussed in Chapter 1, geographic accessibility plays an important role in a range of higher education decisions and outcomes. However, despite this, no comprehensive measures of geographic accessibility exist for Ireland. In this context, the following two chapters consider the extent of geographic accessibility to higher education in Ireland. To begin, this chapter examines geographic accessibility to higher education both within and between the Republic of Ireland and Northern Ireland.

The chapter proceeds as follows: Section 2.2 provides a brief motivation for the analysis. Following this, Section 2.3 provides details of the methodology used to measure geographic accessibility to higher education on the island of Ireland. Applying these methods, Section 2.4 presents results on how geographic accessibility to higher education differs between the Republic of Ireland and Northern Ireland, differentiating by type of higher education. Finally, Section 2.5 concludes with a discussion of the implications of these findings.

### 2.2 Background

Given the numerous potential benefits of education, as described in Chapter 1, increased participation in higher education has become a stated policy aim in Ireland and elsewhere. This has provided the context for much empirical work investigating the key factors that determine higher education participation. One such factor is geographic accessibility to HEIs. While some studies have used basic measures of spatial location in considering the determinants of higher education participation decisions (O'Connell et al., 2006; Flannery and O'Donoghue, 2009; Cullinan et al., 2013), no comprehensive measure of

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<sup>2</sup> This chapter is based upon Walsh, S., Flannery, D. & Cullinan, J. 2015. Geographic accessibility to higher education on the island of Ireland. *Irish Educational Studies*, 34(1), 5-23.

geographic accessibility has been developed for Ireland. The first aim of this chapter is to fill this gap in the literature and shed some light on variations in geographic accessibility to higher education on the island of Ireland.

Variations in geographic accessibility may also influence the type of HEI chosen, as well as the level of degree and field of study a school leaver pursues (Flannery and Cullinan, 2014). This in turn may have important lifecycle implications with respect to labour market outcomes, as variations in the type of HEI attended, as well as the level of higher education completed and field of study, have been shown to influence both employment prospects and earnings (Grubb, 1993; Blundell et al., 2000; McGuinness, 2003; Kelly et al., 2010). In general these studies found that those who obtain higher level qualifications have a significant labour market advantage over those with lower level qualifications. Also, Kelly et al. (2010) showed that for Ireland, controlling for level of degree and subject choice, the type of institution attended (university or not) can have significant future earnings implications. Flannery and Cullinan (2014) analysed the role that spatial factors may play in determining the type of HEI attended in the Republic of Ireland using econometric techniques. While their study provided some insight into the role that geographic accessibility plays at an overall level, a more detailed (regional or county level) analysis of this influence was not investigated. Thus, the second aim of this chapter is to complement these previous studies by investigating the impact of geographic inequalities on the type of higher education available to school leavers in Ireland. To this end, geographic information system (GIS) techniques and recently available statistics on higher education enrolment and mobility rates on the island of Ireland are employed.

The relationship between access to and participation in higher education has been explored both internationally and in Ireland. International research has shown that geographic accessibility is an important driver of both higher education participation generally, as well as the type of education that a person receives (Frenette, 2006; Sá et al., 2006; Spiess and Wrohlich, 2010; Sá et al., 2011; Gibbons and Vignoles, 2012; Kavrouidakis et al., 2013). In the Republic of Ireland, Flannery and O'Donoghue (2009) attempted to account for regional differences in participation rates by including regional-level dummy variables within a choice model of higher education participation. However, they did not uncover any strong influence of location on participation. These findings are consistent with those in O'Connell et al. (2006) who found that admission

rates are high in western counties. However, these studies fail to explore whether there is a differential impact of location and distance on school leavers from different social classes. Cullinan et al. (2013) studied this issue by considering the impact of road network travel distance on the decision of school leavers to proceed to higher education. While travel distance had no significant effect on average, it was found to have a significantly negative impact on higher education participation for those from lower social class backgrounds. This effect intensified as distance increased and the impact of distance was found to be greatest for lower ability school leavers.

As an extension to this analysis, 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 found that geographic accessibility and social class play an important role in these choices. In particular, they found that “an individual living 180 km from a university is 17% less likely to choose a university compared to an otherwise similar individual living 20 km away, while this differential increases with distance” (Flannery and Cullinan, 2014:2959). 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. While studies such as Osborne (2006) and McQuaid and Hollywood (2008) have studied higher education participation in Northern Ireland from a socio-economic viewpoint, no comprehensive analysis of the relationship between geographic accessibility and participation in higher education has been undertaken to date.

Within this general context, and given the fact that geographic inequalities in accessibility to higher education have been shown to have important implications for participation, this chapter presents, for the first time, comprehensive measures of geographic accessibility to higher education on the island of Ireland. These measures of accessibility map differences in geographic accessibility both within and between the Republic of Ireland and Northern Ireland, which in turn allows for a consideration of differences in the type of education available to school leavers on the island of Ireland. Such analysis is particularly important given the localised patterns of progression to HEIs in Ireland (Cullinan and Halpin, 2017). While some studies have mapped higher education access and participation in the UK (HEFCW, 2009; Gibbons and Vignoles, 2012; HEFCE, 2012), no such analysis has been conducted for the island of Ireland. The

chapter also explores the implications of recently announced changes to the higher education sector in the Republic of Ireland with respect to geographic accessibility to higher education. Finally, to further the analysis of the influence that geographic accessibility may have on higher education choices, enrolment rates and mobility of students attending higher education in Ireland are examined on a county and regional basis respectively. Variations in these statistics across counties or regions may indicate whether or not spatial inequalities in participation exist.

## **2.3 Methods**

In order to measure geographic accessibility to higher education, the first step involved ‘geocoding’ the addresses of HEIs in both the Republic of Ireland and Northern Ireland. Geocoding is the process of assigning geographic coordinates to an address. With geographic coordinates, the HEI can then be mapped and entered into a geographic information system (GIS) for spatial analysis. A GIS is a “system for capturing, storing, checking, integrating, manipulating, analysing and displaying data that are spatially referenced to the earth” (Bateman et al., 2002). It can, in simple terms, be thought of as a piece of computer software with a range of ‘analytical tools’ that can be used to analyse ‘spatial’ data. For example, a key functionality of a GIS is its ability to create ‘buffer’ zones around features such as HEIs. Buffer zones may be constructed on the basis of straight-line (Euclidean) distances or as a function of some ‘network’ (e.g. a road network) and represent a vital tool for analysing proximity. Thus, the functionality offered by a GIS makes it particularly suited to considering issues related to geographic accessibility. In this chapter, the ESRI ArcView 10.1 GIS package (subsequently referred to as ArcGIS) is used.

To ensure that the institutions across the two regions are comparable, the analysis is focused on degree-awarding institutions which offer a substantial choice set. Therefore, in the Republic of Ireland, the seven universities along with the main campuses of the IOTs are included. Satellite campuses such as St. Angela’s College or Mary Immaculate College are not included as these colleges do not offer a full range of courses. The Castlebar campus of GMIT is also excluded as this campus hosts fewer than 15% of all GMIT undergraduates and is thus treated as a satellite campus. Similarly, the satellite campuses of LIT are excluded as only 17% of LIT enrolments are based in Tipperary. In Northern Ireland, full-time higher education courses in further education colleges are

mostly at sub-degree level and tend to have a vocational focus with a mixture of academic study and on-the-job experience. Therefore, these colleges are excluded from the study. In addition, Stanmillis University College and St. Mary's University College are not included as they do not offer a full range of courses. A list of the institutions included in the analysis is presented in Table 2.1.

**Table 2.1:** Higher education institutions included in the analysis

<b>Republic of Ireland</b>		<b>Northern Ireland</b>
Universities	Institutes of Technology	Universities
University College Dublin	Dublin IT	Queen's University Belfast
Trinity College Dublin	Waterford IT	University of Ulster Magee
University College Cork	IT Sligo	University of Ulster Jordanstown
NUI Galway	IT Carlow	University of Ulster Coleraine
Maynooth University	IT Tralee	
University of Limerick	Galway/Mayo IT	
Dublin City University	Letterkenny IT	
	Limerick IT	
	Athlone IT	
	Cork IT	
	Dundalk IT	
	IT Tallaght	
	IT Blanchardstown	
	Dun Laoghaire Institute	

*Note:* Only the Galway campus of Galway/Mayo IT and the Limerick campus of LIT are included in the analysis.

*Source:* Department of Education and Skills (ROI) and Department of Employment and Learning (NI).

Once geocoded, the HEIs were mapped alongside 'electoral divisions' (EDs) in the Republic of Ireland and 'small areas' in Northern Ireland.<sup>3</sup> While EDs are larger than 'small areas' in size on average, this is unlikely to impact to any significant extent on the visualisations presented and subsequent conclusions drawn. To calculate network-based measures of accessibility, the 'network analyst extension' in ArcGIS was employed (see Cullinan et al. (2011) and Cullinan et al. (2008) for previous applications). Network analysis is a GIS function used to calculate the distance covered and time taken in making

<sup>3</sup> EDs are small legally-defined administrative areas in Ireland for which population statistics are published from the Census and which range in size from 0.05 to 126.0 km<sup>2</sup>. EDs were chosen over the more homogenous 'small areas' (SAs) due to the considerable added complexity involved in modelling the latter, of which there are close to 18,500 in total.

a journey on a ‘network’. It enables network-based ‘service’ areas, defined as regions that encompass all accessible points on a network from a particular location within a specified impedance (e.g. distance or time), to be estimated for an institution such as a HEI. Once estimated, they provide a good measure of the level of geographic accessibility to that HEI. When calculated for all (or a subset of) HEIs, these distances can then be used to calculate the travel distance to the nearest HEI for any ED/small area, in order to provide a useful visual representation of level of geographic accessibility to higher education. This basic nearest distance accessibility measure is set out in Equation (1):

$$\text{Nearest distance}_i = \min_j d_{ij} \quad (1)$$

Specifically, the road network travel distance is measured from the centroid of ED/small area  $i$  to the nearest HEI  $j$ , with smaller values implying greater geographic accessibility. Distance to nearest HEI can be calculated and mapped for all HEIs within a jurisdiction (i.e. Republic of Ireland *or* Northern Ireland) or across jurisdictions (i.e. Republic of Ireland *and* Northern Ireland), as well as for different types of HEIs (i.e. universities, IoTs, etc.). Given that the focus of this chapter is on examining geographic accessibility to higher education on the island of Ireland, accessibility is considered in terms of distance to nearest HEI using both within- and across-jurisdiction measures.

## 2.4 Results

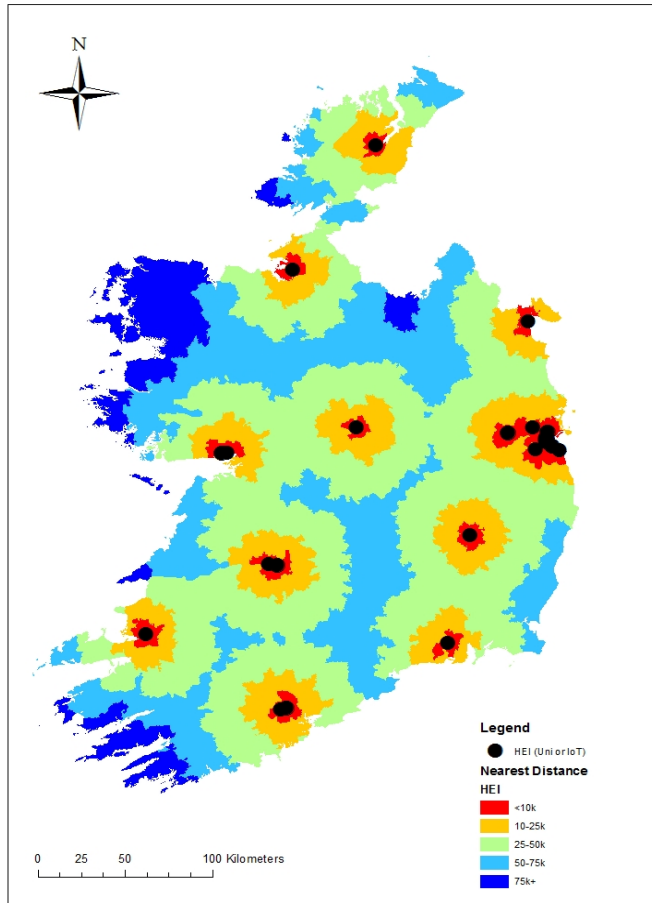
### 2.4.1 Geographic accessibility to higher education

This section considers the level of geographic accessibility to higher education on the island of Ireland using the GIS-based measures described above. This allows for an examination of accessibility to higher education generally, as well as the type of higher education available. To start, Figure 2.1 presents within-jurisdiction geographic accessibility to HEIs on the island of Ireland. In particular, it shows the road network distance from the centroid of each ED/small area to the nearest university or IoT in the Republic of Ireland and the nearest university in Northern Ireland. Figure 2.1 suggests that at an overall level, geographic accessibility to HEIs is relatively good in the Republic of Ireland. However, some regional disparities are evident, especially in the West, North-West, South-West, and along the border counties. For example, there are large areas from which an individual would have to travel 50 kilometres (kms) or more, as well as areas

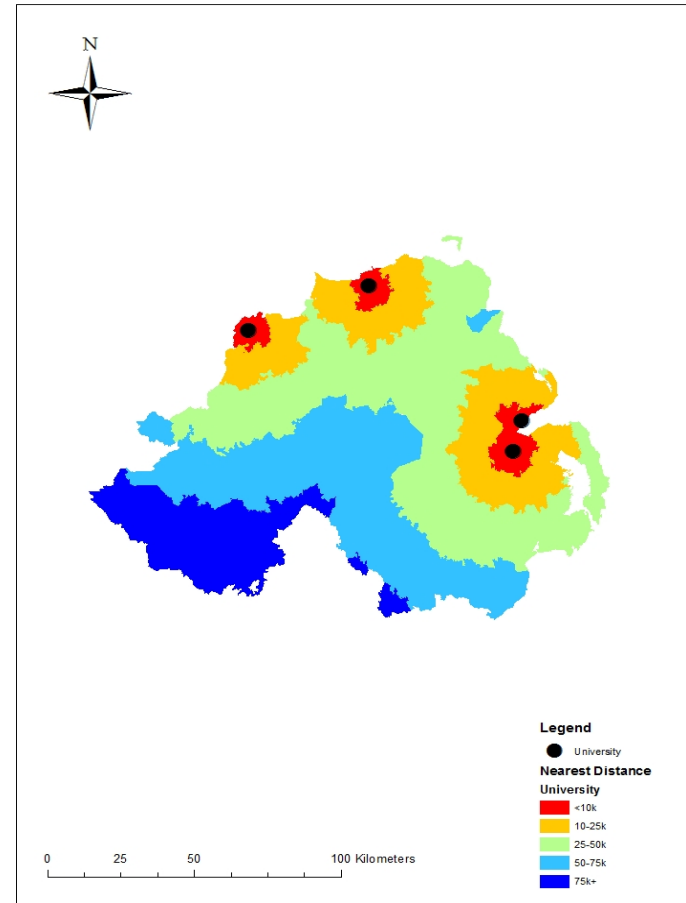
from which the nearest HEI is over 75 kms away. While these areas tend to be quite rural with relatively low population densities, the evidence does suggest some geographic inequalities in relation to HEI accessibility. In Northern Ireland, the regions along the border are the most disadvantaged in terms of access to HEIs. Of course with a fixed number of HEIs, some inequality in access is inevitable. In order to further consider accessibility to higher education across the island of Ireland, Figure 2.2 presents within- and across-jurisdiction measures of accessibility to HEIs for the island as a whole. For example, Panel (b) shows that by considering both regions together, accessibility to HEIs improves along the border. However, the regions of the west coast remain at a relative disadvantage, as do some of the border areas.

Figure 2.3 provides additional analysis of the differences in accessibility to higher education, this time with the aim of examining differences in the type of education available, and shows within- and across-jurisdiction measures of accessibility to universities on the island of Ireland. Since there are important differences in the level of higher education and the fields of study offered by universities and IoTs, it can be important to explore accessibility to higher education, differentiating by type. Geographic accessibility is again measured in terms of the road network travel distance to the nearest university. Looking first at within-jurisdiction accessibility, Figure 2.3(a) shows that in the Republic, there are large areas from which an individual would have to travel at least 75 kms to the nearest university. Interestingly, 71% of school leavers (those aged 15-17 years according to the 2011 Census of Population) live within 75kms to their nearest university. While this represents a significant portion of school leavers, the remaining 29% equates to 48,917 individuals living more than 75kms to their nearest university. Relative to the Republic of Ireland, accessibility to universities in Northern Ireland is good, with most areas within 50kms of the nearest university. However, accessibility to a university becomes more limited closer to the border. An examination of across-jurisdiction accessibility (panel b) shows a notable improvement in geographic accessibility to universities in north Donegal. However, all other regions remain the same.

(a) Universities and IOTs in the Republic

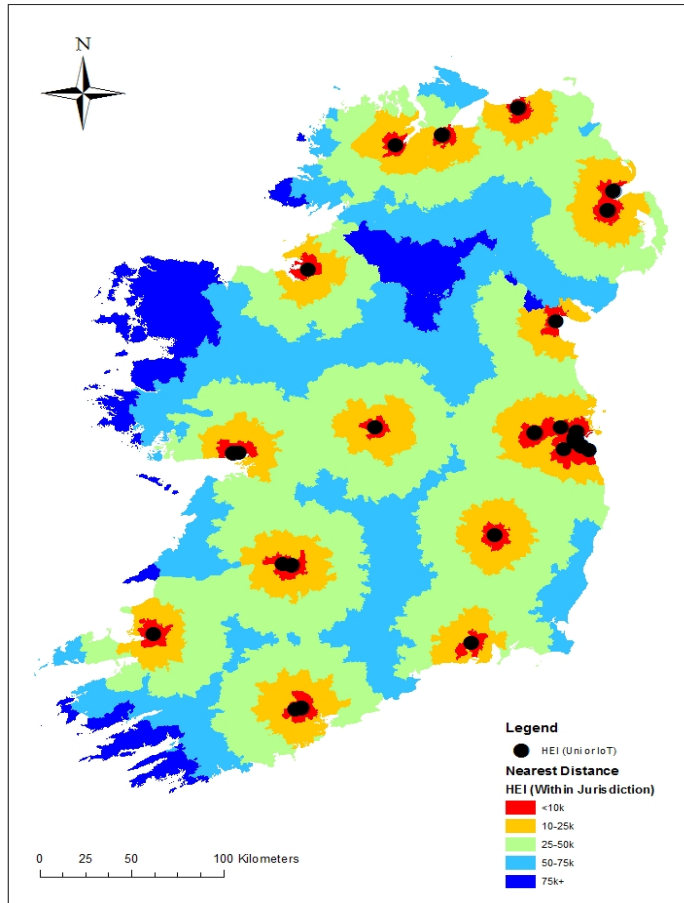


(b) Universities in North

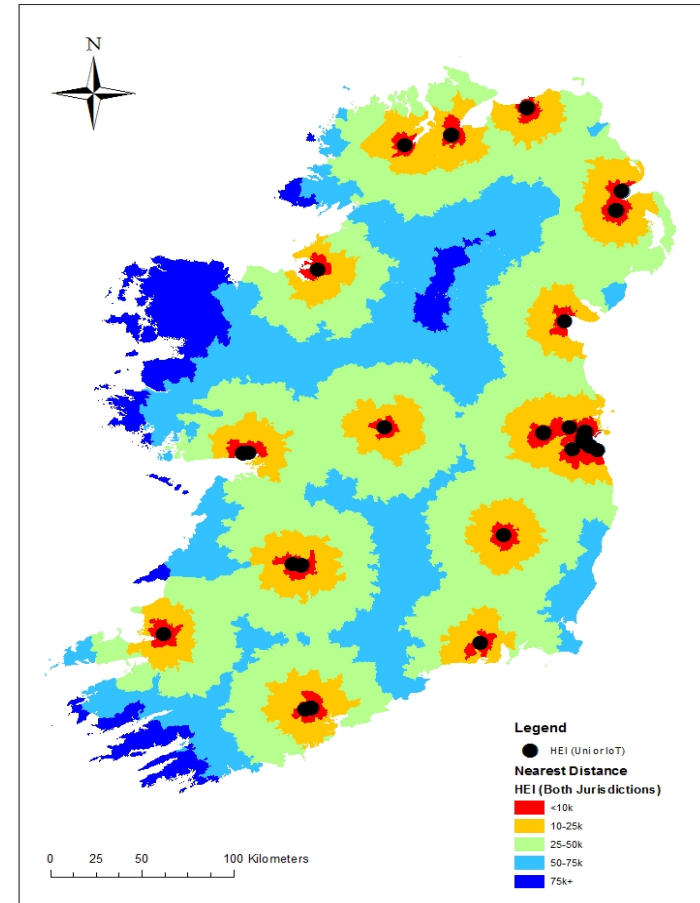


**Figure 2.1:** Within-jurisdiction geographic accessibility to HEIs on the island of Ireland

(a) Within jurisdiction

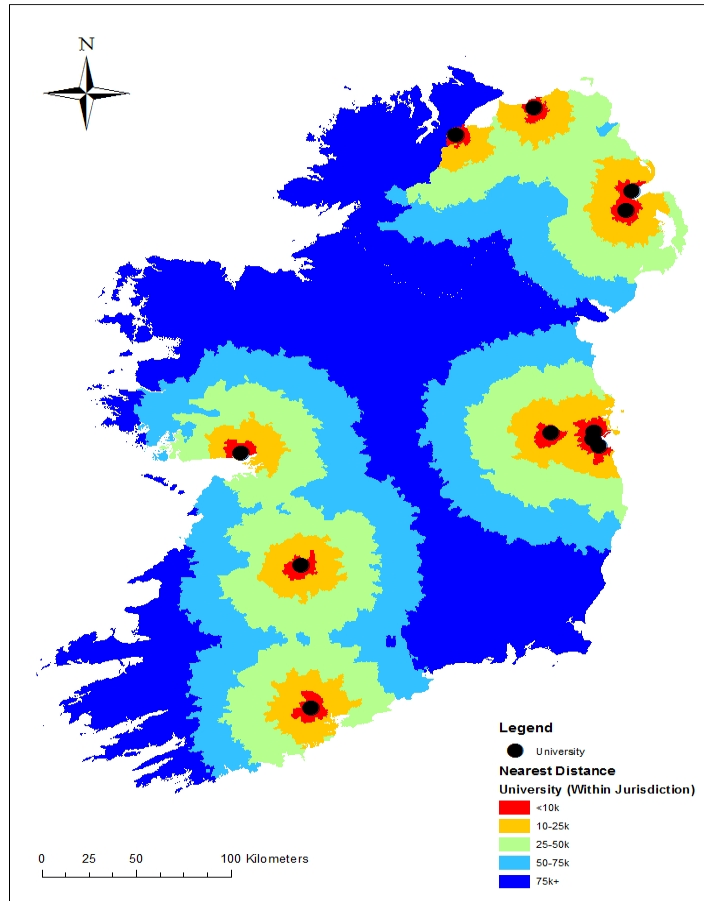


(b) Across jurisdictions

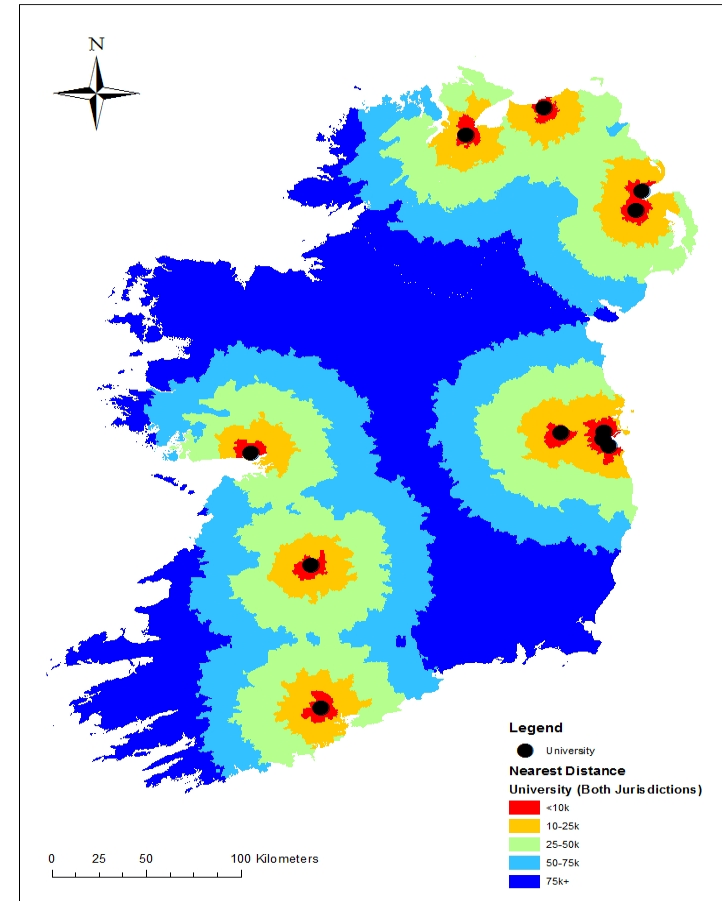


**Figure 2.2:** Within- and across-jurisdiction geographic accessibility to HEIs on the island of Ireland

(a) *Within jurisdiction*

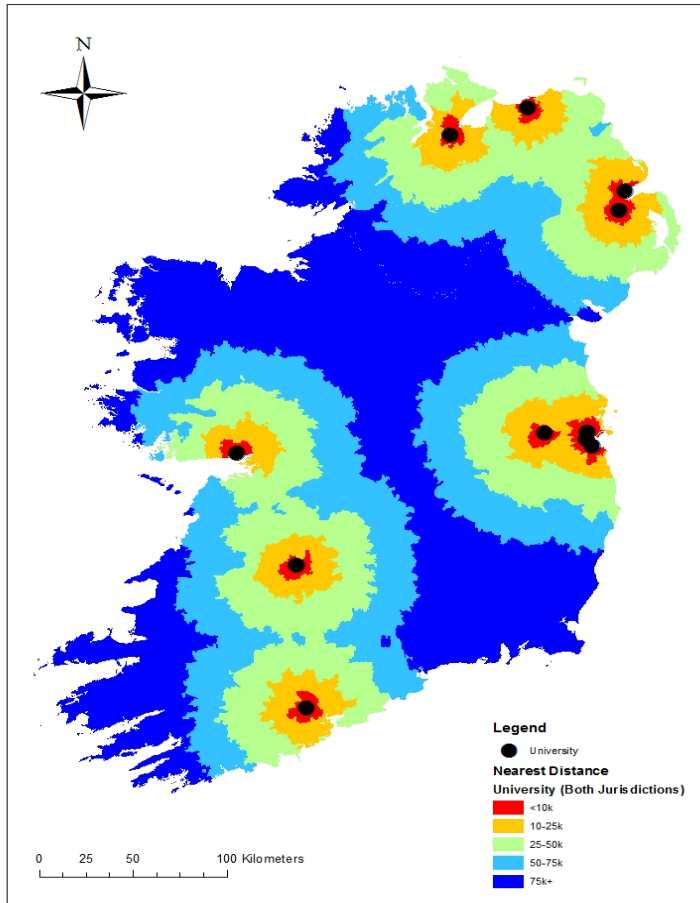


(b) *Across jurisdictions*

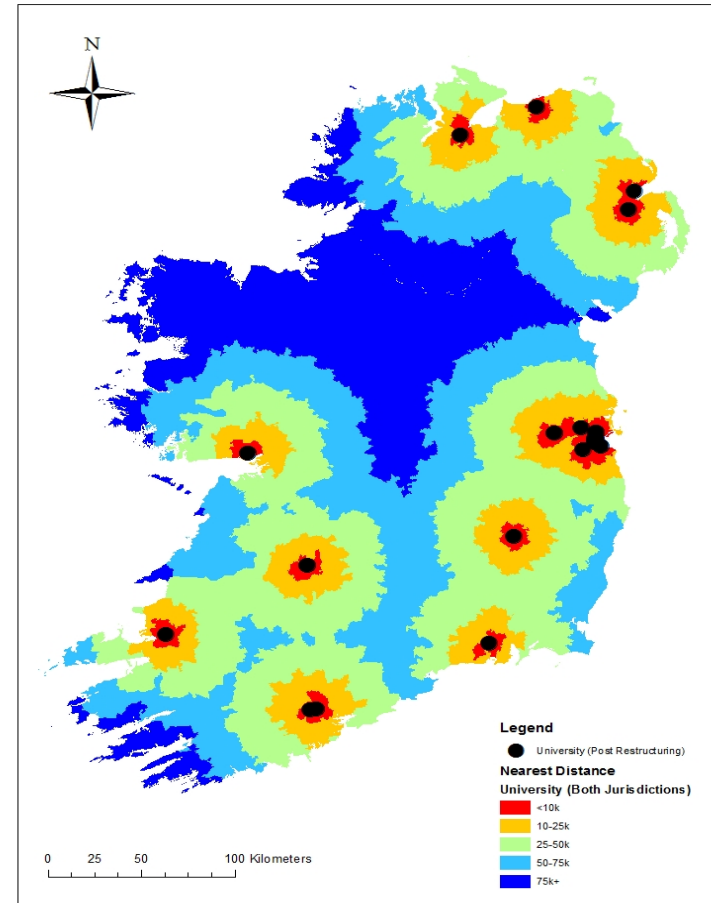


**Figure 2.3:** Within- and across-jurisdiction geographic accessibility to universities on the island of Ireland

(a) Pre-policy across-jurisdiction



(b) Post-policy across-jurisdiction



**Figure 2.4:** Pre- and post-policy across-jurisdiction geographic accessibility to universities on the island of Ireland

Recently announced changes to the structure and composition of higher education in the Republic of Ireland will of course change these patterns. As outlined in Section 1.2.1 in Chapter 1, the proposals will result in the consolidation of three groups of IoTs with the aim of progressing towards technological university status. The expectation is that these consolidations will expand accessibility to university-level higher education in the Republic of Ireland. Figure 2.4 shows the pre- and post-policy geographic accessibility to universities on the island of Ireland, with a focus on across-jurisdiction accessibility in this case. A marked improvement in geographic accessibility to universities in the South-West and South-East is found under post-policy conditions. However, the North-West and the Border counties will continue to experience relatively poor accessibility to university education. The impact of the proposed reforms on geographic accessibility to universities is explored in greater detail in Chapter 3.

#### **2.4.2 Enrolment rates and mobility of students in higher education**

In light of these patterns of geographic accessibility, it is interesting to consider the enrolment rates and mobility of school leavers across counties in both the Republic of Ireland and Northern Ireland. To begin, Table 2.2 presents the county-level undergraduate enrolment rates in the Republic of Ireland for the academic year 2012/13. These are calculated as the ratio of total county-level undergraduate enrolments to third level education over the population of 15, 16 and 17 year olds in each county based on the 2011 Census of Population (Central Statistics Office (CSO), 2011b). In order to correctly align the two datasets, the reference age cohort is defined as the number of 15-17 year olds as these individuals would be likely school leavers during the academic year 2012-13. The enrolment rates are also disaggregated by type, namely university and IoT.

A number of interesting observations emerge from this analysis. Firstly, considering the enrolment rates in universities and IoTs separately highlights the fact that the enrolment rate in IoTs is lower than the enrolment rate in universities in counties where both universities and IoTs are located, namely Galway, Dublin, Cork and Limerick. This provides some indication that proximity to a university may influence the type of higher education undertaken. Furthermore, the table shows that enrolment in IoTs far exceeds that of universities in the cases of Waterford, Louth, Donegal and Sligo, with a percentage difference in enrolment rates of between 18% and 27%. These findings are

interesting given the fact that the spatial analysis presented in Figure 2.3 shows that these counties are located in regions of poor accessibility to a university, such as the South-East and North-West. On the other hand, the combined enrolment rates for universities and IoTs show that Laois, Offaly, Cavan, Donegal and Monaghan have the lowest enrolment rates to higher education in the Republic of Ireland. If these findings are related to the spatial analysis presented in Figure 2.2, it is evident that while Cavan, Donegal and Monaghan experience relatively low levels of accessibility to HEIs, Laois and Offaly do not. Therefore, the low combined enrolment rates in Laois and Offaly are somewhat surprising.

Similar county level enrolment rates are also calculated for Northern Ireland with Table 2.3 showing these results for the academic year 2012/13 (Northern Ireland Statistics and Research Agency (NISRA), 2011). In general, the enrolment rates in universities in Northern Ireland are high relative to the Republic of Ireland. This may be driven by the fact that Northern Ireland has relatively good accessibility to universities compared to the Republic of Ireland. The lowest enrolment rate in Northern Ireland is in Fermanagh (39%). This is interesting given the spatial analysis presented in Figure 2.3 which shows that Fermanagh experiences relatively low levels of accessibility to universities. However, if the combined enrolment rate in the Republic of Ireland is considered, the comparison produces very different results. In this instance, the enrolment rate to higher education far exceeds that of Northern Ireland.

**Table 2.2:** County-level full-time undergraduate enrolment rates (%) in Republic of Ireland in 2012/13, by type

	University enrolments	IoT enrolments	Age Cohort	University enrolment rate (%)	IoT enrolment rate (%)	Total enrolment rate (%)
<i>Connacht</i>						
Galway	4751	3364	9008	53	37	90
Leitrim	418	506	1172	36	43	79
Mayo	2051	2207	5201	39	42	82
Roscommon	982	1050	2496	39	42	81
Sligo	907	1344	2432	37	55	93
<i>Leinster</i>						
Carlow	625	968	1990	31	49	80
Dublin	16627	12671	42006	40	30	70
Kildare	2997	2451	7881	38	31	69
Kilkenny	1365	1386	3815	36	36	72
Laois	843	946	3019	28	31	59
Longford	533	573	1548	34	37	71
Louth	1252	2153	4630	27	47	74
Meath	2609	2272	6934	38	33	70
Offaly	887	1058	3194	28	33	61
Westmeath	1233	1377	3612	34	38	72
Wexford	1654	2197	5778	29	38	67
Wicklow	1927	1763	5272	37	33	70
<i>Munster</i>						
Clare	2155	1545	4585	47	34	81
Cork	9558	6203	18945	50	33	83
Kerry	2336	2462	5588	42	44	86
Limerick	3293	2418	7003	47	35	82
Tipperary	2436	2281	6374	38	36	74
Waterford	1319	2470	4328	30	57	88
<i>Ulster</i>						
Cavan	864	1037	2962	29	35	64
Donegal	1505	2716	6783	22	40	62
Monaghan	708	1018	2541	28	40	68
<i>STATE</i>	65835	60436	169097	39	36	75

*Note:* The age cohort is defined as the total number of persons aged 15-17 in each county (Central Statistics Office (CSO), 2011b).

*Source:* Author's calculations – HEA County of permanent residence for Irish domiciled, full-time undergraduate enrolments 2012/2013.

**Table 2.3:** County-level full-time undergraduate enrolment rates (%) in Northern Ireland. universities in 2012/13

	Enrolment	Age Cohort	Enrolment Rate (%)
Antrim	15214	31658	48
Armagh	3181	6464	49
Derry	5416	11207	48
Down	7047	15593	45
Fermanagh	1044	2693	39
Tyrone	4190	8445	50
<i>Total from Northern Ireland</i>	36092	76060	47

*Note:* The age cohort is defined as the total number of persons aged 15-17 in each county (Northern Ireland Statistics and Research Agency (NISRA), 2011)

*Source:* Author's calculations – HESA student record 2012/13.

Overall, the evidence from these enrolment rates suggests that spatial factors may play a role in the type of higher education that individuals pursue in Ireland. To explore this issue in more detail, it is important to consider the mobility of students attending higher education, both within and across the two jurisdictions. The level of mobility is measured by analysing the student mix of each HEI from a spatial standpoint. Specifically, the number of undergraduate enrolments from the county in which the HEI is located is calculated as a proportion of total undergraduate enrolments for each HEI. This is also calculated by NUTS III region for the Republic of Ireland and by county for Northern Ireland.<sup>4</sup> The spatial frameworks chosen for the analysis are based on data availability and the results are presented in Tables 2.4, 2.5, and 2.6 respectively.

Table 2.4 shows that the mobility of students attending universities in the Republic of Ireland is quite limited, with almost 50% of enrolments coming from the county in which the university is located. The exceptions to this are Maynooth University and University of Limerick where enrolments from the home county are 20% and 25% respectively. However, if mobility by NUTS III region is considered, persistent spatial variation in enrolments is found. For example, while 20% of enrolments in Maynooth University are from the home county of the institution, 62% are from the Dublin and Mid-East regions. Areas that presented as having poor accessibility to universities within the Republic such

<sup>4</sup> A cross-departmental report by the Department of Employment and Learning and Department of Education and Skills (2015) examined student mobility between the two jurisdictions. However, the analysis presented was at an aggregate level and did not consider mobility by region and institution.

as the South-East, Midlands and Border region seem to be under-represented across all of the universities, suggesting that spatial factors may play a role in the type of higher education undertaken.

**Table 2.4:** Mobility of students attending Republic of Ireland universities in 2012/13

	UCD	TCD	DCU	UCC	NUIG	MU	UL	% Age Cohort	Avg. % enrolment
% from home county	47	52	47	63	38	20	25		
<i>NUTS III Regions:</i>									
% from Border	9	7	15	1	15	14	3	12	9
% from Midlands	5	4	6	1	8	10	5	7	5
% from West	5	5	5	1	52	5	12	10	12
% from Dublin	47	52	47	1	3	28	3	25	26
% from Mid-East	14	15	16	1	4	34	3	12	13
% from Mid-West	3	3	2	10	10	1	42	9	10
% from South-East	10	7	8	12	4	7	13	11	9
% from South-West	4	5	2	73	4	1	19	15	15
<i>Northern Ireland:</i>									
% from N.I.	1	1	0	0	0	0	0		

*Note:* The age cohort is defined as the total number of persons aged 15-17 in each NUTS III region. The % of Age Cohort is the proportion of 15-17 year olds in each NUTS III region. Ratio refers to the ratio of the average % enrolment to the % of age cohort.

*Source:* Author's calculations - HEA County of permanent residence of Irish-domiciled full-time students in all HEA-funded institutions (2012/13).

This argument would seem to be supported by the results presented in Table 2.5 which examines the mobility of students attending IoTs in the Republic. The enrolment rate from the home county of the IoT is 45% on average, with enrolments from the region in which the IoT is located averaging 65%. The implication of this limited mobility is that proximity to a certain type of HEI may have a strong influence on the type of higher education that a person receives, a point which appears to be feeding through in some of the enrolment rates presented in Table 2.2. However, the analysis suggests that the establishment of technological universities in the Republic of Ireland will result in a marked improvement in geographic accessibility to university education in the South-West and South-East of the country. Therefore, it could be argued that the poor mobility of students in the Republic of Ireland may not pose a major policy challenge in the future, as most regions will have good accessibility to university-level education.

**Table 2.5:** Mobility of students attending Republic of Ireland institutes of technology in 2012/13

	AIT	CIT	DIT	IADT	DKIT	GMIT	ITB	ITC	ITS	ITT	ITTRA	LYIT	LIT	WIT	% of Age Cohort	Avg % enrolment
% from home county	24	73	57	60	42	63	69	18	27	78	65	74	36	34		
<i>NUTS III Regions:</i>																
% from Border	8	1	8	5	62	10	5	4	53	1	2	86	2	1	12	18
% from Midlands	50	1	4	2	2	6	2	14	7	1	2	2	4	4	7	7
% from West	27	2	3	4	1	68	1	3	32	0	3	6	7	1	10	11
% from Dublin	2	1	57	60	11	2	69	3	1	78	1	2	1	2	25	21
% from Mid-East	6	1	20	17	19	3	22	26	3	18	3	2	2	6	12	11
% from Mid-West	3	7	2	1	1	7	0	2	1	0	12	1	63	8	9	8
% from South-East	2	8	5	8	1	2	1	45	1	1	3	1	13	71	11	11
% from South-West	1	80	2	2	1	2	0	2	1	0	75	0	8	7	15	13
<i>Northern Ireland:</i>																
% from N. Ireland	0	0	0	0	2	0	0	0	0	0	0	1	0	0		

*Note:* The age cohort is defined as the total number of persons aged 15-17 in each NUTS III region. The *% of Age Cohort* is the proportion of 15-17 year olds in each NUTS III region. Ratio refers to the ratio of the average % enrolment to the % of age cohort.

*Source:* Author's calculations – HEA County of permanent residence of Irish-domiciled full-time students in all HEA-funded institutions (2012/13)

With regard to Northern Ireland, Table 2.6 shows the mobility of students attending Northern Ireland universities in 2012/13. At an overall level, the percentage of students enrolled in Northern Ireland universities from the Republic of Ireland is very low. However, the University of Ulster has an enrolment rate from the Republic of Ireland of 7%. This equates to 1,250 individuals which represents a considerable movement of students from the Republic of Ireland and may provide some evidence of mobility between the two regions. In a study of the patterns of admissions to higher education in Ireland, O'Connell et al. (2006) found that when admissions to colleges in Northern Ireland are accounted for, the admission rate to higher education in the border counties increased. The authors found that this effect was strongest in Donegal and Monaghan. Thus, there does appear to be some evidence of cross-border mobility of students from the Republic of Ireland to Northern Ireland which may help to alleviate the impact of the poor accessibility which was shown to exist in the North-West and Border regions.

**Table 2.6:** Mobility of students attending Northern Ireland universities in 2012/13

	Queen's Belfast	St Mary's	Stanmillis	University of Ulster	% of Age Cohort	Avg % enrolment
% from home county	46	29	42	55		
<i>Counties:</i>						
% from Antrim	46	29	42	36	42	38
% from Armagh	9	9	11	8	8	9
% from Derry	10	13	9	18	15	13
% from Down	22	23	21	16	21	20
% from Fermanagh	3	4	3	3	4	3
% from Tyrone	9	20	12	12	11	13
<i>Republic of Ireland</i>						
% from ROI	2	2	2	7		

*Note:* The age cohort is defined as the total number of persons aged 15-17 in each county (Northern Ireland Statistics and Research Agency (NISRA), 2011). The *% of Age Cohort* is the proportion of 15-17 year olds in each county. Ratio refers to the ratio of the average % enrolment to the % of age cohort.

*Source:* Author calculations – HESA Student Record (2012/13)

## 2.5 Discussion and conclusion

Increasing higher education accessibility and participation is a stated policy objective in both the Republic of Ireland and Northern Ireland as it is associated with important economic and societal benefits. This has provided the context for much empirical work investigating the factors that determine higher education participation. In general, geographic accessibility has been shown to be an important driver of higher education participation. However, despite the important role of geographic accessibility and regional availability in the decision of school leavers to proceed to higher education, no measure of geographic accessibility to higher education exists for the island of Ireland. In light of this, this chapter marks a significant contribution to the literature on Irish higher education. Using GIS techniques, it presents comprehensive measures of geographic accessibility to higher education in Ireland. The differences in geographic accessibility both within and between the Republic of Ireland and Northern Ireland are examined. As an extension to this analysis, the chapter also explores the enrolment rates and mobility of those attending higher education in both jurisdictions, as this serves to highlight the impact of poor accessibility on those wishing to pursue higher education.

Accessibility to higher education is shown to be relatively good in Northern Ireland with certain regional disparities evident in the West, North-West, South-West and along the border counties in the Republic of Ireland. However, when differentiated by the type of HEI, geographic accessibility to universities in the Republic of Ireland is found to be poor relative to Northern Ireland, with large areas from which an individual would have to travel over 75km to the nearest university. Looking at between-jurisdiction accessibility, there is some improvement in County Donegal. Recently proposed changes to the higher education system in the Republic of Ireland are shown to result in a significant improvement in accessibility to a university education in the South-West and South-East. However, the North-West remains at a disadvantage.

The analysis of enrolment and mobility rates suggests that there is an association between proximity to different types of HEIs and the type of education received by individuals. Enrolment in IoTs is shown to far exceed that of universities in counties which are located in the South-East and North-West, regions which have poor accessibility to a university. This provides some indication that proximity to a university influences the type of higher education undertaken. The university enrolment rates in Northern Ireland are strong

relative to the Republic of Ireland, with the lowest enrolment rate in Fermanagh (39%). However, a comparison of the combined enrolment rates for universities and IoTs in the Republic of Ireland and the enrolment rates in Northern Ireland, shows that the enrolment rates in the former far exceed those of the latter. With regard to student mobility, both the Republic of Ireland and Northern Ireland are found to have very limited mobility. However, there is some evidence of student mobility from the Republic of Ireland to Northern Ireland which may help to alleviate the limited geographic accessibility which persists in the North-West. Of course, the potential for student mobility to mitigate the impact of limited accessibility may not be equal across all student groups. The strong public policy focus on increasing participation in higher education, along with the important role of higher education for both individuals and society, make the findings of this analysis both policy relevant and timely. Given the fact that the purpose of the higher education grant offered by the Irish Government is to equalise access to higher education, this chapter poses questions about the effectiveness of the grant system given the apparent geographic inequalities in the type of higher education that a person receives. However, further and more comprehensive work is needed in order to robustly examine this.

In considering the results of this analysis, some caveats should be borne in mind. Firstly, it could be argued that accessibility measures based on travel time and/or the availability of public transport may be preferable. Unfortunately, accurate data in relation to average travel speeds across different road types and public transport availability in Ireland is currently not publically available, implying that significant errors in estimating travel times for students would be likely. For this reason, travel distance to the nearest HEI is used as a measure of geographic accessibility. This network-based method has been applied in a number of other studies, both in Ireland and internationally (Witten et al., 2003; Apparicio et al., 2007; Cullinan, 2011; Cullinan et al., 2011; Cullinan et al., 2013; Flannery and Cullinan, 2014). While nearest distance provides a valuable visual representation of the level of geographic accessibility to higher education on the island of Ireland, extensions to this analysis are considered in Chapter 3.

## Chapter 3

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# The impact of proposed higher education reforms on geographic accessibility to universities in Ireland <sup>5</sup>

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### 3.1 Introduction

Building on the analysis presented in Chapter 2, this chapter employs a wider and more sophisticated range of techniques and measures to examine geographic accessibility to university education in Ireland, with a particular focus on analysing the effects of recently proposed higher education policy reforms. In particular, GIS-based methodologies are utilised in order to model the impact of the proposed reforms on both the level of, and inequalities in, geographic accessibility to university education in Ireland. This includes mapping and analysing a range of accessibility measures, as well as calculating spatially-based university accessibility Gini indices. The chapter proceeds as follows: Section 3.2 provides a motivation for the study. Section 3.3 then provides a detailed description of the methods used in the analysis, while Section 3.4 presents the results. Finally, Section 3.5 concludes with a discussion of the implications of the findings.

### 3.2 Background

As discussed previously, spatial factors have been increasingly acknowledged as a potential barrier to access and subsequent participation in higher education. 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 in Ireland (HEA, 2014a). Despite this, relatively little is known about the extent of geographic accessibility to higher education in Ireland. While Chapter 2 provided a comprehensive analysis of geographic accessibility to higher education both within and between the Republic of Ireland and Northern Ireland, the analysis was limited

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<sup>5</sup> This chapter is based upon Walsh, S., Cullinan, J. & Flannery, D. 2016. The impact of proposed higher education reforms on geographic accessibility to universities in Ireland. *Applied Spatial Analysis and Policy*, DOI: 10.1007/s12061-016-9193-3.

to examining nearest distance accessibility. Given this, the aim of this chapter is to present a wider variety of techniques and measures to examine geographic accessibility to university education in Ireland. In particular, a range of spatial analysis tools and techniques are used to model the potential impact of proposed reforms to the higher education sector on both the level of, and inequalities in, geographic accessibility to university education in Ireland.

The proposed changes to the higher education sector pertain to the structure and organisation of the system, details of which were outlined in Section 1.2.1 in Chapter 1. While there is no explicit spatial consideration in the policy, the role of spatial factors in higher education access, and participation in different types of higher education, forms part of the wider policy debate in Ireland. For this reason, it is pertinent to examine the implication of the reforms with regard to spatial accessibility. The implementation of the proposed reforms will result in an expansion of university level education in Ireland and, for this reason, the analysis here is focused on examining the impact of the policy reforms on accessibility in the university sector. In addition to this, previous research has shown a positive impact of a university education for a range of labour market outcomes, including earnings, over and above a third level qualification from an IoT (Kelly et al., 2010). For this reason, analysing inequalities in geographic accessibility to a university education is a key issue for consideration in the policy debate. It is important to note, however, that universities in Northern Ireland are not included in the analysis in this Chapter, unlike in Chapter 2. While these may potentially help alleviate limited geographic accessibility within certain areas of the Republic of Ireland, such as the Border area for example, the goal is to analyse geographic accessibility for students within their own country of residence.

Overall, GIS techniques are used to estimate and map a range of accessibility measures, including nearest distance, system-wide, and population-weighted measures of accessibility, while ‘cartograms’ are employed to represent the spatial distribution of the population of 17-19 year olds in Ireland. Furthermore, a spatially-based university accessibility Gini index is calculated to help quantify the potential impact of the reforms on geographic inequalities in university accessibility. While higher education related Gini indices have been estimated previously (Senadza, 2012), these have tended to focus on educational attainment rather than geographic accessibility. This approach, combined

with the other measures of geographic accessibility, helps illustrate the power of these methods in exploring spatial inequalities in higher education and their ability to inform policy.

### 3.3 Methods

#### 3.3.1 Accessibility measures and cartogram

In order to measure the level of geographic accessibility, a dataset of travel impedance (i.e. distance) to universities in Ireland is first constructed using GIS techniques. As in Chapter 2, university addresses are geocoded and the geocoded universities are mapped against the 3,409 electoral divisions<sup>6</sup>. The road network distance from the centroid of each electoral division to the universities is then calculated, pre- and post-policy change. A full list of the institutions included in the analysis is presented in Table 3.1.

**Table 3.1:** HEIs included in the analysis

Pre-reform	Post-reform
Dublin City University (DCU)	Dublin City University (DCU)
National University of Ireland, Galway (NUIG)	National University of Ireland, Galway (NUIG)
Maynooth University (MU)	Maynooth University (NUIM)
Trinity College Dublin (TCD)	Trinity College Dublin (TCD)
University College Cork (UCC)	University College Cork (UCC)
University College Dublin (UCD)	University College Dublin (UCD)
University of Limerick (UL)	University of Limerick (UL)
	Cork Institute of Technology (CIT)
	Dublin Institute of Technology (DIT)
	IT, Blanchardstown (ITB)
	IT, Carlow (ITC)
	IT, Tallaght (ITT)
	IT, Tralee (ITTRA)
	Waterford IT (WIT)

As in Chapter 2, the network distances are estimated using the ‘network analyst extension’ of ArcGIS. Using these network-based measures of distance, the level of geographic accessibility to universities in Ireland is estimated using a number of accessibility measures. Although accessibility modelling has been addressed quite

<sup>6</sup> A basic university headquarters point model is adopted here. However, it is important to acknowledge that in some instances multi-campus configurations exist within existing institutions.

extensively in the health literature (Brabyn and Skelly, 2002; Teljeur et al., 2004; Wang and Luo, 2005; Kalogirou and Foley, 2006), the analysis presented in Chapter 2 is the first to undertake spatial modelling in Ireland with regard to the higher education provision. The current chapter builds on this methodological approach by also estimating and considering system-wide measures of accessibility. Details of the measures are set out in Table 3.2, while summary statistics on the accessibility measures pre- and post-reform are presented in Table 3.3.

**Table 3.2:** Definition of accessibility measures

Measure	Description	Formula
A(1)	Nearest distance accessibility	$A(1)_i = \min_j d_{ij}$
A(2)	System-wide accessibility	$A(2)_i = \sum_j \frac{1}{d_{ij}}$
A(3)	System-wide accessibility accounting for university size	$A(3)_i = \sum_j \frac{n_j}{d_{ij}}$
A(4)	System-wide accessibility accounting for university size and population of 17-19 year olds	$A(4)_i = \sum_j \frac{n_j}{p_i * d_{ij}^2}$

*Notes:*  $d_{ij}$  is the road network travel distance from the centroid of ED  $i$  to university  $j$ ;  $n_j$  is the service capacity or size of university  $j$ , as measured by the number of students enrolled;  $p_i$  is the population of 17-19 year olds in electoral division  $i$ .

**Table 3.3:** Summary statistics for accessibility measures

	Mean	Std. Dev	Min	Max
<i>A(1): Nearest distance accessibility (kms)</i>				
Pre-reform	48.29	51.63	0.66	266.35
Post-reform	37.91	47.75	0.15	266.11
<i>A(2): System-wide accessibility</i>				
Pre-reform	0.21	0.26	0.02	1.88
Post-reform	0.38	0.41	0.05	3.20
<i>A(3): System-wide accessibility accounting for university size</i>				
Pre-reform	3364.31	4415.56	354.39	36380.09
Post-reform	4848.64	6103.71	509.81	49570.28
<i>A(4): System-wide accessibility accounting for university size and population of 17-19 year olds</i>				
Pre-reform:17-19 years	6.31	22.89	0	539.18
Post-reform:17-19 years	9.52	33.01	0	670.18

To begin, measure A(1) estimates the road network travel distance from the centroid of electoral division  $i$  to the nearest university  $j$ , with smaller values implying greater geographic accessibility. This minimum distance measure can also provide a valuable visual representation of the level of geographic accessibility to universities in Ireland and is similar to that utilised in Chapter 2. However, the obvious drawback of A(1) is that it considers only the distance to the nearest university, whereas a more complete accessibility measure could encompass accessibility to all universities. To this end, the method applied in Sá et al. (2006) is employed, which proposes a system-wide accessibility measure capturing all universities - see A(2) in Table 3.2. Measure A(2) estimates accessibility to universities by calculating the sum of the inverse of the network travel distance from the centroid of electoral division  $i$  to all universities, with larger values implying greater system-wide accessibility. This system-wide measure provides a more complete picture of overall accessibility to universities, which is important for understanding the choices facing school leavers. From a policy perspective, a system-wide accessibility measure provides important information on the spatial distribution of universities across the whole system. Indeed, Sá et al. (2006:157) argue system-wide accessibility is a useful measure of geographic accessibility to higher education as the spatial distribution of the institutions is determined to a large extent by national

governments and “the objective of policy makers is often to provide all potential students with the same higher education options and opportunities”.

While A(2) provides a more complete measure of overall accessibility than A(1), it ignores the extent of the opportunities available across the system. Therefore, as an extension to this measure, A(3) incorporates the service capacity of the university as measured by the total number of students enrolled in third level courses in 2012/13 (Department of Education and Skills, 2013). This accessibility measure improves if the summed university size increases or the summed travel impedance falls, implying larger values of A(3) are associated with greater accessibility. Finally, the fourth accessibility measure, A(4), takes into account both the size of the university and the population of likely school leavers in an ED, and is essentially a population-weighted accessibility measure similar to the one used in Kalogirou and Foley (2006). Once again, increases in A(4) imply improved overall accessibility. If areas with poor accessibility have large populations of 17-19 year olds, then disparities in equity of access pose a significant policy challenge. In light of the recently proposed re-structuring of the higher education system, analysis based on this measure is very policy relevant as it serves to highlight regions with poor accessibility, weighted by the population of 17-19 year olds. Analysis is focused on the population of 17-19 year olds as this population sub-group captured 80% of new entrants into universities in Ireland in 2012/13 (HEA, 2013a).

As an additional means of considering the impact of the proposed policy reform on the level of geographic accessibility, cartograms are also employed in order to represent the spatial distribution of the population of 17-19 year olds in Ireland. Cartograms are “maps in which the sizes of geographic regions such as countries or provinces appear in proportion to their population or some other analogous property” (Gastner and Newman, 2004:7499). In other words, a cartogram distorts an area in order to show the importance of some characteristic, in this case the population of potential new entrants to university in Ireland. This provides a powerful means of displaying population data as it places visual emphasis on areas with a high population density. The cartogram was constructed using the density-equalising methodology developed by Gastner and Newman (2004). In order to construct the cartogram, the Tom Gross Cartogram Geoprocessing Tool in ArcGis is used.

### 3.3.2 Inequality measure

As noted previously, in addition to mapping the impact of the proposed system reforms on the level of geographic accessibility to universities in Ireland, this chapter also aims to quantify the potential impact of the reforms on geographic inequalities in university accessibility. In particular, it examines whether significant geographic inequalities exist in relation to accessibility to universities and the impact of the proposed policy reforms on this inequality. To address this, a Gini coefficient is calculated for all of the accessibility measures. The Gini coefficient ranges between 0 and 1, where theoretically 0 corresponds to perfect equality and 1 corresponds to perfect inequality, with an increase in the Gini coefficient indicating greater inequality. Previous work in the education literature has estimated the Gini coefficient with respect to issues such as educational achievement (Senadza, 2012), school enrolment and education expenditure (Maas and Criel, 1982; Sheret, 1988), educational attainment (López et al., 1998; Thomas et al., 2000) and regional inequality in schooling (Qian and Smyth, 2008; Tomul, 2009). In contrast, the aim in this chapter is to estimate a Gini coefficient in relation to geographic accessibility in the university sector.<sup>7</sup> The Gini coefficients are calculated as:

$$G = \frac{2}{n^2 \bar{y}} \sum_{i=1}^n i(y_i - \bar{y}) \quad (1)$$

where  $y_i$  is the cumulative accessibility over all EDs,  $\bar{y}$  is the mean accessibility over all EDs and  $n$  is the cumulative proportion of 17-19 year olds.<sup>8</sup> The Gini was chosen over other methods since it satisfies the criteria for a useful inequality measure as set out in Rey and Smith (2013). In particular, it is scale invariant (multiplying each member of the population by a constant does not change the level of inequality) and also sensitive to transfers (a transfer of ‘distance’ from a ‘high distance’ individual to a ‘low distance’ individual will result in decreased inequality). While other measures, such as the Theil index, also satisfy these criteria, the Gini index is more widely and commonly used.

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<sup>7</sup> To check the robustness of the results, other inequality measures were also calculated, such as the Theil index. Overall, the pattern of results is consistent across the alternative measures.

<sup>8</sup> Lorenz curves were also constructed which map the cumulative accessibility share against the cumulative population (17-19 years) share, ordered from least to most accessible. To make an unequivocal statement about which distribution is more unequal, non-parametric tests of Lorenz dominance were conducted and in all cases, Lorenz dominance holds.

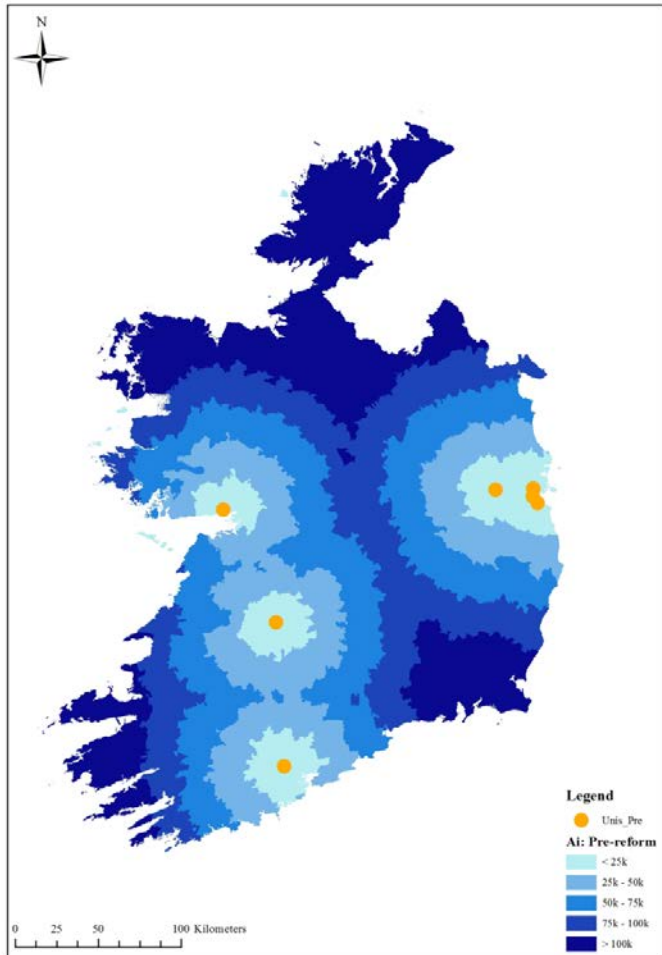
## **3.4 Results**

### **3.4.1 Geographic accessibility to universities and cartogram analysis**

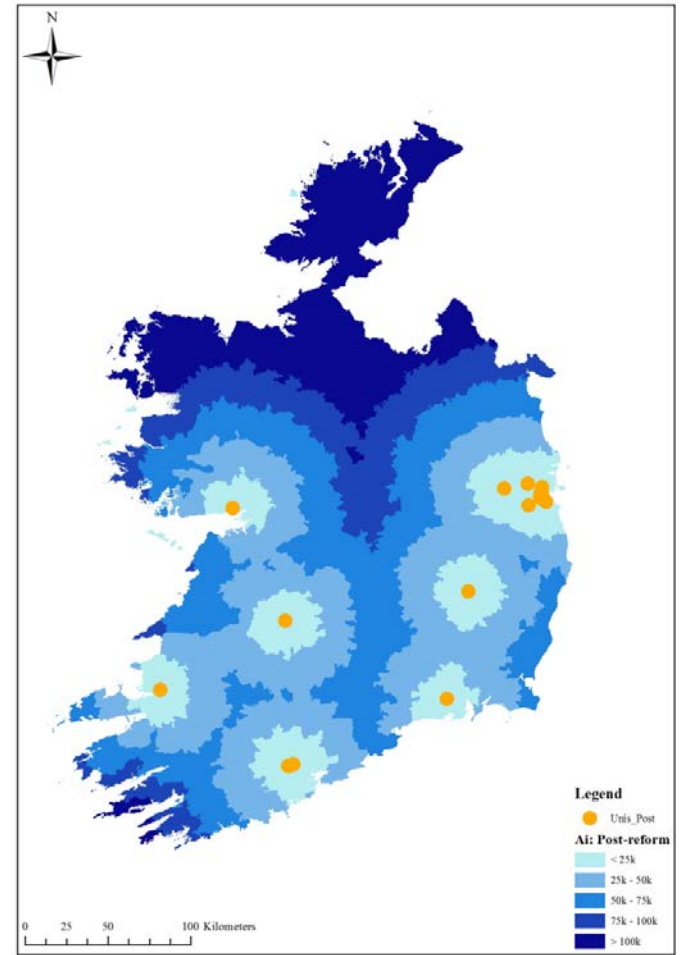
This section examines the level of geographic accessibility to universities in Ireland, pre- and post- policy change, applying the GIS-based measures described above. To begin, Figure 3.1 illustrates the variation in geographic accessibility to universities in Ireland based on the road network distance from the centroid of each electoral division to the nearest university i.e. measure A(1). This is similar to the analysis presented in Chapter 2 and Walsh et al. (2015b). Those living in areas indicated with dark blue are more than 100kms to their nearest university. Geographically, this dark blue area covers a significant area of the country. Thus, Figure 3.1 suggests that under the current higher education system, accessibility to universities in Ireland is quite limited in a number of regions, namely the North-West and Border regions, along with certain parts of the West, South-East and South-West. Post-reform, there is an improvement in accessibility to universities in the South-East and South-West of the country. However, the Border, West and North-West regions continue to experience comparatively poor accessibility. This pattern of improved accessibility overall is also evident in Table 3.3, with a fall in the mean value of A(1) post-reform.

In order to consider geographic accessibility to the entire university sector, Figure 3.2 presents system-wide accessibility to universities in Ireland, with accessibility scores divided into quintiles. In this case, higher accessibility scores indicate better geographic accessibility. Figure 3.2 shows that when the entire system of universities is examined, there is evidence of a general distance decay effect across the country with higher accessibility scores within the immediate vicinity of the cities containing universities. What is interesting from this analysis is that the Midlands region is also shown to have relatively good accessibility to universities with the South-West, North-West and parts of the West and Border regions in the lower accessibility quintiles. Accessibility is shown to improve considerably in relative terms in the South-East and South-West regions post-reform, with the North-West and West regions remaining a standout in terms of poor system-wide accessibility.

(a) Pre-reform

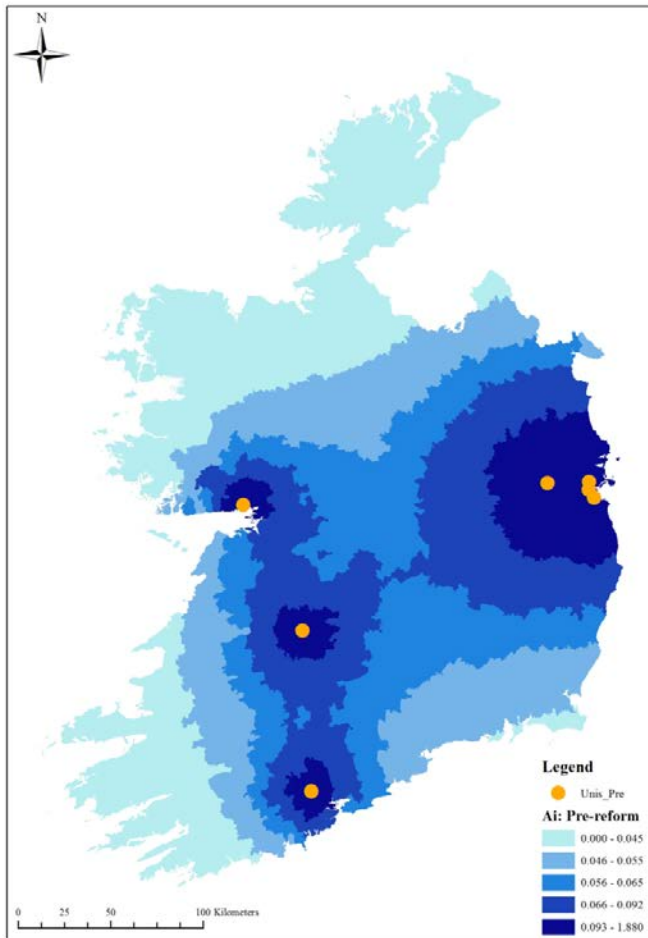


(b) Post-reform



**Figure 3.1:** Nearest distance accessibility - A(1)

(a) Pre-reform



(b) Post-reform

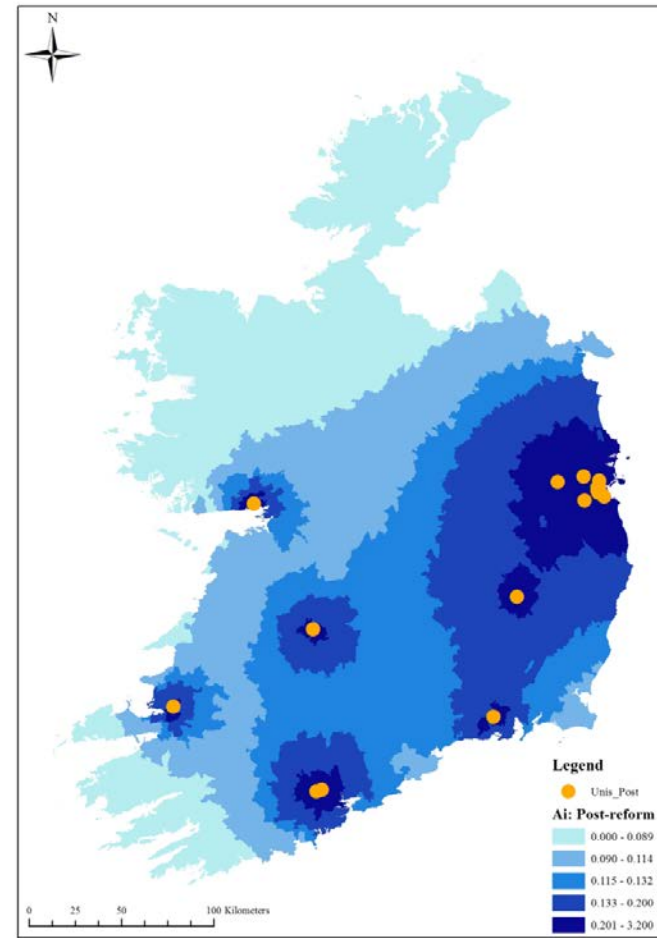


Figure 3.2: System-wide accessibility - A(2)

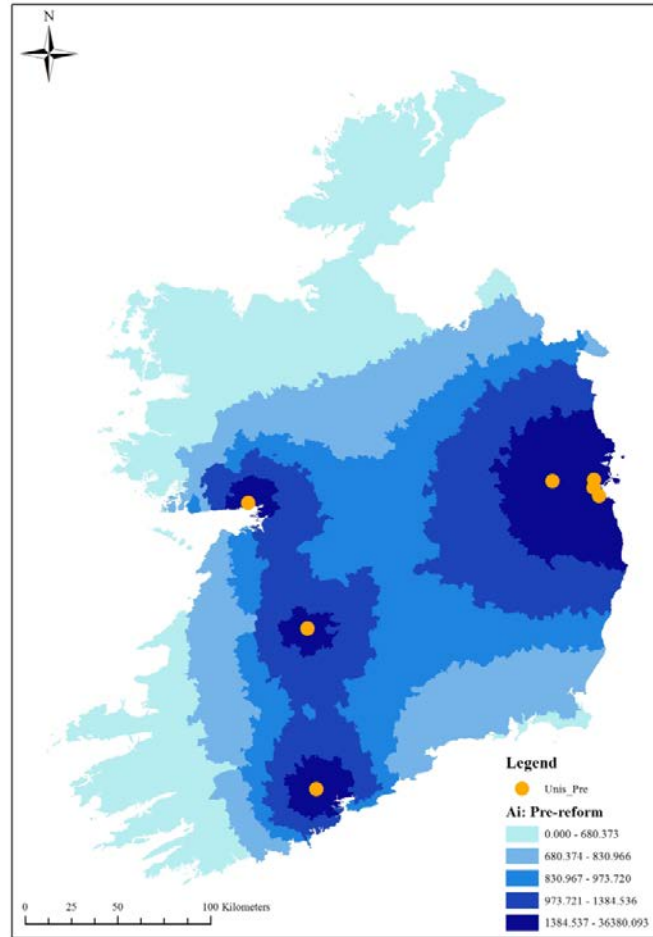
To take account of the relative size of the individual universities, Figure 3.3 shows system-wide accessibility to universities in Ireland. As outlined in Section 3.3.1, the service capacity of the universities is measured as the total number of students enrolled<sup>9</sup> and, as before, the accessibility scores are divided into quintiles. Once again, Figure 3.3 illustrates that when the sizes of the universities are accounted for, system-wide accessibility to universities pre-reform in the greater Dublin area and the other major cities containing a university is very good relative to the North-West, West, South-West and South-East regions, which are in the lowest quintiles once again.

In fact, the general patterns of pre-reform system-wide accessibility are quite similar to those shown in Figures 3.2(a) and 3.3(a). Post-reform, system-wide accessibility improves in many areas as can be seen in Figure 3.3(b). However, compared to measure A(2) as represented in Figure 3.2(b), the inclusion of IT Tralee appears to have a more limited impact on the spatial distribution of university accessibility, given its relatively small size. Overall, however, the consolidation of Waterford IT and IT Carlow in the South-East, as well as the merging of DIT, IT Tallaght and IT Blanchardstown in Dublin has a large impact on system-wide geographic accessibility, particularly in the South-East, while the West and South-West remain at a disadvantage in terms of university accessibility, and the North-West region is particularly disadvantaged.

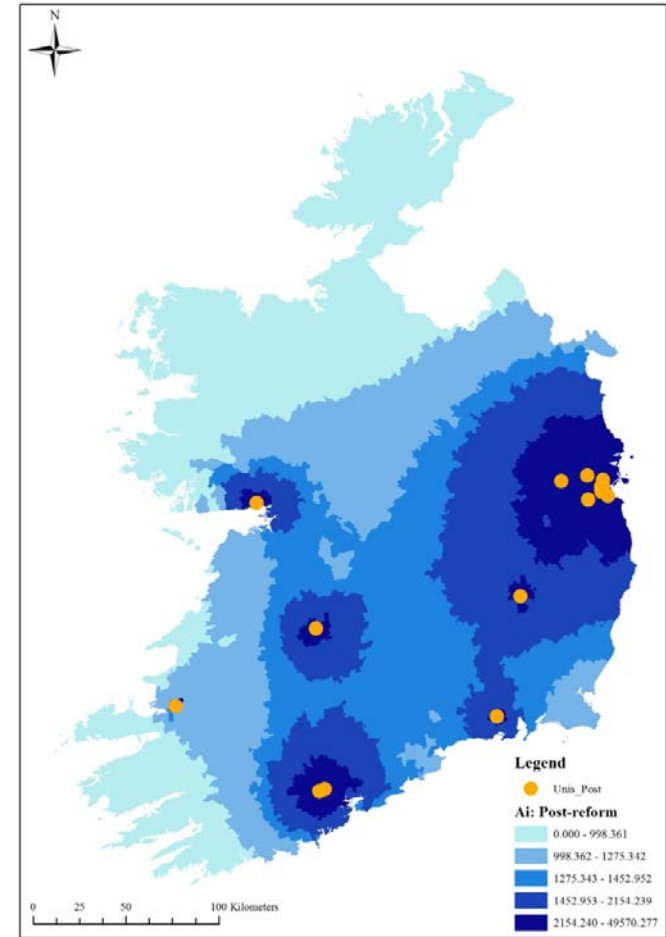
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<sup>9</sup> In order to check the robustness of the results, university size was also measured by the number of courses offered. Overall the patterns of accessibility were consistent.

(a) Pre-reform



(b) Post-reform

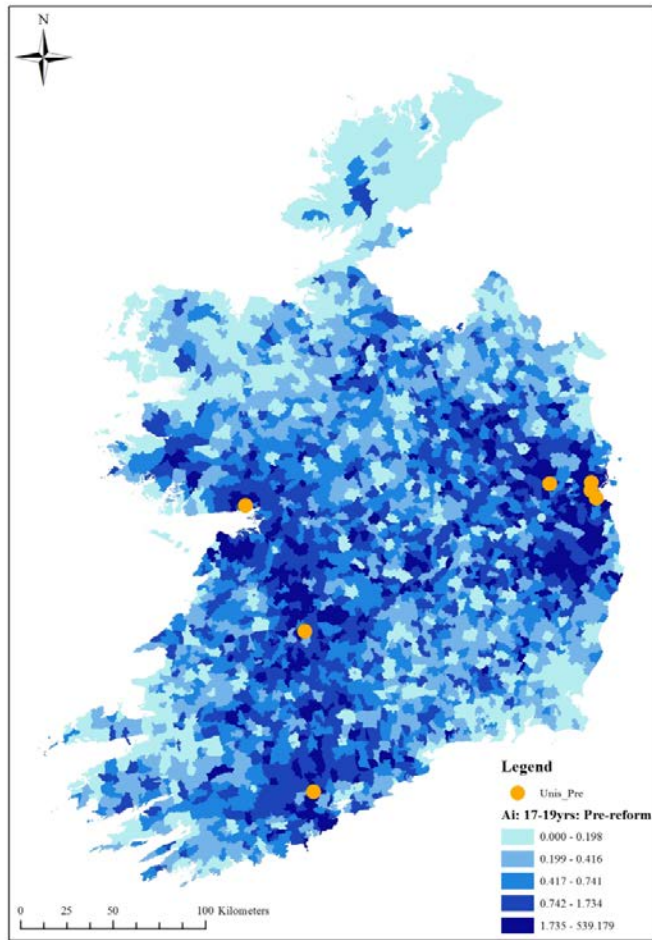


**Figure 3.3:** System-wide accessibility accounting for university size - A(3)

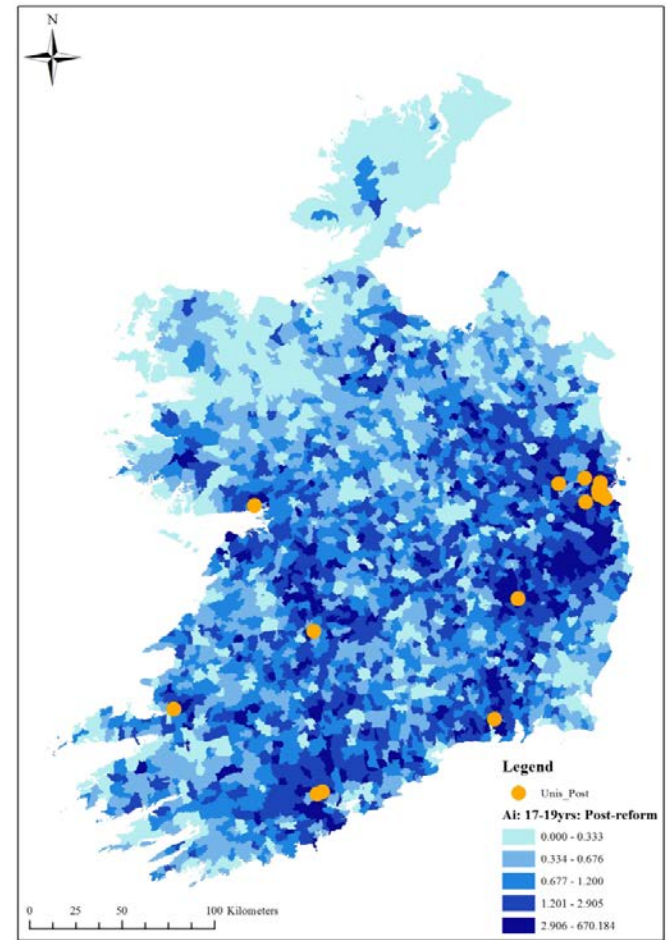
In light of the findings from this system-wide accessibility analysis, it is also interesting to consider a population-weighted measure of accessibility. This addresses the question of whether areas with poor accessibility to universities also have large population densities. If so, the policy challenge posed by this limited accessibility is much greater than would otherwise be the case. Figure 3.4 provides a population-weighted accessibility measure which also takes account of the size of the university. Higher values of this measure indicate better accessibility to university and accessibility scores are again divided into quintiles. By focussing on the overall pattern pre-reform, it is evident that under the current education system the regions in close proximity to universities are in the highest accessibility quintiles. By comparison, the remote parts of the South-West, West and South-East along with the North-West are generally in the lowest quintiles of accessibility. Notably, the North-West of the country is characterised generally by limited accessibility to universities, even after accounting for population densities.

However, as is apparent in Figure 3.4, certain EDs within this region are shown to be in the highest quintile of accessibility. These outliers are driven by the fact that the population of 17-19 year olds in these EDs is negligible. In other words, the high accessibility score in the urban centres represents good accessibility to universities, while high accessibility scores in some remote areas are being driven by very low populations of young people, using this measure. Thus, focus should be placed on the overall regional patterns in Figure 3.4, rather than on individual EDs within regions. Post-reform, population-weighted system-wide accessibility remains quite limited in the North-West of the country. This implies that there are significant numbers of young people living in this region who will continue to have poor system-wide accessibility to universities post-reform. However, other regions such as the South-East see a significant improvement.

(a) Pre-reform



(b) Post-reform

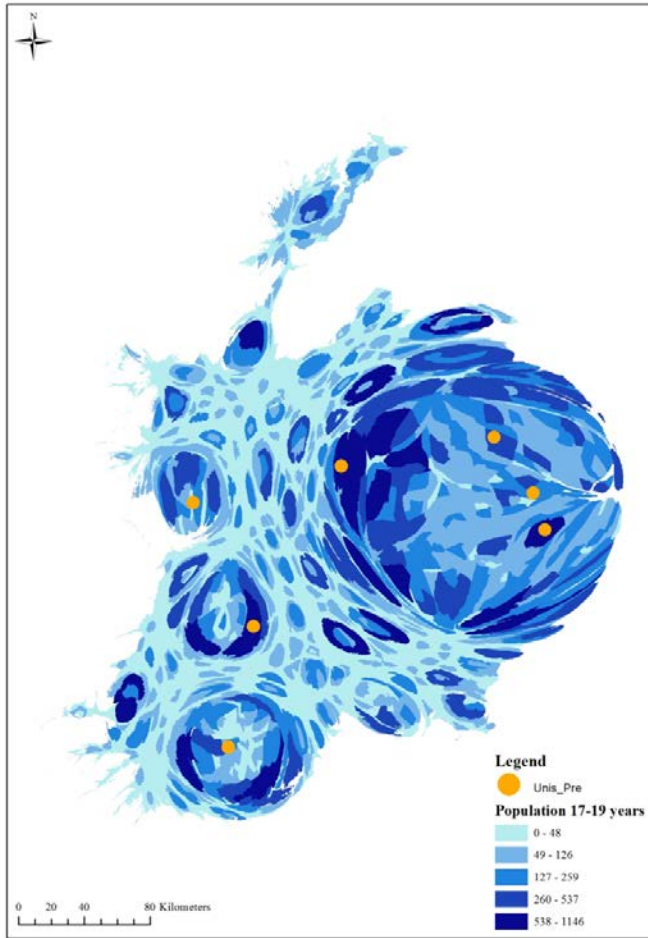


**Figure 3.4:** System-wide accessibility accounting for university size and population of 17-19 year olds - A(4)

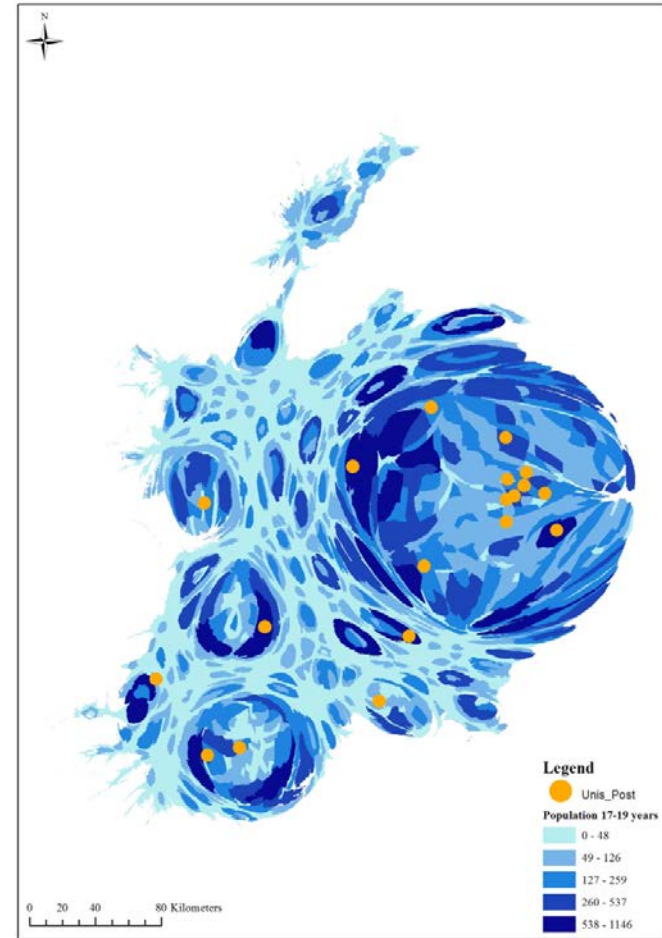
To supplement this analysis, Figure 3.5 considers the impact of the policy reform on the level of geographic accessibility using a cartogram of 17-19 year olds in Ireland along with the location of universities pre- and post-policy reform. Cartograms complement the analysis above as they illustrate the spatial distribution of the population of 17-19 year olds in Ireland by distorting electoral areas to show the importance of the population of potential new entrants to university. Interestingly, the cartogram reveals that there is a substantially uneven spread of 17-19 year olds across Ireland, with the main concentration in Dublin and its surrounding counties, along with Cork, Limerick and Galway. An examination of the location of universities under the current system reveals that these densely populated regions are well serviced by universities.

What is interesting from this analysis is that the North-West region has ‘shrunk’ somewhat compared to Figures 3.1-3.5, suggesting that this region is not particularly heavily populated by 17-19 year olds, at least relative to the greater Dublin area and the other cities. This is also the case for the more remote parts of the West, South-West and South-East regions. Nonetheless, these regions do contain urban centres, such as Letterkenny, Sligo, Tralee, Carlow and Waterford, which have high concentrations of young people and which are not currently in close proximity to a university. Post-reform, the high population density areas in Tralee, Waterford and Carlow will be located close to a university, through the amalgamation of Cork IT and IT Tralee in the South-West and the consolidation of Waterford IT and IT Carlow in the South-East. However, population centres such as Sligo and Letterkenny in the North-West will remain at a disadvantage. Overall, the cartogram analysis shows once again that the proposed reforms do little to address poor accessibility to university education in the North-West region.

(a) Pre-reform



(b) Post-reform



**Figure 3.5:** Cartogram of 17-19 year olds

### 3.4.2 Population with poor accessibility

As an additional means of considering the impact of the policy reform on the level of geographic accessibility, the percentage of likely school leavers living within a range of distances to their nearest university is estimated. This allows for an examination of the level of geographic accessibility by identifying those who are currently experiencing poor accessibility to universities in Ireland. The cartogram revealed that universities are located close to the main population centres, with some exceptions. This analysis quantifies the number of 17-19 year olds who are disadvantaged with regard to university accessibility and the results of the analysis are presented in Table 3.4.

**Table 3.4:** Nearest distance categories with corresponding % of population of 17-19 year olds

	Mean distance (kms)	Std. Dev.	Population (%)
<i>Distance bands: Pre-reform</i>			
<50kms	23.20	16.16	61.50
50-100kms	73.99	14.04	23.99
100-150kms	118.36	12.50	10.65
150-200kms	168.01	16.84	0.83
>200kms	232.17	16.45	3.03
<i>Distance bands: Post-reform</i>			
<50kms	24.43	15.62	73.75
50-100kms	69.21	14.14	18.39
100-150kms	118.14	12.62	4.08
150-200kms	171.31	16.87	0.75
>200kms	231.75	16.35	3.03

*Note:* Population figures are based on the 2011 Census of Population (CSO, 2011)

Under the current higher education system, 14.5% of 17-19 year olds live more than 100kms to their nearest university. This equates to 24,622 individuals and suggests a significant portion of this cohort currently experience poor accessibility to university. However, post-reform, only 7.9% (13,347) of 17-19 year olds would live over 100kms to their nearest university. This provides confirmation of the results from the cartogram analysis which showed that the new amalgamated universities will be located in close proximity to population centres. Nonetheless, the results also illustrate that, post-reform, almost one in twelve school leavers will reside more than 100kms from a university and

that the reforms will have little impact on those with the lowest levels of geographic accessibility i.e. those living more than 150kms from a university. These include young people living in urban centres such as Letterkenny and its surrounding areas in the North-West region who will remain unaffected by the proposed reforms. These findings are particularly interesting in light of recent research by Flannery and Cullinan (2014) who found that those living over 160kms to a university are less likely to choose to study at a university compared to an otherwise similar individual living 20kms away.

### **3.4.3 Geographic inequalities in university accessibility**

While mapping the level of geographic accessibility to universities allows for an initial visual analysis of spatial disparities in university accessibility, it is also possible to quantify the extent of this geographic inequality. To this end, a Gini coefficient is calculated for each accessibility measure, pre- and post-policy reform. The Gini coefficient, like other inequality indices, essentially summarizes the dispersion of values for a variable, such as nearest travel distance. It ranges along the unit interval where zero represents perfect equality and one represents perfect inequality. Thus, in relation to nearest distance for example, higher values of the Gini coefficient indicate greater levels of inequality in relation to the distances that school leavers must travel to their nearest HEI.

Table 3.5 presents the Gini coefficient for all four accessibility measures, pre- and post-policy reform. With regard to the first accessibility measure which is based on distance to the nearest university, the Gini is 0.55 under the current higher education system. Interestingly, the Gini coefficient for this accessibility measure increases to 0.59 post-reform. In other words, based on this measure, accessibility to universities is more unequal after the reforms are implemented. This increase is driven by the fact that the North-West and Border regions, which are the most disadvantaged with regard to university accessibility, do not experience any improvement in accessibility post-reform. Thus, the policy reform results in a widening of the gap between those who have most and least access. As an additional verification of this result, the nearest distance quintile ratio share is also calculated pre- and post-policy reform. This ratio was calculated by dividing the average distance travelled by those in the top quintile (highest distance to the nearest university) by the average distance travelled by those in the bottom quintile. Under the current higher education system, the quintile ratio share is 14.77 indicating

that those in the highest distance quintile would have to travel an average distance to the nearest university of 14.77 times that of those in the lowest distance quintile. This figure increases to 20.54 post-reform, reiterating the fact that after the reforms are implemented, equity of access to university education worsens based on this measure.

**Table 3.5:** Measures of geographic inequality in university accessibility, based on population level data

	Gini coefficient
<i>A(1): Nearest distance accessibility</i>	
Pre-reform	0.546
Post-reform	0.586
<i>A(2): System-wide accessibility</i>	
Pre-reform	0.542
Post-reform	0.505
<i>A(3): System-wide accessibility accounting for university size</i>	
Pre-reform	0.558
Post-reform	0.548
<i>A(4): System-wide accessibility accounting for university size and population of 17-19 year olds</i>	
Pre-reform:17-19 years	0.864
Post-reform:17-19 years	0.858

However, when the system-wide accessibility measures are used, the Gini coefficient actually falls slightly post-reform, suggesting that there is marginally less inequality in system-wide accessibility under the proposed higher education system. This is evident in Figure 3.2, for example, which shows that while parts of the South-East experience an improvement in accessibility, certain areas in the vicinity of Galway, Limerick and Cork are no longer in the top accessibility quintile under the post-reform system. In other words, system-wide accessibility is lower in these regions after the reforms are introduced which reduces the accessibility differential. This is being driven by the fact that the inclusion of the technological universities will result in a greater geographic spread of universities. As a result, overall system-wide accessibility in some of the larger urban centres will be lower under the proposed reforms. This result holds when the size of the universities (measure A(3)) and the population of the ED (measure A(4)) are accounted for. It implies that while there are still some regions that face relatively poor

accessibility post-reform (e.g. the North-West), there are other regions where relative accessibility has improved (e.g. the South-East).

### **3.5 Discussion and conclusion**

Geographic accessibility has been increasingly acknowledged as a potential barrier to achieving equity of access to higher education. While previous studies have helped to identify the empirical link between spatial factors and higher education participation in Ireland, they do not provide an in-depth picture or analysis of the levels of, and inequalities in, geographic accessibility to higher education. In this context, this chapter estimates a range of accessibility measures in order to model accessibility to university education in Ireland. This is done for both the status quo and post-policy reform situations. The GIS-based approach used provides a powerful means of identifying the spatial inequalities that currently exist in Ireland in this sector and the spatial implications of the policy reforms.

Consistent with Chapter 2, the results presented show significant variation in geographic accessibility to university across Ireland under the current system. Using a basic nearest-distance measure, accessibility to universities is found to be quite limited in relative terms in a number of regions, namely the North-West and Border regions, along with certain parts of the West, South-East and South-West. Post-reform, the analysis reveals an improvement in nearest distance accessibility to universities in the South-East and South-West of the country, though the Border and North-West regions continue to experience comparatively poor accessibility. This overall pattern of results is broadly similar to the findings using more sophisticated accessibility measures, though some differences emerge. For example, using a system-wide accessibility measure, accessibility is found to improve considerably in relative terms in the South-East and South-West regions post-reform, with the North-West region remaining a standout in terms of its poor system-wide accessibility. However, once the relative size of the individual institutions is taken into account, the inclusion of IT Tralee appears to have a more limited impact on the spatial distribution of university accessibility, given its relatively small size. Therefore, the consolidations have a large impact on system-wide geographic accessibility, particularly in the South-East, though accessibility in parts of the West and South-West remain at a disadvantage in terms of university accessibility, while the North-West region is particularly disadvantaged.

The impact of the reforms on the percentage of likely school leavers living within a range of distances to their nearest university, as well as on geographic inequalities in accessibility is also considered. In relation to the former, 14.5% of 17-19 year olds are currently found to live more than 100kms to their nearest university. Post-reform, this reduces to 7.9%, though there is little impact on the numbers living more than 150kms from a university. Again, these individuals are mainly located in the North-West region. In terms of geographic inequality, the analysis suggests a small improvement in system-wide inequalities. This is because while there are regions where relative accessibility will improve (e.g. the South-East), there are other regions that continue to face relatively poor accessibility post-reform (e.g. the North-West).

The results of this chapter have a number of important implications for higher education policy. Firstly, it is the very first in-depth analysis of the levels of, and inequalities in, geographic accessibility to university education in Ireland and the findings raise some concerns about the impact on geographic accessibility of the proposed reform in the sector. The chapter specifically shows that the North-West and areas of the West and South-West are poorly serviced in terms of absolute and relative accessibility to university education both pre- and post-reform. These areas consistently remain in the bottom quintile across every measure of accessibility used, implying that the impact of the reforms for those regions is negligible. From a more positive point of view, the results do show that the percentage of the 17-19 year old cohort who live more than 100kms to their nearest university would fall from 14.5% to 7.9% post-reform. However, the same analysis shows that there would remain a significant minority living more than 150kms from a university. Given that previous empirical work has showed that particularly long travel distances impact on where students choose to study and what they study, it appears that the reform will do little to remove geographical impediments to university participation for those that are most disadvantaged from a spatial standpoint. This conclusion is supported by the inequality analysis that shows little improvement in overall geographic inequality in university accessibility across Ireland as a result of the consolidation reform. Therefore, the analysis shows that while 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.

Secondly, the analysis of accessibility presented also poses questions around the suitability of current geographically-adjusted financial supports to students for higher education. As discussed in Chapter 1, the Irish Government provides grant assistance to students attending higher education based on parental income and distance to HEI. The purpose of the non-adjacent/adjacent grant system is to equalise access to higher education by mitigating the impact of distance on the decision of school leavers to proceed to higher education. However, the distance decay patterns that emerge from the spatial analysis suggest that a more step-wise and nuanced grant system would better address differences in geographic accessibility. For example, under the 45km cut-off in the current grant system a young person in the second highest quintile of accessibility as shown in any of Figures 3.2(a), 3.3(a), 3.4(a) or 3.5(a) that wishes to attend university is treated the same as an individual in the lowest quintile of accessibility in these measures. As mentioned previously, Flannery and Cullinan (2014) show that long travel distances can influence where a young person chooses to study and what they study. Therefore the research presented here helps identify the specific areas of Ireland that this may be most keenly felt and so help inform any alternative policy in relation to spatially-based financial aid, irrespective of the proposed consolidation reform.

Thirdly from a policy perspective, the various methodologies employed highlight the fact that different policy conclusions can be reached, depending on the measure of accessibility used. For example, Figures 3.1(b) and 3.3(b) show marked differences in the impact of the proposed reform on accessibility for the South-West region of the country, with the reforms shown to deliver less improvement in accessibility when a system-wide measure of accessibility is utilised. While this may seem like an obvious conclusion to make, this study helps illustrate the scale of these differences. This also helps emphasise the need for a range of measures to be considered when analysing the impact of higher education policy on geographic accessibility, particularly those involving consolidation measures within the sector.

In considering the results of this analysis, a number of caveats should be borne in mind. Firstly, as in Chapter 2, it could be argued that accessibility measures based on travel time, as opposed to distance, may be preferable. However, time travel could not be computed due to the paucity of data on travel speeds for students in Ireland. Nevertheless, Apparicio et al. (2008) found that when data on speed limits are unavailable, network distance is a reliable alternative. Secondly, due to the lack of existing data, the availability

of public transport is not included in the analysis, which may be an important factor in any participation decisions based on travel distance and time. Thirdly, this analysis examines accessibility at one point in time and essentially transforms current IoTs into technological universities. Clearly, this provides only a partial analysis of the impact of the reforms as it does not incorporate any potential changes in service capacity which may result from the amalgamations. Such aspatial factors are likely to be important in practice, however they cannot be incorporated in the analysis due to the lack of available data.

A final caveat relates to the Gini coefficient as a measure of geographic inequality. A relatively basic spatial Gini is consciously utilised since the focus here is on describing the impact of the policy reforms, as opposed to making a methodological contribution to the spatial Gini literature. Moreover, because the focus is on describing changes in the overall level of inequality in accessibility across the entire country, the basic Gini analysis is sufficient. As pointed out by Rey and Smith (2013:56), the Gini coefficient is a “whole-map, locationally invariant measure of inequality”, which means that a single index serves as a summary measure quantifying the extent of the inequality in the attribute of interest. Locationally invariant implies that this whole-map measure is insensitive to the absolute and relative position of the value observations across the map. In other words, the measure remains unchanged if the values were permuted over the map. The Gini can identify if inequality is happening, but not where it is happening within the region. For the purposes of this chapter, this is sufficient since the focus is on changes in the overall level of inequality across Ireland and not about where the inequality is happening. As a result, a spatial decomposition of the Gini coefficient is not required, such as presented in Rey and Smith (2013). Of course, examining the regions which have poor accessibility is of interest, but this matter is separate to the analysis which uses Ginis and which focusses on inequalities.

Overall, despite these caveats, the value of the analysis presented in this chapter is to capture the impact of the reforms using both GIS mapping techniques and inequality measures. Indeed, although the analysis focuses on the Republic of Ireland, the methodologies presented here help illustrate the potential capability of spatial analytical tools in informing higher education policy in any jurisdiction. Specifically, the

identification of appropriate locations for HEIs<sup>10</sup> may be better informed with the use of population-weighted measures of accessibility and/or the construction of spatially-based higher education accessibility Gini indices.

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<sup>10</sup> As highlighted by Schofer (1975), Tight (2011) and Metcalfe (2009).

# Chapter 4

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## Student preferences for the attributes of higher education institutions: Design and implementation of the DCE survey

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### 4.1 Introduction

The following four chapters centre on the DCE examining student preferences for the attributes of HEIs in Ireland. To begin, this chapter provides a detailed description of the design, development and administration of the DCE questionnaire. As qualitative research can help to ensure that valid attributes are presented and clearly expressed, the DCE was developed through a lengthy and iterative design process. In the first instance, an extensive literature review was conducted to identify previous studies that examined the factors influencing institution choice and Section 4.2 provides a detailed discussion of the findings of this review.

Following the literature review, qualitative research was conducted on the population of interest. An initial exploratory exercise was undertaken with both students and their parents that aimed to unravel the factors influencing institution choice. Following this, a series of focus group discussions was held with both secondary school students and recent school leavers. Details of this qualitative work are presented in Section 4.3. Based on this qualitative analysis, a final set of attributes and levels were chosen for inclusion in the DCE and Section 4.4 presents a detailed description of these attributes and levels. Experimental design was then used to generate specific combinations of attributes and levels that respondents evaluated in choice questions. Details of this experimental design are outlined in Section 4.5, while Section 4.6 offers an overview of the questions contained in the questionnaire. Finally, Section 4.7 discusses the survey administration process, while Section 4.8 provides a brief chapter summary.

### 4.2 Literature review

Prior to conducting any qualitative research, an extensive literature review was conducted. The purpose of this literature review was to provide initial insights into the attributes (the characteristics that make up a good/service) and levels (the different values

of an attribute) that influence student preferences for HEIs. This section examines the international literature in relation to the factors influencing HEI choice (a detailed review of the literature relating to the methodologies used for valuing HEIs is provided in Chapter 6). 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 (Chapman, 1981; Hossler and Gallagher, 1987; Paulsen, 1990). 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 choice 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 socio-economic 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: 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: 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	Method
Briggs (2006)		✓		✓						Survey
Broekemier & Seshadri (2000)			✓			✓	✓		✓	Survey
Callender and Jackson (2008)	✓									Survey
Dao & Thorpe (2015)	✓		✓					✓	✓	Survey
Drewes & Michael (2006)				✓						Micro dataset
Dunnett et al. (2012)	✓	✓								Conjoint analysis
Forsyth & Furlong (2000)	✓			✓						Longitudinal study
Hagel & Shaw (2010)	✓	✓								Conjoint analysis
Holdsworth & Nind (2006)			✓				✓			DCE
Hooley & Lynch (1981)		✓	✓						✓	Conjoint analysis
Joseph & Joseph (1998)	✓	✓	✓	✓				✓		Survey
Kee & Sia (2013)	✓		✓	✓					✓	Survey
Maringe (2006)	✓		✓	✓			✓		✓	Survey
Nora (2004)					✓					Survey
Obermeit (2012)	✓	✓		✓					✓	Literature review
Price et al. (2003)								✓		Survey
Reay et al. (2005)				✓	✓					Interviews
Sá et al. (2012)									✓	Micro dataset
Shah et al. (2013)			✓			✓				Focus groups
Simões & Soares (2010)				✓					✓	Survey
Smith (2007)					✓					Interviews
Soutar & Turner (2002)		✓	✓			✓	✓			Conjoint analysis
Verghese & Kamalanabhan (2015)		✓	✓					✓		Survey
Walsh et al. (2015a)		✓		✓						Conjoint analysis

Source: Author's own

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 focussed 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.

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, Simões 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 socio-economic 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: 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 (Broekemier and Seshadri, 2000; Soutar and Turner, 2002; Shah et al., 2013), facilities (Joseph and Joseph, 1998; Price et al., 2003; Dao and Thorpe, 2015; Verghese and Kamalanabhan, 2015) and job prospects (Broekemier and Seshadri, 2000; Soutar and Turner, 2002; Holdsworth and Nind, 2006; Maringe, 2006).

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.

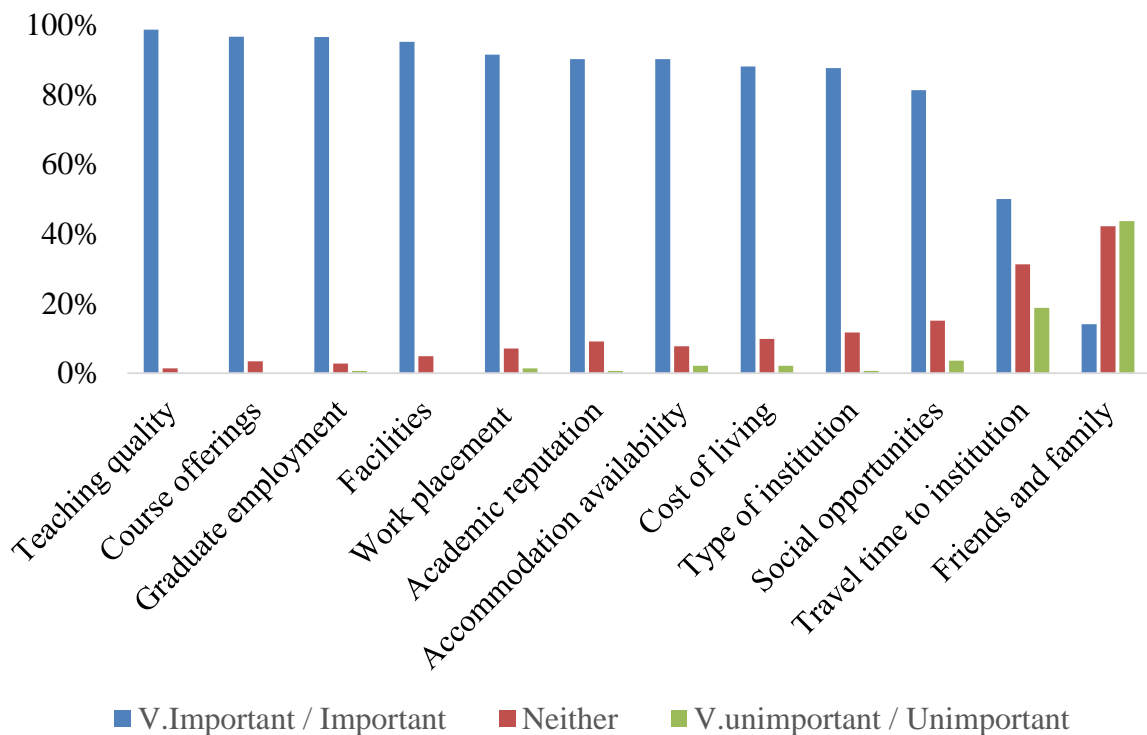
Obermeit (2012) also found that academic reputation is one of the most highly ranked factors in both US and German studies, along with other quality aspects such as good faculty and quality of the program. Moreover, they found evidence that students with high ability attach greater importance to quality 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 (Hooley and Lynch, 1981; Joseph and Joseph, 1998; Broekemier and Seshadri, 2000; Soutar and Turner, 2002; Holdsworth and Nind, 2006; Maringe, 2006; Kee and Sia, 2013; Shah et al., 2013; Dao and Thorpe, 2015; 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.

While the literature review was valuable in identifying a range of potential attributes and levels to be included in the study, the attributes chosen for inclusion in the DCE was based on feedback from qualitative research. Thus, not all attributes identified as important in the literature were included in the DCE.

### 4.3 Qualitative research

#### 4.3.1 Open day survey

To identify the attributes most relevant to the population of interest, the choice factors identified from the literature formed the basis of an initial exploratory exercise. Specifically, a survey was administered to a convenience sample of parents and students at the NUI Galway Open Day in Spring 2015. Respondents were asked to rank the importance of the factors influencing institution choice that were identified from the literature on a Likert scale. The aim of the survey was to further refine the attributes (the characteristics that make up a product) and levels (the different values of an attribute) by examining the key factors influencing respondents' choice of institution. In total, 146 individuals took part in the survey. Details of the survey instrument are presented in Appendix A, while a descriptive summary of the findings is presented in Figure 4.1.



**Figure 4.1:** % of respondents by response category for each survey item

Figure 4.1 shows the percentage of respondents by response category for each survey item. It was found that factors such as teaching quality, course offerings, graduate employment, facilities, work placement and academic reputation were most important in determining institution choice. Other factors such as the type of institution and the cost of attending the institution (including accommodation and living costs) also played an important role. While the results of this analysis provided a useful preliminary insight into the factors influencing choice of HEI, further qualitative research was needed in order to refine the attributes and levels to be included in the DCE. It is important to note that the findings from this analysis are subject to selection bias due to the non-random sampling technique employed. This is likely to influence the relative importance placed on the factors influencing institution choice. For example, those who participated in the survey had shown a willingness to travel to an open day which means they may be less influenced by travel time in their choice of institution.

### **4.3.2 Focus groups**

Following on from the open day, the purpose of the focus groups was to further explore the attributes and levels that influence student preferences for HEIs in Ireland. Focus group discussions have become accepted methods used in the initial stages of valuation research (Kaplowitz and Hoehn, 2001). They can be used to generate research hypotheses and to learn how participants talk about the topic of interest, which makes them an appropriate tool in the development of DCE questionnaires. They allow data to be collected through group interaction on a topic of interest, which allows for different views and issues to be highlighted (Stopher, 2012; Finch et al., 2014).

Focus groups are not selected with an attempt to be representative of the target population. While this could be viewed as a limitation of focus groups, it is common for several focus groups to be organised such that each group is selected with the aim of obtaining a diversity of views (Krueger and Casey, 2009; Stopher, 2012). In addition to this, iterative focus groups should be conducted until the researcher reaches theoretical saturation (Stewart and Shamdasani, 2007). This is “the point where you have heard the range of ideas and aren’t getting any new information” (Krueger and Casey, 2009: 21). Members of the focus group are selected on the basis of the homogeneity of the group with respect to the issue being discussed (Krueger and Casey, 2009; Stopher, 2012). In

this case, the group was selected based on the fact that they had either recently made a decision with regard to their higher education choices or were in the process of doing so.

In order to obtain a diverse range of perspectives, four focus group discussions were held between March and May 2015. Prior to commencing the focus groups, ethical approval was obtained from the NUI Galway Research Ethics Committee. Individuals were assured that participation in the focus group was voluntary and that they could withdraw at any time. A convenient sampling technique was used in order to recruit participants. Two focus groups were held with undergraduate students in NUI Galway (NUIG) and University of Limerick (UL) respectively. In order to recruit participants, lecturers in the Discipline of Economics were contacted and asked to coordinate the focus groups with an undergraduate class. These participants were chosen based on the fact that they were recent school leavers who had already made their choices with regard to higher education. As the decision was made in the recent past, it was felt that the insights that could be gained from such individuals could be valuable. A further two focus groups were held with Leaving Certificate students in Tuam (Co. Galway) and Portarlinton (Co. Offaly). As the survey would be carried out on Leaving Certificate students, it was essential to incorporate the views of this group in the design of the DCE. For these focus groups, teachers in the respective schools were contacted and a suitable group was chosen for participation. Each focus group discussion consisted of between seven and eight people, which is in line with recommendations in the literature (Krueger and Casey, 2009). Discussions were tape-recorded to allow for subsequent analysis.

The main purpose of the focus groups was to identify and refine the attributes that were important to the participants. They were also useful for identifying words and phrases that participants used to describe the attributes. Such information was valuable in defining and describing the attributes and levels in the DCE questionnaire. In order to ensure a clear set of objectives and engage the participants, a questioning route was prepared in advance (Krueger and Casey, 2009). The first part of the discussion included an opening question to make participants feel at ease and some introductory questions in order to encourage conversation among participants. Following this, the questions became more specific, focusing on key questions underlying the study. In particular, participants were invited to provide feedback on the characteristics of HEIs that were important to them when choosing between institutions.

In addition to refining the attributes and levels, focus group participants were also asked for feedback on the wording and format of the supplementary questionnaire. To this end, participants were presented with a draft version of the questionnaire. The purpose of this was to gauge the level of complexity and understanding of the questionnaire items. In general, participants felt that the survey items were clear and understandable. However, participants suggested that some school leavers may not know their parents' level of education. As this was likely to be an important variable in our analysis, it was decided to test this in the pre-pilot and pilot stage.

#### 4.4 Attributes and levels

Based on the study objectives, as well as findings from the qualitative research, five attributes were chosen for inclusion in the DCE. The attributes and levels are set out in Table 4.2 and described in detail below, along with the feedback from the focus group discussions which informed the choice of attributes.

**Table 4.2:** DCE attributes and levels

Attributes	Levels	Description
Travel time from home	1 hour, 2 hours, 3 hours	Time it would take to travel from a student's family home (as opposed to your college residence) to the HEI
Type of HEI	University, Institute of Technology	Refers to the type of HEI that a student would attend
Course reputation	Excellent, Good, Fair	Indicates the reputation of the courses on offer at the HEI in providing the knowledge and skills required for future employment and/or study
Work placement	Yes, No	Describes whether or not work placement opportunities are available as part of degree programmes at the HEI
Student fee (per year)	€1500, €3000, €4500, €6000	Each of the HEI options will come at a cost to the student, referred to as a student fee. This is an annual out-of-pocket expense for student

### *Travel time from home*

Travel time from home to the HEI was one of the most important attributes to emerge from the focus group discussions.<sup>11</sup> This highlighted the importance of geographic accessibility in determining higher education decisions which is interesting given the analysis conducted in Chapters 2 and 3. Related to this, a number of participants highlighted the fact that their choice of institution was partly driven by a desire to choose somewhere that was familiar to them. This was relevant both to participants who intended to commute to college and those who planned to move away from home.

*“Distance was the biggest thing.”*

*“It’s such a good college to be just an hour away. I think that was a big thing. My parents are from here as well so I have family here.”*

*“It’s close to home as well so accessibility is important...I’m the opposite, I want to live as far away as possible.”*

*“It’s too expensive to move away.”*

*“You want to move away, but at the same time, you don’t want to feel out of your depth.”*

Participants also pointed to the presence of cohort effects in their choice of institution. Specifically, they suggested that their siblings choice of institution as well as where their friends planned to apply would impact their choices.

*“I have siblings as well and they all went to college so that would have made a difference.”*

*“My brother went here. He was in first year in college when I was in 5<sup>th</sup> year so I was down with him a few times. I just enjoyed it. Decided to come back here.”*

Initially, travel time from home was presented as a binary attribute: the institution is within commuting distance from my home or the institution is not within commuting distance from my home. This attribute is predicated on the assumption that the impact of travel time on institution choice is solely based on whether or not an individual can live

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<sup>11</sup> This is at odds with the findings from the open day survey which found travel time from home to be relatively less important.

at home while attending higher education. While this was initially thought to be an appropriate definition of the attribute, it was subsequently felt that defining travel time from home in hours would allow me to determine how much people are willing to trade for a 1 hour change in travel time. Most focus group participants agreed that anything up to 1 hour was a reasonable commuting time. Therefore, it was decided to define travel time from home as 1 hour, 2 hours and 3 hours. A follow-up question was also included in the questionnaire which asked respondents why travel time is important to them in to order tease out the potential role of rising rental costs on student preferences for travel time. In addition to this, questions were included in the survey to examine the role of parents, siblings and friends in institution choice. An analysis of the importance and correlates of peer, sibling and parental influences on HEI choice is presented in Chapter 5.

### ***Type of HEI***

The type of HEI was another important characteristic for the focus group participants. Many of the participants associated a certain prestige with attending a university, with universities assumed to have a stronger academic reputation.

*“When a lot of people are picking a course, they would always try to find it in a university before an IoT. Universities would always be priority.”*

*“I think that’s how a lot of people think when they are doing the Leaving Cert. They kind of strive to go to university.”*

As noted in Section 1.2.1 in Chapter 1, the higher education sector in Ireland is comprised of universities, institutes of technology and colleges of education. For the purpose of the survey, it was decided to merge colleges of education and universities. The reason for this is that colleges of education focus their course offerings on teacher training. Therefore, they represent a niche element of the higher education sector. Also, feedback from the focus group discussions showed that students consider qualifications obtained from college of education to be in line with those of a university. Clear instructions were given to the participants in this regard.

### ***Course reputation***

Focus group participants indicated that course offerings were an important determinant of institution choice. The two aspects of courses that were important to the focus group

participants were the reputation of the courses and the breadth of courses on offer. While universities and IoTs are comparable with regard to the number of courses on offer, course reputation is likely to differ substantially between institutions. Therefore, course reputation was included as an attribute in the DCE. Focus group participants indicated that the reason course reputation was important in determining institution choice was due to its potential to impact on labour market prospects post-graduation.

*“You want a course that will lead to jobs in the future.”*

Thus, the course reputation attribute was presented as fair, good and excellent reflecting the reputation of the courses on offer at the HEI in providing the knowledge and skills required for future employment and/or study.

### ***Work placement opportunities***

Additionally, some participants highlighted work placement/cooperative internship opportunities as an important factor in their choice of institution. Again, participants indicated that the value of this attribute lies in the potential for it to impact labour market outcomes. Participants felt that gaining relevant work experience would prove valuable to them when seeking employment and that work placements also offer the potential to create industry contacts.

*“You might not have had a job while you were in school and then when you come to college you might only get summer work. It’s a great advantage to have work experience on your CV when you finish.”*

They also suggested that graduate employers associated with the institution were important as it acts as a signal of the type of employment that may be available post-graduation. In addition to this, work placement is an attribute that is amenable to policy. While all HEIs in Ireland provide a career advisory service, the provision of work placement opportunities as part of degree programmes is limited in Irish HEIs. Thus, this attribute was presented with two levels - yes and no - to depict whether or not work placements were available as part of degree programmes at the HEI. Future research could focus on student preferences for the quality and/or type of such work placements.

### *Student fee*

Finally, the focus groups were helpful in developing an appropriate cost attribute which would be used to obtain WTP estimates. Feedback from the focus groups suggested that accommodation costs were an important cost consideration when choosing between institutions. However, a number of issues were identified with using accommodation costs as the cost attribute. Firstly, given the correlation between distance from a person's home to the HEI and accommodation costs, the inclusion of both attributes could have resulted in implausible combinations during experimental design. Additionally, respondents who plan to live at home will not incur accommodation costs which could lead to attribute non-attendance (Hensher et al., 2005; Scarpa et al., 2009; Campbell et al., 2011; Hole, 2011; Hensher et al., 2012; Scarpa et al., 2012; Hess and Hensher, 2013; Hole et al., 2013; Lagarde, 2013). For these reasons, accommodation costs were not used as a cost attribute in the DCE. As an alternative payment vehicle, participants were asked about their views on student fees/contributions and how this may influence their decision to choose one institution over another. Many participants expressed that if a HEI satisfied all of their preferences, they would be willing to pay a marginally higher student fee.

Therefore, student fee was used as the cost attribute. Given that this is an out-of-pocket expense (which is not affected by the availability of a student grant), it was decided to set one level below the current fee level in order to capture the fact that students may not be willing to pay the current fee of €3000. Given the trend towards rising fees in Ireland in recent years, two levels were also set above the current fee level. Thus, the student fee attribute was presented with four levels - €1500, €3000, €4500 and €6000. Four levels were found to be sufficient to enable students to make meaningful trade-offs while also providing sufficient variation in the levels to establish the range in students' WTP (Flannery et al., 2013). It was felt that providing more than four levels would have increased the cognitive burden in answering the DCE, thus reducing respondent efficiency (Street et al., 2008).

## **4.5 Experimental design**

Experimental design was used to generate specific combinations of attributes and levels that respondents evaluated in the choice questions (Johnson et al., 2013). According to Lancsar and Louviere (2008: 667), "an experimental design is a sample from all possible combinations of attribute levels used to construct choice alternatives and assign them to

choice sets”. It involves mapping the attributes and levels into sets of alternatives from which respondents select their preferred option. Traditionally, experimental design centred on the principle of orthogonality. Orthogonal designs ensure that the attribute levels are spread over all choice tasks, and that attribute level combinations do not exhibit a correlated pattern (Bliemer and Rose, 2011). However, recent advances in experimental design theory have found that while the property of orthogonality may be an important criteria in determining independent effects in linear models, discrete choice models are not linear (Rose and Bliemer, 2009). Thus, this approach is only efficient when prior knowledge about the parameters is not available.

Efficient experiment designs offer an alternative to orthogonal designs (Huber and Zwerina, 1996; Sándor and Wedel, 2001; Kanninen, 2002; Burgess and Street, 2003; Carlsson and Martinsson, 2003; Street and Burgess, 2004). This approach aims to find designs that are statistically as efficient as possible in terms of predicted standard errors of the parameter estimates (Rose and Bliemer, 2009). They are generated based on the asymptotic variance covariance (AVC) matrix, which requires prior parameter values to be specified. However, precise parameter values are unlikely to be known by the researcher at the design stage and so it is necessary to make some assumptions about what these values will be (Bliemer et al., 2008). Bayesian efficient designs accommodate potential uncertainty in the prior parameters and are thus robust to misspecification. Given this, Bayesian D-error (Db-error) criterion was employed for this study (Bliemer et al., 2008). Formally, let  $\varphi(\tilde{\beta}|\theta)$  denote the multivariate probability density function of the priors  $\tilde{\beta}$ , where  $\theta$  are the corresponding parameters of this distribution. The Db-error can then be written as:

$$E(f) = \int_{\tilde{\beta}} f(\tilde{\beta}|X)\varphi(\tilde{\beta}|\theta)d\tilde{\beta} \quad (1)$$

In order to improve the efficiency of the estimates, a sequential experimental design was used in which the priors were updated as more information was collected (Scarpa et al., 2007). To accommodate this, the survey was conducted in four phases. In the pilot phase (phase 1), priors were chosen based on information from the focus group discussions and previous literature. The following three phases relate to the main survey, whereby data were collected in waves and the experimental design was updated after each wave based

on conditional logit parameter estimates. The choice cards were generated using Ngene software and a sample choice card is presented in Figure 4.2.

Each choice card contained three unlabelled higher education alternatives (A, B and C) along with an opt-out alternative (D). An unlabelled DCE involves assigning generic alternatives in the choice set. On the other hand, a labelled experiment involves assigning labels that convey additional information regarding the alternative (de Bekker-Grob et al., 2010). While labelled DCEs are more realistic and less abstract, adding to task realism, Louviere et al. (2000) suggest that respondents may use labels to infer omitted information and that these inferences are usually correlated with the random error component, which may have a significant impact on model estimates. In addition to this, a labelled DCE means that results are not generalizable. On the other hand, unlabelled DCEs encourage respondents to choose an alternative by trading-off attribute levels, which is desirable from a nonmarket valuation perspective (de Bekker-Grob et al., 2010). Thus, for the purpose of this study, an unlabelled DCE was employed.

	OPTION A	OPTION B	OPTION C	OPTION D
<b>Type</b>	University	Institute of Technology	University	Prefer not to attend any of the higher education institutions presented here
<b>Travel time from home</b>	1 hour	3 hours	2 hours	
<b>Course reputation</b>	Good course reputation	Excellent course reputation	Fair course reputation	
<b>Work placement</b>	No work placement	Work placement	No work placement	
<b>Student fee (per year)</b>	€4,500	€1,500	€4,500	
Please tick the one option you <b>prefer</b> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Figure 4.2:** Sample choice card

In this context, it is important to acknowledge the potential for labelling effects through the inclusion of an attribute capturing the type of HEI. However, the focus group discussions revealed this as a key attribute in the choice of HEI and participants suggested that they would find the alternatives too abstract if it was not included. In addition to this, analysis of the pilot responses revealed that all of the attributes had a statistically significant effect on the choices made by students. If it was the case that type of HEI had resulted in a labelling effect, the impact of this attribute would have far exceeded the others, which was not the case. Thus, I am satisfied that this is not an issue in the analysis.

An opt-out alternative was included as it may capture unobserved attributes which are known to the individual but not the researcher. It can also capture a genuine preference for none of the alternatives (Boxall et al., 2009). Failure to include an opt-out alternative may force respondents into choosing between two potentially unappealing alternatives which would not be chosen in practice (Lancsar and Louviere, 2008). Thus, the inclusion of the opt-out alternative leads to welfare estimates that are consistent with demand theory (Louviere et al., 2000). Two blocks of choice cards were created and each respondent was asked to complete 12 choice cards. In each case, they were asked to choose their preferred alternative.

## **4.6 Questionnaire**

In this section, an outline of the survey questionnaire is provided. The questionnaire consisted of a number of sections which are described in detail below, while the full text can be found in Appendix B.

### **4.6.1 Introduction**

This section was used to introduce the respondents to the questionnaire and to brief them on the exact purpose of the questionnaire. They were informed that it was being carried out in collaboration with the National University of Ireland, Galway. They were told that the questionnaire was seeking to understand the characteristics of HEIs that play a role in their choice of institution. Respondents were told that the questionnaire should take approximately 20 minutes and that they should find it interesting. They were assured that their responses would be kept confidential and were assigned an anonymous ID number.

#### **4.6.2 Section A: Plans for third level education**

Section A of the questionnaire was designed to ascertain respondent's plans for higher education and to determine the factors influencing their higher education choices. The first question asked them how important they think higher education is for their future career. The purpose of this question was to capture the importance that respondents placed on higher education. The following three questions asked respondents specific questions about their plans for higher education. They were asked which HEI is likely to be their first choice and what field of study they are interested in applying for. The remaining questions in this section asked respondents about the factors that may influence their higher education choices. For instance, they were asked about the extent to which siblings and parents are likely to influence their choice of HEI. Thus, this section sought to introduce respondents to the questionnaire and establish their plans for higher education. An additional objective of this section was to collect data that may be used as explanatory variables for the modelling phase of the study.

#### **4.6.3 Section B: Choice cards**

The objective of this section was to examine student preferences for the attributes of HEIs and to obtain WTP estimates for the attributes. Respondents were informed that the purpose of the section was to determine the value they placed on the attributes of HEIs. The instructions provided in this section were designed to provide sufficient detail without overburdening the respondents with excess information. Additionally, the questionnaire was administered in person and thus verbal instructions were also provided. Respondents were also given the opportunity to ask questions of clarification throughout.

To begin, respondents were told that they would be presented with hypothetical higher education choices. They were told that each HEI was described by a number of characteristics and that they should take all characteristics into account when making their decision. Respondents were then presented with a sample choice card to illustrate the format of the questions and the structure of the choice card was described. A brief description of the attributes was given. These descriptions were carefully pre-tested in focus group discussions and pilot interviews to ensure that they were properly understood. With regard to student fee, respondents were asked to treat this as an annual out-of-pocket expense. Respondents were told that although in reality they may not have

to pay this fee, as they may be entitled to a grant, for the purposes of the questionnaire they were asked to imagine that they would have to pay. Following these instructions, respondents were asked to complete 12 choice cards.

#### **4.6.4 Section C: Post choice card questions**

Questions in this section comprised mainly of debriefing questions following the choice cards (Campbell et al., 2008; Bridges et al., 2011; Balcombe et al., 2014). The first question asked respondents how easy or difficult they found it to choose a preferred option. The purpose of this question was to assess the cognitive burden experienced by respondents when evaluating the different alternatives in the choice card. The following two questions asked them whether or not they ignored attributes in their choices and how confident they were in making their decisions. In this section, respondents were also asked to indicate the most and least important attributes when choosing a HEI. Respondents were also given the opportunity to specify any other factors that they considered important when choosing between institutions.

Additionally, this section included a question on whether travel time was an important factor in a respondent's choice of institution and why this was the case. The purpose of these questions was to establish whether the influence of travel time was centred on the availability and cost of rental accommodation. Where applicable, the final follow-up question asked respondents why they chose the opt-out alternative (if they did so).

#### **4.6.5 Section D: Background information**

The final section was designed to gather demographic and socio-economic information from the respondents. Responses to these questions would allow an examination of how preferences vary by socio-demographic characteristics. These questions focused on gender, geographic location, household composition, academic performance, parental work status and occupation, as well as parental education.

### **4.7 Survey administration**

#### **4.7.1 Pre-pilot and pilot survey**

Prior to the commencement of data collection, ethical approval was provided by the NUI Galway Research Ethics Committee and Garda clearance was obtained. Following this, a number of pre-pilot interviews were conducted with three students in the final year of

upper secondary education (Leaving Certificate). This allowed me to test the length of the survey, whether it was understood, as well as to identify potential issues in responses before the piloting stage. These interviews were conducted in August 2015. Feedback from the pre-pilot suggested that respondents found the survey easy to complete and that they had no difficulty understanding the attributes and levels.

The questionnaire was then piloted on 59 Leaving Certificate students in a secondary school in Ennis, Co. Clare in September 2015. The purpose of the pilot study was to establish the suitability of the attributes and levels and to ensure that the survey could be completed in the allotted time. The pilot study revealed that students had no difficulties in completing the 12 choice cards in the time available. A conditional logit model was also estimated using the pilot responses and all coefficients were found to be highly statistically significant and of the expected sign. Therefore, no substantial issues were identified from the pre-pilot or pilot survey. However, one minor change was made to the main survey. For the purpose of the pre-pilot and pilot surveys, each choice card contained two higher education alternatives and an opt-out alternative. However, for the main survey, it was decided to add a third HEI alternative to the choice cards as it would allow for more variation in the choices faced by individuals. In addition to this, the wording of some questions was altered and some instructions were added for the purpose of clarification.

#### **4.7.2 Main survey**

For the main survey, the sampling frame was taken from the Department of Education and Skills website which provides a complete list of all secondary schools in Ireland. Based on this sampling frame, a stratified random sample was chosen which was broadly representative of the population of schools across a number of dimensions, namely school size (measured by the number of students enrolled), geographic location (NUTS III region), DEIS status<sup>12</sup> and gender enrolment mix. Schools were first stratified by NUTS III region and then a random sample was drawn within each stratum. School principals were informed about the project by letter and invited to take part. Included with the letter of invitation was an information sheet outlining the purpose of the project and what

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<sup>12</sup> The DEIS programme is aimed at achieving educational inclusion by addressing the educational needs of children and young people from disadvantaged communities. Schools participating in the DEIS programme receive extra funding from the Government in order to provide additional educational supports to their students.

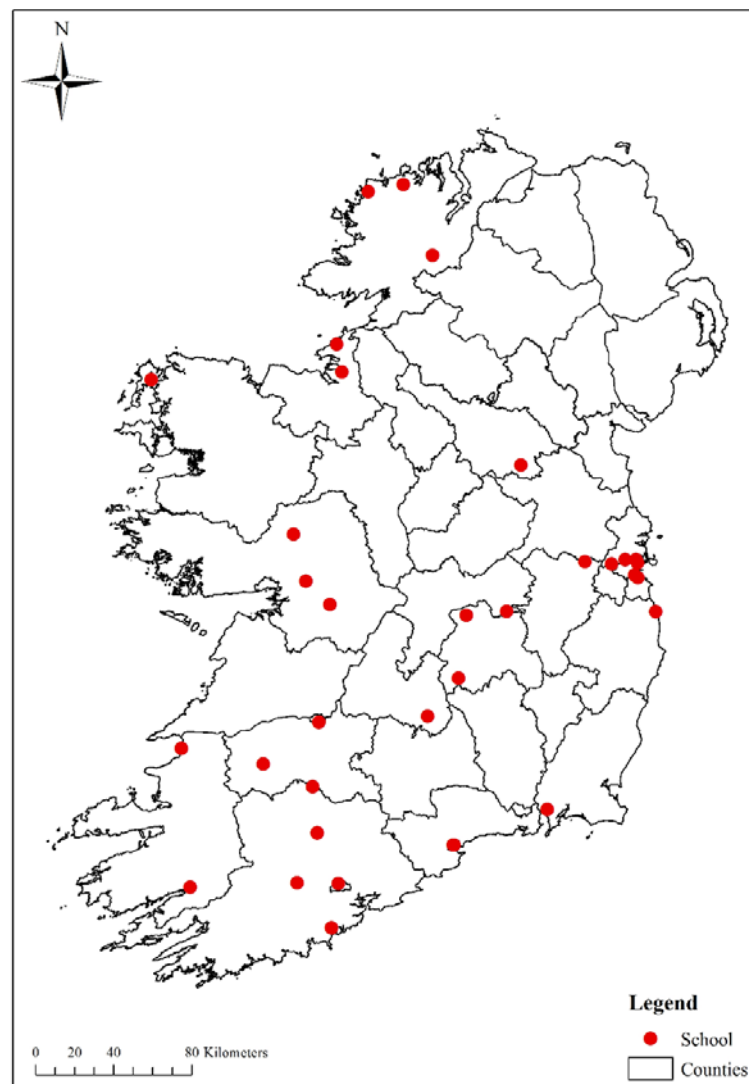
would be involved should they wish to take part. Details of this cover letter and information sheet are provided in Appendix C. Once schools agreed to participate in the study, parental information sheets and a corresponding consent form were sent to the school along with an information sheet and assent form for each student which had to be completed in advance. Details of these information sheets and consent/assent forms are provided in Appendix D and E.

In total, 1,105 Leaving Certificate students from 34 schools took part in the study. The response rate from the schools that were contacted was 44%, while the response rate from students within schools was 99%. This results in a final sample size of 1,093 individuals (13,116 observations). Table 4.3 shows the representativeness of the sample across the four dimensions outlined above, while Figure 4.3 presents the geographic location of the schools that took part in the study. Figure 4.3 shows that there is a good geographic spread of schools across the country, a point which is also reflected in Table 4.3.

**Table 4.3:** Representativeness of sample

Criteria	% of schools (sample)	% schools (nationally)
<i>Geography</i>		
Border	17.65%	12.17%
West	11.76%	11.34 %
Midlands	8.82%	6.09%
Mid-East	5.88%	9.13%
Dublin	17.65%	25.45%
South-East	8.82%	9.41%
South-West	20.59%	15.49%
Mid-West	8.82%	10.93%
<i>School size</i>		
500+	52.94%	49.24%
300-500	32.35%	25.31%
200-300	8.82%	14.80%
< 200	5.88%	10.65%
<i>DEIS</i>		
Have DEIS status	14.71%	26.42%
<i>Gender mix</i>		
Single sex	35.29%	34.16%
Mixed	64.71%	65.84%

In fact, despite some minor differences, Table 4.3 indicates that the sample is broadly representative of the population of secondary schools in Ireland based on school size, geographic location, DEIS status and gender enrolment mix. The survey was administered in person and Leaving Certificate students were asked to complete the survey during a class period. The decision to administer the survey in person was motivated by the fact that interviewer-based administration is generally accepted as the best approach for achieving a good response rate (Ryan and Gerard, 2003). In addition to this, it was felt that by administering the survey in person, questions of clarification could be addressed by the researcher, thereby minimising potential bias from teachers. A paper-based questionnaire was administered to allow the survey to be completed during any class period.



**Figure 4.3:** Geographic location of the sample of schools

## **4.8 Chapter summary**

This chapter reviewed the stages involved in the design and implementation of the DCE questionnaire. The process began with an extensive literature review which examined the factors influencing institution choice. Following this, a Likert-scale survey along with a series of focus group discussions were employed which were used to identify and define the attributes and levels to be included in the DCE questionnaire. The focus group discussions were also used to refine the wording and presentation of the questionnaire with the aim of maximising the response rate. Findings from the qualitative work were discussed along with a detailed description of the attributes and levels chosen for inclusion in the DCE. The chapter also provided a description of the experimental design that was used to generate the choice cards and choice alternatives. Finally, the chapter provided an in-depth description of the questionnaire along with details of the survey administration process.

# Chapter 5

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## Student preferences for the attributes of higher education institutions: Descriptive statistics and exploratory analysis<sup>13</sup>

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### 5.1 Introduction

This chapter presents descriptive statistics of the responses to the questionnaire outlined in Chapter 4, which was conducted to study student preferences for the attributes of HEIs in Ireland. Specifically, the purpose of the chapter is to provide a socio-demographic profile of the respondents and to provide findings from a range of attitudinal questions aimed at examining respondents' plans for and attitudes towards higher education. Findings from a range of follow-up questions to the valuation exercise are also discussed and presented in Section 5.2. In addition to this, Section 5.3 presents the results of an analysis to examine the importance of peer, sibling and parental influences on HEI choice, as well as the factors associated with the decision to live at home while attending higher education. Section 5.4 provides a brief chapter summary.

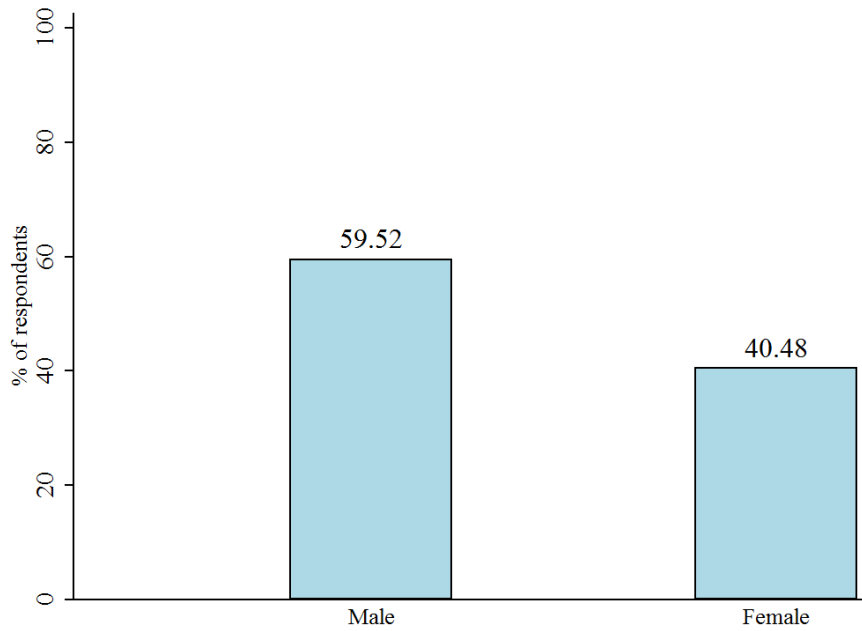
### 5.2 Descriptive statistics

#### 5.2.1 Profile of respondents

To begin, this section presents a profile of respondents with respect to their socio-demographic characteristics. Figure 5.1 displays the gender breakdown of the survey respondents. The sample is comprised of more male than female respondents. Nonetheless, females are well represented, making up 40.5% of the sample.

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<sup>13</sup> This chapter is based in part on Walsh, S. & Cullinan, J. 2017. Factors influencing higher education institution choice. *In: Cullinan, J. & Flannery, D. (eds.) Economic insights on higher education policy in Ireland: Evidence from a public system.* London: Palgrave MacMillan.



**Figure 5.1:** Gender of respondents

With regard to the socio-economic group of the respondents, Table 5.1 presents a breakdown of the household socio-economic status, which is defined based on the highest parental socio-economic group. To generate the parental socio-economic groups, the SOC90-based census classification was employed (Central Statistics Office (CSO), 2011a). As indicated in Table 5.1, 19.3% of respondent households are in the highest socio-economic category, ‘employers & managers’, while 33.1% are classified as ‘non manual or manual skilled’ and 7.0% are classified as ‘semi-skilled, unskilled or farmers’.

**Table 5.1:** Profile of respondents according to household socio-economic status

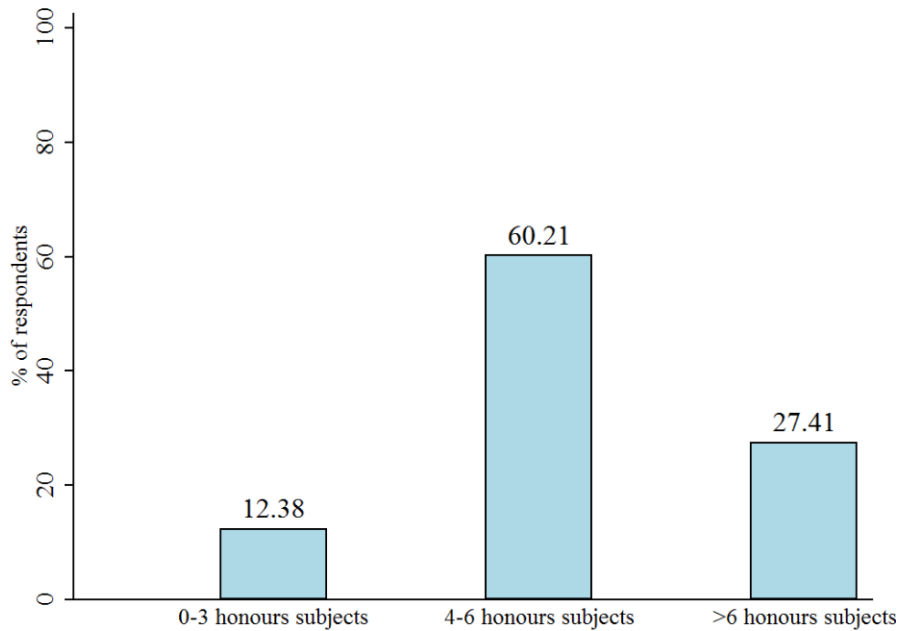
Household socio-economic status	Frequency	Percent
Employers & managers	211	19.30
Higher professional	181	16.56
Lower professional	165	15.10
Non-manual	264	24.15
Manual skilled	98	8.97
Semi-skilled	50	4.57
Unskilled	5	0.46
Farmers	22	2.01
Missing	97	8.88
<b>Total</b>	<b>1093</b>	<b>100</b>

Related to this, Table 5.2 shows the percentage of respondents who believe that they are eligible for a ‘student grant’. As shown, 41.8% of respondents believe that they are eligible for financial support from the Government in the form of a student grant, while 30.1% of the sample were unsure about their eligibility. This is roughly in line with the national figure from the Higher Education Authority in which 46% of new entrants across all HEA-funded institutions are in receipt of a student grant (HEA, 2015c). Notable, 30.1% of the sample respondents reported ‘Don’t know’ to this question.

**Table 5.2:** Profile of respondents according to whether they believe they are eligible for a student grant

Eligible for student grant	Frequency	Percent
Yes	457	41.81
No	280	25.62
Don’t know	329	30.10
Missing	27	2.47
Total	1093	100

As a proxy for academic ability, Figure 5.2 displays the number of Leaving Certificate honours subjects that respondents plan to take. For ease of presentation, the number of subjects is divided into categories. Respondents are most commonly assigned to the category of 4-6 honours subjects, which accounts for 60.2% of the sample. Interestingly, 27.4% of respondents indicated that they intend to sit all examinations at honours level, while 12.4% fall into the 0-3 category.



**Figure 5.2:** Number of Leaving Certificate honours subjects

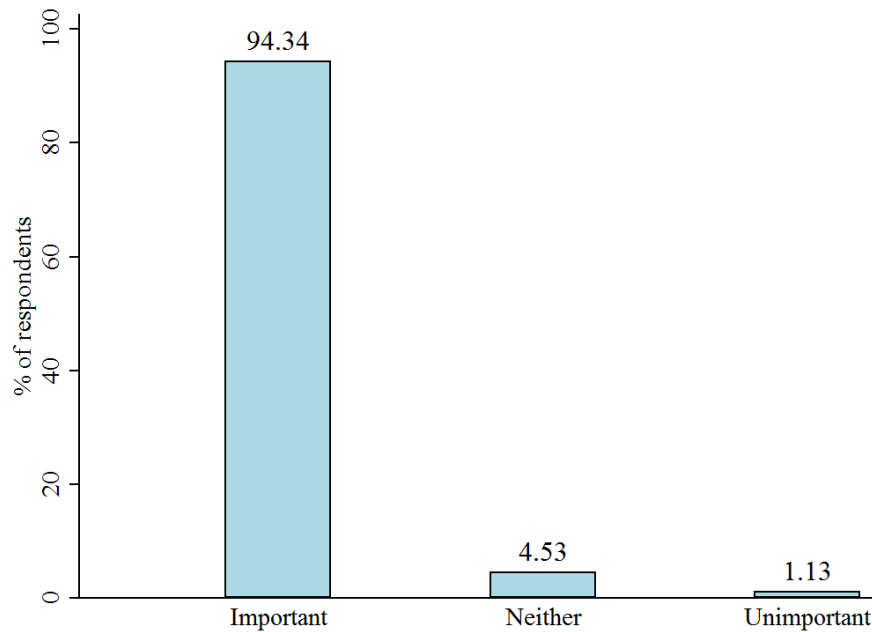
### 5.2.2 Plans for and attitudes towards higher education

Respondents were also asked a series of questions about their plans for higher education as well as their attitudes towards various factors that may influence their choice of institution. Table 5.3 indicates that over 90% of respondents planned to apply to a HEI, with the aim of progressing to higher education following their Leaving Certificate examination. This would suggest that the majority of respondents place significant importance on progressing to higher education.

**Table 5.3:** Current higher education plans

	Frequency	Percent
Plan to apply to higher education	1,008	92.22
Do not plan to apply higher education	31	2.84
Don't know	44	4.03
Missing	10	0.91
Total	1093	100

To explore this further, respondents were asked whether they felt that higher education was important for their future career. From Figure 5.3 it is evident that the vast majority of respondents (94.3%) believe that progressing to higher education is central to their future career opportunities.



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**Figure 5.3:** Respondents’ opinions regarding the importance of higher education for their future career

Following this, a series of questions were asked to establish the factors that may influence respondents in their choice of institution. These questions provide the foundation for the analysis presented in Section 5.3. Respondents were first asked whether their choice of HEI would be influenced by where their friends plan to go. Table 5.4 shows that while the majority of respondents are not influenced by their friends’ choices, 12.6% of respondents indicated that they would be influenced by their friends in their choice of HEI, which represents a significant minority of the sample. Related to this, 19.0% of respondents who had siblings in higher education indicated that they planned to apply to the same HEI as their siblings. The factors associated with whether or not a respondent is influenced by their friends and siblings in their choice of HEI are examined in Section 5.3.

**Table 5.4:** Influence of friends on choice of HEI

Friends influence	Frequency	Percent
Choice of HEI influenced by where friends plan to go	138	12.63
Choice of HEI not influenced by where friends plan to go	822	75.21
Missing	133	12.17
Total	1093	100

A second question was included in the same section of the questionnaire to establish the influence of parents on respondents' choice of HEI. Respondents were asked to indicate on a Likert scale from very high to very low how much their parents or guardians are likely to influence their choice of HEI. From Table 5.5 it is evident that the majority of respondents (68.8%) rate parental influence as either high or very high.

**Table 5.5:** Influence of parents on choice of HEI

Level of parental influence	Frequency	Percent
Very high or high	752	68.80
Low or very low	292	26.72
Don't know	22	2.01
Missing	27	2.47
Total	1093	100

Respondents were also asked whether or not they plan to live at home while attending higher education and the results are presented in Table 5.6. Overall, 30.4% of respondents indicated that they did plan to live at home, while 48.5% indicated that they planned to move away from home. A further substantial proportion (18.9%) indicated that they did not know whether or not they would live at home. The factors associated with the decision of whether or not to live at home are explored in Section 5.3.

**Table 5.6:** Plan to live at home while attending higher education

Live at home while attending higher education	Frequency	Percent
Yes	332	30.38
No	530	48.49
Don't know	206	18.85
Missing	25	2.29
Total	1093	100

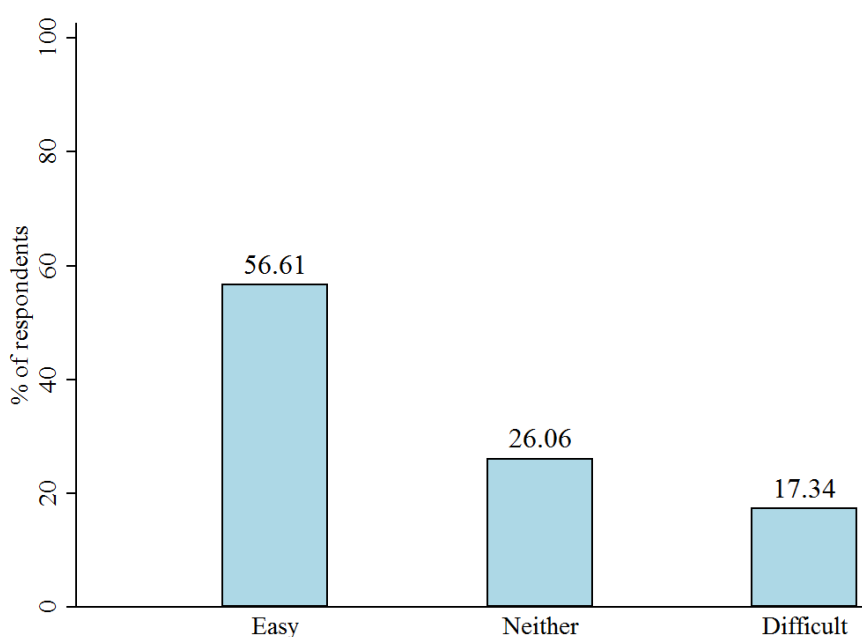
Related to this, respondents were also asked to indicate the reasons why travel time from home to the HEI was (ir)relevant in their choice of institution. Table 5.7 reveals that a substantial proportion of the sample are influenced by the costs associated with longer travel times. Specifically, 18.1% of respondents indicated that travel time was a factor in their choice due to the cost and availability of rental accommodation, while 16.9% indicated they were wished to avoid high travel costs. Interestingly, 33.6% of respondents stated that they want to move away from home while engaging in higher education, which may reflect a desire by respondents to gain independence.

**Table 5.7:** Reasons why travel time is important/unimportant in respondents' institution choice

Reason travel time is important/unimportant	Frequency	Percent
Cost and availability of rental accommodation	198	18.12
Want to live at home	176	16.10
Want to move away from home	367	33.58
Want to avoid high travel costs	185	16.93
Other	83	7.59
Missing	84	7.69
Total	1093	100

### 5.2.3 Follow-up questions

Following the choice task, respondents were asked to indicate how easy or difficult they found it to choose their preferred option. The purpose of this question was to assess the cognitive burden experienced by respondents when evaluating the different alternatives in the choice card. It is evident from Figure 5.4 that the majority of respondents found it easy to choose their preferred alternative, which suggests a relatively low level of cognitive burden. However, it should be noted that 17.3% of respondents indicated that they found the choice task difficult.



**Figure 5.4:** Respondents' opinions regarding the difficulty of the choice task

Respondents were also asked to specify whether they ignored attributes in their choice of alternative. Table 5.8 shows that 41.7% of respondents ignored travel time from home, which suggests that a certain segment of the sample was unconcerned with the amount of time it takes to travel from their home place to the HEI. Further, 26.8% of respondents indicated that they ignored student fee in their choice of alternative, which implies that a certain cohort of students are insensitive to paying higher fees. IoTs were ignored by 24.4% of respondents, while the availability of work placement was ignored by 19.4%. Interestingly, only 9.3% of respondents indicated that they ignored course reputation in

their choice. As a complement to this, respondents were also asked whether they *considered* all the attributes when making their choice. Overall, 81.2% of respondents stated that they considered all attributes in their choice, which suggests a low level of attribute non-attendance. This is seemingly at odds with the findings from Table 5.8.

**Table 5.8:** Percentage of respondents who stated that they ignored attributes in the choice task

Statement	Percent
I always ignored the university	12.35
I always ignored the institute of technology	24.43
I always ignored the course reputation	9.33
I always ignored student fees	26.81
I always ignored work placement opportunities	19.40
I always ignored travel time from home to the third level institution	41.72

As discussed in Chapter 4, each respondent was presented with 12 choice cards and each choice card contained three HEI alternatives and an opt-out alternative. In each case, respondents were asked to choose their preferred alternative. Given this, it is interesting to consider how many respondents chose the opt-out alternative. As shown in Table 5.9, 436 respondents chose the opt-out alternative on at least one occasion.

**Table 5.9:** Number of times opt-out alternative was chosen

Number of times opt-out chosen	Frequency	Percent	Cumulative Percent
Once	100	22.94	22.94
Twice	74	16.97	39.91
3 times	61	13.99	53.90
4 times	54	12.39	66.28
5 times	50	11.47	77.75
6 times	31	7.11	84.86
7 times	18	4.13	88.99
8 times	16	3.67	92.66
9 times	6	1.38	94.04
10 times	6	1.38	95.41
11 times	4	0.92	96.33
12 times (always)	16	3.67	100.00
Total	436	100	

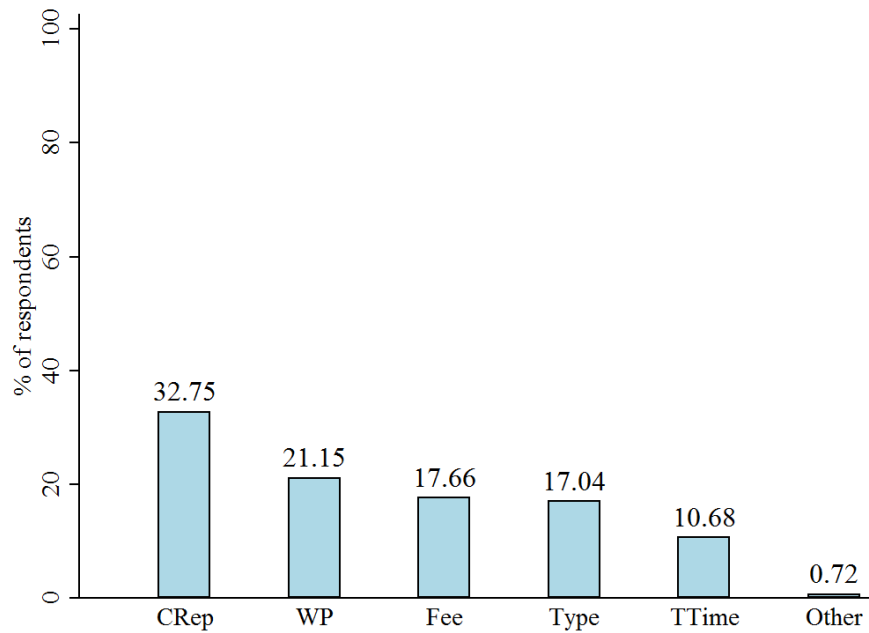
The table also provides a breakdown of the number of times the opt-out was chosen by these respondents. For instance, 22.9% of respondents who chose the opt-out alternative did so on one occasion, while only 3.6% always chose the opt-out. Following on from this, Table 5.10 shows the reasons respondents chose the opt-out alternative. 57.1% of respondents who chose the opt-out did so because they could not choose a preferred alternative or they did not like any of the alternatives. With regard to student fees, 21.6% of respondents indicated that they chose the opt-out because they cannot afford to pay fees out-of-pocket, while 21.1% stated that fees were too high. Interestingly, only 1.4% of respondents stated that they object to paying student fees while only 6.4% stated that they believe the Government should pay their fees. This indicates a low level of protest responses.

**Table 5.10:** Reasons why respondents chose opt-out alternative

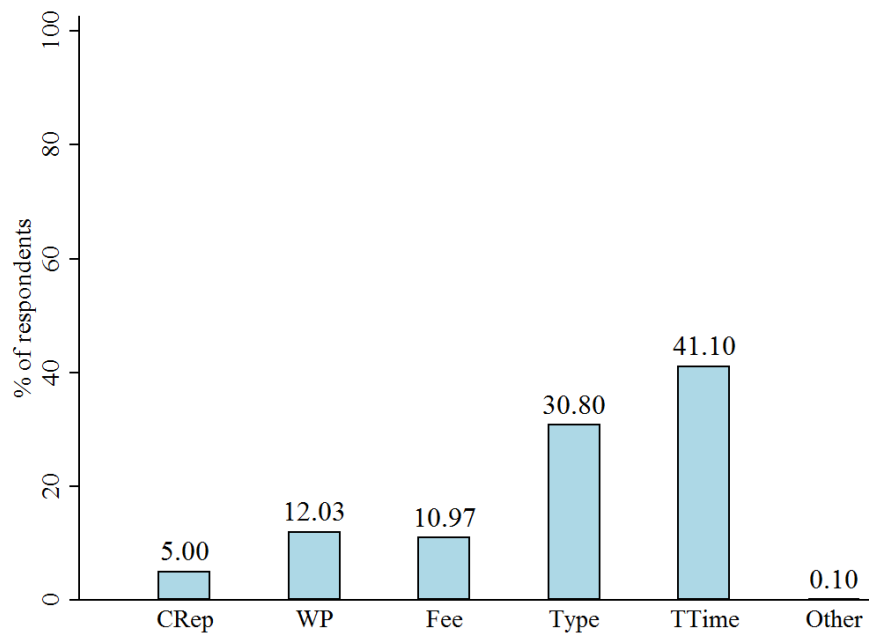
Reason for choosing opt-out	Frequency	Percent
Can't afford to pay fees	55	12.61
Fees are too high	92	21.10
Object to paying fees	6	1.38
Government should pay my fees	28	6.42
Didn't know which option was best	31	7.11
Didn't like any of the options	218	50.00
Missing	6	1.38
Total	436	100

Finally, respondents were asked to indicate the most and least important factor to them when considering a HEI. Figure 5.5 shows that 32.8% of students in the sample identify course reputation as the most important factor when considering a HEI, while only 5.0% 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 21.2% of respondents indicating that it is the most important factor determining choice. Results are mixed with regard to student fee, with 17.7% of respondents identifying it as the most important factor and 11.0% identifying it as the least. Interestingly, while 17.0% of students state that the type of institution (university or IoT) 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.

(i) *Most important factor*



(ii) *Least important factor*



**Figure 5.5:** Respondents' views on the most and least important factor in their choice of higher education institution

*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.

### **5.3 Analysis of peer, sibling and parent influences on HEI choice**

The descriptive statistics presented in Section 5.2 identified peers, siblings and parents as having an influence on institution choice. Given this, the following section examines the importance and correlates of peer, sibling and parental influences on HEI choice, along with the factors influencing the decision of whether or not to live at home while attending higher education. Using supplementary data that was collected with the DCE, the purpose of this analysis is to explore some of the factors influencing institution choice that were not included as attributes in the DCE. A robust analysis of the DCE data is presented in Chapters 6 and 7.

Previous studies examining the factors influencing institution choice have highlighted peers, siblings and parents as important. While peer effects have been shown to influence a range of higher education outcomes (Winston and Zimmerman, 2004; Munley et al., 2010), 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 had a stronger influence than parents who did not progress to higher education.

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: 476). Simões 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 were more reliant on school-based forms of guidance.

### 5.3.1 Empirical approach

To begin, a set of multivariate binary logit models are estimated in order 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, as presented earlier, 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), while 68.8% reported parental influence as being important (see Table 5.11). To model these influences, a latent variable *Influence*<sup>\*</sup> is defined to be a linear function of a vector of control variables **X**, a set of parameter coefficients  $\beta$  to be estimated and an error term  $\varepsilon$ , such that:

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

**Table 5.11:** Variable definitions and sample descriptive statistics

Variable Name	Variable Description	N (%) or Mean (SD)
<i>Dependent Variables</i>		
Friend Influence	Indicator for whether respondent's choice of HEI would be influenced by where friends plan to go	
	= 0 if would have no influence	822 (75.21%)
	= 1 if would have an influence	138 (12.63%)
	= . if don't know or missing	133 (12.17%)
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 (26.72%)
	= 1 if important	752 (68.80%)
	= . if don't know or missing	49 (4.48%)
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 (48.49%)
	= 1 if plans to live at home	332 (30.38%)
	= 2 if don't know	206 (18.85%)
	= . if missing	25 (2.29%)
<i>Independent Variables</i>		
Male	= 0 if student is female	439 (40.13%)
	= 1 if student is male	644 (58.87%)
	= . if missing	11 (1.01%)
Honours Subjects	No. of Leaving Certificate honours subjects	5.41 (1.64)
Honours Subjects Sq	No. of Leaving Certificate honours subjects squared	31.97 (16.33)
SE Group	Indicator for the household socio-economic group	
	=1 if managers/employers, higher or lower professionals	557 (50.96%)
	=2 if non-manual or manual skilled	362 (33.12%)
	=3 if semi-skilled, unskilled or farmers	77 (7.04%)
	= . if missing	97 (8.88%)
Mother 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 on next page*

**Table 5.11** (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 = 1 if DEIS status	915 (83.64%) 179 (16.36%)
Single Sex School	Indicator for whether respondent attends a single sex school	
	= 0 if mixed school = 1 if single sex school	697 (63.71%) 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)

In the final models that are presented, a range of variables are included in **X** and these are also listed in Table 5.11. For example, an indicator variable is included 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 and for the household's socio-economic status, as well as an indicator for whether the student believes (s)he is eligible for a student grant. A number of school- and spatial-level variables are also included. For example, an indicator variable is included 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 5.11. All models are estimated using clustered standard errors at school level.

As an extension to this analysis the factors associated with a student's intention to live at home when attending higher education are also considered. In this instance a multinomial logit model is employed reflecting three categories of responses to this question, namely: doesn't plan to live at home; plans to live at home; doesn't know<sup>14</sup>. The same independent variables as before are included in the model, while variables relating to whether a student reported being influenced by a friend or a parent are also included. It is important to note that while a wide range of explanatory variables have been included as controls in this analysis, the estimates are purely descriptive and cannot be interpreted as causal.

### 5.3.2 Results

The estimated marginal effects from the binary logit models are presented in Table 5.12. Starting with *Friends Influence*, the model implies that boys are 11.3 percentage points (ppts) more likely to be influenced by their friends in making their decision about which HEI to attend, while students in a DEIS school are 7.7 ppts less likely to be influenced by their peers, all else equal. 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. Additionally, those in the 'semi-skilled, unskilled or farmers' group are 16.6 ppts less likely to apply to the same HEI as their siblings compared to those in the 'managers/employers, higher or lower professionals' group. Finally, *Parent Influence* is found to be 7.2 ppts higher for students whose mother has completed higher education, 5.6 ppts lower for those eligible for a student grant, and 10.0 ppts higher for students in DEIS schools, all else equal.

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<sup>14</sup> A binary logit model was also estimated excluding those students who stated they don't know. Results were broadly consistent with the multinomial choice model.

**Table 5.12:** Binary logit models of friends, sibling and parent influence on choice of HEI

	Friends influence	Sibling influence	Parent influence
Male	0.113 (3.38)***	0.011 (0.19)	-0.038 (1.30)
Honours Subjects	0.045 (1.06)	-0.230 (2.36)**	0.034 (0.70)
Honours Subjects Sq	-0.005 (1.12)	0.021 (2.54)**	-0.004 (0.96)
SE Group = Managers/Employers, Higher or Lower professionals	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
SE Group = Non-manual or Manual skilled	0.021 (0.82)	-0.072 (1.41)	-0.034 (0.93)
SE Group = Semi-skilled, Unskilled or Farmers	0.100 (1.43)	-0.166 (2.01)**	0.012 (0.18)
Mother Higher Education	-0.009 (0.40)	-0.046 (0.89)	0.072 (2.03)**
Grant Eligibility = No	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Grant Eligibility = Yes	-0.023 (0.77)	-0.025 (0.34)	-0.056 (1.84)*
Grant Eligibility = Don't Know	-0.047 (1.44)	0.023 (0.38)	-0.054 (1.62)
DEIS School	-0.077 (1.77)*	-0.078 (1.01)	0.100 (2.51)**
Single Sex School	0.021 (0.90)	0.055 (0.98)	-0.017 (0.47)
Distance Chosen HEI	-0.000 (0.53)	-0.001 (3.88)***	0.000 (0.79)
Distance Nearest HEI	0.001 (1.28)	0.005 (3.87)***	-0.002 (1.62)
Region	Y	Y	Y
Wald $\chi^2$ statistic	189.24	153.10	22.91
Number of Observations	804	404	879

*Notes:* 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.

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 lower socio-economic groups are less likely to be influenced by their siblings. However, socio-economic status is not associated with whether respondents are influenced by their friends or parents. 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 Chapters 2 and 3.

Turning to the multinomial logit model of planning to live at home, estimated marginal effects are presented in Table 5.13. They suggest that students who are eligible for a grant are 7.5 ppts more likely to be unsure about this decision, while those who stated they would be influenced by their friends are 6.0 ppts less likely to live at home. Students influenced by their parents are 10.6 ppts less likely to live away from home and 7.7 ppts more likely to be unsure. Students in the 'semi-skilled, unskilled or farmers' group are 6.8 ppts more likely to live at home, while school DEIS status is also a significant predictor. Students from a DEIS school are 7.2 ppts less likely to live at home and 10.3 ppts more likely to be unsure. Students from single sex schools are 10.4 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 and socio-economic group are also important, all else equal. Interesting differences also emerge 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 Chapters 2 and 3.

**Table 5.13:** Multinomial logit model of planning to live at home while at higher education

	Live away from home	Live at home	Don't know
Male	0.022 (0.68)	0.018 (0.56)	-0.040 (1.16)
Honours Subjects	0.052 (1.17)	-0.014 (0.43)	-0.039 (1.11)
Honours Subjects Sq	-0.005 (0.93)	0.001 (0.35)	0.003 (0.89)
SE Group 1 = Managers/Employers, Higher or Lower professionals	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
SE Group2 = Non-manual or Manual skilled	-0.034 (1.10)	-0.002 (0.13)	0.036 (1.17)
SE Group3 = Semi-skilled, Unskilled or Farmers	-0.012 (0.20)	0.068 (2.08)**	-0.056 (0.82)
Mother Higher Education	-0.006 (0.30)	-0.009 (0.25)	0.015 (0.41)
Grant Eligibility = No	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Grant Eligibility = Yes	-0.054 (1.39)	-0.021 (0.76)	0.075 (2.18)**
Grant Eligibility = Don't Know	-0.050 (1.27)	-0.011 (0.27)	0.061 (1.75)*
Friends Influence	0.001 (0.01)	-0.060 (1.81)*	0.060 (2.01)**
Parents Influence	-0.106 (3.36)***	0.029 (1.23)	0.077 (2.27)**
DEIS School	-0.031 (0.68)	-0.072 (2.15)**	0.103 (2.34)**
Single Sex School	0.060 (1.34)	-0.104 (2.61)***	0.044 (1.21)
Distance Chosen HEI	0.002 (11.29)***	-0.002 (10.98)***	0.000 (1.25)
Distance Nearest HEI	0.007 (5.98)***	-0.007 (5.83)***	-0.001 (0.91)
Region	Y	Y	N
Pseudo R <sup>2</sup>	0.369		
Observations	795		

*Notes:* 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.

## 5.4 Chapter summary

The purpose of this chapter was to provide descriptive statistics on some of the key variables collected as part of the survey, along with a descriptive analysis of some of the factors influencing institution choice. The results from the descriptive statistics suggested that the majority of respondents plan to apply to a HEI and that they place significant importance on participation in higher education for their future career. Friends, parents and siblings were found to influence the choice of HEI for a significant proportion of respondents. Interestingly, a substantial proportion of respondents were influenced by rent and travel costs associated with longer travel times. Responses to follow-up questions were also examined in this chapter in order to tease out the reasons behind respondents' choices, as well as the cognitive burden involved. In general, respondents found the choice task easy to complete and the extent of protest responses was found to be limited. While some respondents indicated that they ignored particular attributes in their choice of alternative, the majority of respondents stated that they considered all attributes in their choice.

The chapter also presented an 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 the factors associated with whether or not an individual plans to live at home while attending higher education. Using supplementary data from the DCE survey, males were found to be 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, 2016c), if dependence on peers results in male students choosing a course or HEI that does not necessarily match their own independent preferences.

Mother's education was also found to be strongly and positively correlated with parental influence, while grant eligibility was correlated with lower levels of parental guidance. Students in DEIS schools were 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,

friend and parent influence were found to play a role, while grant eligibility too was important. Interestingly, students from DEIS schools and single-sex schools were less likely to plan to stay at home while in higher education. As expected, proximity to HEIs likely plays an important role in this decision.

# Chapter 6

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## Student preferences for the attributes of higher education institutions in Ireland: Results from a discrete choice experiment <sup>15</sup>

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### 6.1 Introduction

This chapter provides a detailed examination of student preferences for the attributes of HEIs in Ireland using the DCE discussed in Chapters 4 and 5. In addition to a standard conditional logit (CL) model, a latent class (LC) model is also employed in order to explore preference heterogeneity. WTP, a monetary measure of value, is estimated for the different attribute levels. Given the debate surrounding the nature of higher education financing in Ireland, exploring the scale and variation of WTP for various HEI attributes, and how these preferences may vary across groups, is important. Related to this, compensating surplus for bundles of HEI attributes are also estimated. The chapter is organised as follows: Section 6.2 discusses the background and motivation for the analysis. A review of the international empirical literature on the factors influencing institution choice is provided in Section 6.3. Following this, Section 6.4 provides an overview of the theoretical context and describes the methods used in the analysis of student preferences for HEIs. Section 6.5 then presents the results of the analysis while the final section concludes.

### 6.2 Background

HEIs operate in an increasingly competitive environment and, as a result, it is becoming ever more important for HEI managers to make informed choices about the allocation of scarce resources in an effort to attract students (British Council, 2012). 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

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<sup>15</sup> This chapter is based upon Walsh S, Flannery D, Cullinan J, 2017. Analysing the preferences of prospective students for higher education institution attributes, *Education Economics*, DOI: 10.1080/09645292.2017.1335693.

expectations of prospective students. Moreover, there is continued debate surrounding the optimal financing structure for higher education, specifically with regard to the relative burdens faced by the state and/or students themselves. Exploring the scale and variation of prospective students' WTP for various attributes, and how these preferences may vary by socio-economic background, is therefore important.

These issues are prominent within higher education policy in the Irish context. For example, the considerable funding challenge facing the higher education sector in Ireland at present has impacted the ability of HEIs to provide high-quality undergraduate programmes (Expert Group, 2016; Flannery et al., 2017). The current financing structure entails that funding to HEIs in Ireland is predominantly dependent upon the intake of undergraduate students. With a shrinking public contribution, the necessity to attract increasing numbers of students has become more pronounced. Therefore, an understanding of the value students place on certain HEI attributes may allow HEI managers to target their limited resources towards the attributes of service provision most valued by students. Within this same policy context, OECD (2006), the Strategy Group for Higher Education (2011) and the more recent Expert Group on Future Funding for Higher Education (Expert Group, 2016) have urged the Irish government to consider the implementation of alternative funding structures for undergraduate higher education. This has generated a considerable amount of public debate and to inform public policy in this area it would be helpful to have an understanding of the value young people in Ireland attach to different attributes of HEIs and their preferences (or relative disutility) for tuition fees. Such an analysis could also help explore socio-economic variations in student attitudes to the private cost of higher education, which may in turn help inform equity of access issues.

To date, research in Ireland has focused on examining the socio-economic and spatial factors associated with progression to higher education (Flannery and O'Donoghue, 2009; McCoy and Byrne, 2011; Cullinan et al., 2013; Flannery and Cullinan, 2014). However, no research has been conducted on the attributes of HEIs that are valued by students, and so this chapter addresses an important gap in the Irish literature. Analysis of such factors, where it has occurred internationally, has mainly employed basic ranking or rating surveys, while some studies have adopted a conjoint analysis methodology. However, Louviere et al. (2010: 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”. In contrast, they argue that DCEs are grounded in a long-standing, well-tested theory of choice behaviour. DCEs provide a rich array of information which can enable those responsible for setting policy in the area to prioritise the attributes that are most highly valued. While the use of DCEs is well established in areas such as environmental economics (e.g. Adamowicz et al., 1994; Carson et al., 2003) and health economics (e.g. Hanley et al., 2003; Ryan et al., 2008; Flynn et al., 2010), the application of DCEs in the areas of education economics and education policy is relatively new (Flannery et al., 2013; Jin et al., 2014; Humburg and van der Velden, 2015; Huybers et al., 2015; Meginnis and Campbell, 2017)<sup>16</sup>.

Given this, this chapter adds to the literature in the area by using a DCE methodology to examine student preferences for HEIs based on a unique dataset of students in the final year of upper secondary education in Ireland. It makes a number of distinct contributions to the international literature. It is the first study to examine heterogeneity in preferences across both the attributes of HEIs and across socio-economic groups. It also estimates the compensating surplus for bundles of HEI attributes, which has not been examined previously. This allows for the welfare gain or loss from alternative HEIs to be isolated.

### **6.3 Literature review**

While previous studies examining the factors influencing institution choice were discussed in Chapter 4, this literature review focuses on the empirical methods that have been applied to examine student preferences for the attributes of HEIs. The development of several theoretical student behaviour models has provided the foundation for much of the empirical research examining the factors that are influential in determining institution choice. In relation to empirical approaches, a number of studies in the education and marketing literature have employed simple survey-based ranking and rating exercises to examine the factors influencing institution choice. These studies have highlighted that, in general, attributes such as academic reputation, course content/reputation, location/distance from home, cost, job prospects, teaching quality and facilities are highly influential in determining students’ institution choice (Callender and Jackson, 2008; Obermeit, 2012). In addition to these institutional attributes, such studies have also

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<sup>16</sup> Details of previous DCE studies relevant to this chapter are set out in Section 6.3.

identified peers, parents and teachers as having a strong influence on HEI choice (Maringe, 2006; Simões and Soares, 2010). While these studies provide a useful insight into the factors influencing institution choice, they do not examine the relative importance of HEI characteristics in determining student preferences for HEIs.

To account for this, a number of marketing and education studies have employed conjoint analysis, a form of stated preference methodology, to examine student preferences for HEIs<sup>17</sup>. For example, Dunnett et al. (2012) employed the technique to examine the impact of fee changes on students' university choice. They found that course reputation and university reputation were the most important factors influencing institution choice. Fees were found to be relatively less important; however there was considerable variability in the importance that respondents placed on fees. Interestingly, the authors show that individuals from lower socio-economic backgrounds prefer a local university which they attribute to cost awareness (Dunnett et al., 2012).

These findings are consistent with those in Walsh et al. (2015a) who also employed a conjoint analysis. They found that course and university reputation are the key factors determining choice, followed by university orientation and distance from home. Using the same methodology, Soutar and Turner (2002) examined student preferences for university in Western Australia and found that the most important determinants of preferences for university were course suitability, academic reputation, job prospects and teaching quality. An earlier study by Hooley and Lynch (1981) in the United Kingdom identified a number of key factors influencing university choice, namely: course suitability, university location, academic reputation, distance from home and type of university. Finally, Hagel and Shaw (2010) explored the importance of study mode in students' choice of university, again using a conjoint analysis methodology. They found that reputation was the most influential factor in university choice followed by accessibility, study mode flexibility, cost of attendance and campus activity.

Thus, most previous studies examining the relative importance of HEI attributes in determining institution choice have employed a conjoint analysis methodology. However, as discussed in Section 6.2, conjoint analysis is subject to a number of methodological limitations. Given this, Holdsworth and Nind (2006) conducted a

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<sup>17</sup> An alternative to these stated preference methodologies is to employ a revealed preference approach such as that in Drewes and Michael (2006) and Long (2004).

'labelled DCE'<sup>18</sup> in order to examine the preferences of high school seniors for university education in New Zealand. Student preferences were found to be strongly influenced by the quality and flexibility of the degree and/or course options, as well as the likelihood that employers will recruit from the university. The subsidisation of accommodation and the overall cost of attending the university were also found to be important. More recently, Burge et al. (2014) employed a DCE to examine the relative importance of tuition fees on the choice between universities in England. They established that several factors influence university choice apart from tuition fees, including employment prospects, living expenses, location and quality of the course offered.

While these previous DCE studies provide a useful insight into student preferences for HEIs, they have a number of methodological weaknesses. For example, Holdsworth and Nind (2006) employ an orthogonal fractional factorial experimental design which aims to minimise correlation in the data. As discussed in Chapter 4, while the property of orthogonality may be an important criteria to determine independent effects in linear models, discrete choice models are not linear (Rose and Bliemer, 2009). Thus, this approach is only efficient when prior knowledge about the parameters is not available. They also apply a labelled choice experiment whereby alternative names have a substantive meaning to the respondents. While this can help to improve task realism, respondents may use labels to infer omitted information and these inferences are usually correlated with the random error component, which may have a significant impact on model estimates (Louviere et al., 2000). The fact that the experiment is labelled also means that the results are not generalizable. Finally, the authors only report CL results which do not take account of heterogeneity in preferences and they do not estimate mean WTP.

Furthermore, Burge et al. (2014) do not use qualitative research to define attributes and levels. Rather, attributes and levels are based on standardised information on courses offered at HEIs in the UK. They also bundle groups of attributes together, making it impossible to isolate preferences. Finally, similar to Holdsworth and Nind (2006), the authors use an orthogonal experimental design as opposed to an efficient experimental design, which has been shown to produce lower standard errors in estimates (Bliemer

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<sup>18</sup> A labelled DCE involves assigning labels that communicate information about the alternative. In this case, each alternative was given the name of a university in New Zealand.

and Rose, 2011). Thus, this chapter aims to build on these previous studies by applying an efficient experimental design in order to examine student preferences for HEIs, while also accounting for heterogeneity in student preferences through the use of a latent class model. WTP for each attribute level is also estimated.

## **6.4 Methodology**

### **6.4.1 Theoretical framework**

Standard economic theory assumes that individuals are rational decision-makers. In other words, when faced with a set of possible consumption bundles, individuals are able to assign preferences to each of the bundles and choose their most preferred bundle given their budget constraint. To satisfy this condition, a number of axioms must hold. Completeness ensures that individuals always have the power to make a choice. It assumes that individuals can compare and rank all possible bundles such that  $A$  is preferred to  $B$ ,  $B$  is preferred to  $A$  or individuals are indifferent between the two (individual will be equally satisfied with either). Transitivity implies that individuals have logically consistent tastes. It means that if an individual prefers  $A$  to  $B$  and  $B$  to  $C$ , then they must prefer  $A$  to  $C$ . Finally, continuity implies that if  $A$  is preferred to  $B$ , then bundles suitably 'close to'  $A$  must also be preferred to  $B$  (Mas-Colell et al., 1995; Pindyck and Rubinfeld, 2013). If these conditions are satisfied, a utility function can be derived to reflect an individual's preference ranking. Standard consumer theory is based on the assumption that utility is a function of the quantities of a good and not the attributes of the good.

On the other hand, DCEs are based on the proposed extension to standard consumer theory in Lancaster (1966), which stated that utility is not derived from the consumption of the good *per se* but from the characteristics the good possesses. As detailed in Chapter 4, the good of interest in the current study is a HEI and the attributes include course reputation, type of HEI, the availability of work placement opportunities, travel time from home and fee. The utility derived from each HEI is determined by the preferences for the levels of the attributes provided by each HEI alternative. The inclusion of a price

proxy (fee attribute) allows for the monetary value of each attribute to be estimated, which is its marginal WTP or implicit price.<sup>19</sup>

Analysis of DCEs is grounded in random utility theory which assumes that while an individual may be able to discriminate between the alternatives, the analyst has incomplete information which must be accounted for (Thurstone, 1927; Luce, 1959; McFadden, 1974; Manski, 1977). Thus, the random utility model is based on the principal that utility  $U_{ni}$  for individual  $n$  of alternative  $i$  consists of an observable component  $V_{ni}$  and a random component  $\varepsilon_{ni}$ , which leads to the following representation of utility:

$$U_{ni} = V_{ni} + \varepsilon_{ni} \quad (1)$$

where  $V_{ni} = \beta'_{ni}$  with  $\beta'$  representing a vector of parameters used to describe preferences for attributes  $x$ .

Due to the presence of the random component in the utility function, it is only possible to make probabilistic statements about the choice outcomes. An individual is assumed to choose Option 1 if, and only if, the utility from Option 1 is higher than the utility of any other option in a set of  $J$  alternatives. Thus, the probability,  $P$ , that utility is maximised by choosing Option 1 is given by Equation 2:

$$\begin{aligned} P(Y_i = 1) &= P(U_{i1} > U_{ij}) \\ &= P(V_{i1} + \varepsilon_{i1} > V_{ij} + \varepsilon_{ij}) \\ &= P(V_{i1} - V_{ij} > \varepsilon_{ij} - \varepsilon_{i1}) \quad \forall j \neq 1 \end{aligned} \quad (2)$$

where  $Y_i$  is a random variable representing the choice outcome (Lancsar and Louviere, 2008). This implies that the probability of choosing Option 1 over any other option in a set of  $J$  alternatives increases as the difference in the estimated utility between the two alternatives increases. Therefore, the probabilities can be interpreted as the strength of preferences for the different alternatives.

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<sup>19</sup> It is important to note that the WTP estimates are stand-alone estimates and as such they cannot be summed.

## 6.4.2 Data analysis

Different discrete choice models are obtained depending on what assumptions are made about the distribution of the unobserved portion of utility (Train, 2003). The starting point for most analysis of DCE data is the CL model which assumes that the error terms are independently and identically distributed and follow a Gumbel distribution. Under the CL model, the probability of individual  $n$  choosing alternative  $i$  from the set of  $j$  alternatives can be written as:

$$\text{Prob}_{ni} = \frac{\exp(\beta' x_{ni})}{\sum_j \exp(\beta' x_{nj})} \quad (3)$$

The model was specified such that the probability of selecting a particular HEI alternative was a function of the attributes of that alternative and of the alternative specific constant (ASC) which equals 1 when the opt-out alternative was chosen and 0 if one of the HEI alternatives was chosen. While the CL model has proved the most common method of analysis for DCE data, it is associated with a number of restrictive assumptions.

Firstly, the assumption of independence of irrelevant alternatives (IIA) implies that the ratio of the probabilities of choosing any two alternatives is independent of the attributes or the availability of other alternatives (Hausman and Mc Fadden, 1984). The classic illustration of the IIA assumption is the red bus-blue bus example (Train, 2003). Assume that individuals have the choice of a red bus or a car to get to work. Assume also that both alternatives have the same representative utility ( $\text{Pr}(\text{car}) = \text{Pr}(\text{red bus}) = 1/2$ ) and the ratio of probabilities is 1 ( $\text{Pr}(\text{car}) / \text{Pr}(\text{red bus}) = 1$ ). IIA requires that if a new alternative is introduced, the original odds must be maintained by adjusting the probabilities for the previous choices (Cheng and Long, 2007).

Suppose, for example, a blue bus is introduced with same representative utility as the red bus. Consequently, the ratio of probabilities between the bus alternatives is 1 ( $\text{Pr}(\text{red bus}) / \text{Pr}(\text{blue bus}) = 1$ ). IIA implies that the ratio of probabilities will remain 1 between the car and the red bus, despite the introduction of the blue bus. Thus, the only probabilities that satisfy  $\text{Pr}(\text{car}) / \text{Pr}(\text{red bus}) = 1$  and  $\text{Pr}(\text{red bus}) / \text{Pr}(\text{blue bus}) = 1$  are  $\text{Pr}(\text{car}) = \text{Pr}(\text{red bus}) = \text{Pr}(\text{blue bus}) = 1/3$ . More reasonably, we might expect that half of those riding the red bus would be expected to ride the blue bus and half of the population would still choose to travel by car. That is,  $\text{Pr}(\text{car}) = 1/2$  and  $\text{Pr}(\text{red bus}) = \text{Pr}(\text{blue bus}) = 1/4$ . Due to the IIA assumption, the conditional logit model would

overestimate the probability of choosing a bus alternative and would underestimate the probability of choosing the car alternative. The ratio of probabilities between the car and red bus,  $\Pr(\text{car}) / \Pr(\text{red bus})$ , would, therefore, be affected by the introduction of the blue bus alternative, rather than remain constant as required by the conditional logit model (Long and Freese, 2001; Train, 2003).

This example implies that, if IIA holds, the parameter estimates obtained on the subset of alternatives will not be significantly different from those obtained on the full set of alternatives. While the IIA assumption may be realistic in some choice situations, it is inappropriate in others, for example, in the case of close substitutes (Train, 2003). The CL model also fails to incorporate preference heterogeneity in the utility parameters. While it is possible to interact socio-demographic information with the parameters, if two individuals have the same demographic information (e.g. education), the CL model assumes they have the same tastes. Finally, the CL model fails to account for the panel nature of the DCE data which means that it cannot capture correlation between unobserved factors for any one respondent over the series of choice situations (Train, 2003).

The restrictive nature of these assumptions has led to the development of a number of extensions (Hensher et al., 2015). In particular, the mixed logit (MXL) model and the LC model allow DCE response data to be modelled with more flexible covariance matrix structures. For the purpose of this chapter, the LC model is employed. Under the LC model, a vector  $\beta'_c$  takes on a finite set of distinct values. Taste heterogeneity is statistically accounted for by probabilistically assigning individuals into latent classes and estimating the choice model. Which latent class contains any particular individual is unknown to the analyst (Greene and Hensher, 2003). However, the assumption is that respondents probabilistically assigned to one class have the same preferences but differ in their preferences from respondents assigned to another class (Swait and Adamowicz, 2001). The LC model employed in this chapter is estimated using a panel specification which provides a more realistic representation of the data by accounting for observations drawn from the same respondent. A sequence of choices  $y_n$ , which is observed for a particular respondent, is defined as  $y_n = \langle y_{nt-1}, \dots, y_{nt-T} \rangle$  for  $T$  choice situations. In the case of the LC model,  $\beta$  is assumed to take  $c$  possible values labelled  $\beta_1, \dots, \beta_c$  with probability  $Prob_c$  so the latent class probability becomes:

$$\text{Prob}_{yn} = \sum_{c=1}^c \text{Prob}_c \prod_{t=1}^T \left( \frac{\exp(\beta'_c x_{nit})}{\sum_j \exp(\beta'_c x_{njt})} \right) \quad (4)$$

For the panel model, the probability is estimated as the product of logit formulae, one for each choice situation. The expected probability of alternative  $i$  being chosen is the expected value (over classes) of the class specific probabilities. The share of the population probabilistically assigned to class  $c$  is  $\text{Prob}_c$ , which can be estimated along with the  $\beta'_c$  for each class. In the LC model, a respondent is probabilistically assigned to class  $c$  based on their preferences for the good under consideration.

## 6.5 Empirical results

### 6.5.1 Conditional logit model

The results of the CL model of student preferences for HEI attributes are set out in Table 6.1. The ASC for the opt-out alternative is negative and statistically significant which suggests that, *ceteris paribus*, respondents prefer to choose one of the HEI alternatives rather than opt-out of the choice. The model is well specified with regard to the statistical significance of the coefficients, indicating that all attributes contributed to respondent preferences. In addition to this, the signs on the attributes, which indicate whether a change in the attribute level has a positive or negative effect on utility, conform to prior expectations. As expected, the coefficient on fee is negative and significant, suggesting that *ceteris paribus*, respondents prefer lower fees (that is, fees contribute negatively to student utility). This serves to demonstrate the theoretical validity of the DCE. The coefficient on university is positive and relatively large, which indicates that respondents in general prefer universities to IoTs.

As expected, the travel time coefficients are negative and increasing (in absolute terms) as travel time increases. This suggests that, on average, respondents prefer a shorter travel time from home (1 hour) relative to longer travel times (2 or 3 hours). The results also indicate that respondents have a strong preference for a HEI that offers a work placement relative to one that does not, given the large positive coefficient on the work placement attribute. Finally, the marginal change in an attribute that was most important to respondents (i.e. had the largest coefficient) was the reputation of the courses on offer at the HEI. In particular, students are found to have a very strong preference for both good and excellent course reputation relative to a fair course reputation.

**Table 6.1:** Conditional logit model estimates of preferences for HEI attributes

Variable	Coefficient	WTP (€)
Student fee	-0.300 (0.1200D-04)***	
Type of HEI - University	0.572 (0.029)***	1,918.84 (138.01)***
Travel time from home - 2 hours	-0.514 (0.040)***	-1,724.31 (136.62)***
Travel time from home - 3 hours	-0.990 (0.048)***	-3,323.77 (80.23)***
Good course reputation	1.094 (0.044)***	3,672.32 (241.04)***
Excellent course reputation	1.520 (0.044)***	5,100.18 (276.87)***
Work placement is available	0.965 (0.027)***	3,237.41 (174.03)***
ASC	-0.492 (0.101)***	
Log-likelihood	-14251.12	
AIC	28518.24	
BIC	28578.04	
No. of individuals	1,093	
No. of observations	13,116	

Notes: Standard errors in parenthesis. \* denotes significant at 10% level, \*\* denotes significant at 5% level and \*\*\* denotes significant at 1% level.

To estimate the trade-offs that respondents are willing to make between attributes, WTP for marginal changes in the attributes were estimated for all non-cost attributes. The is calculated as the ratio of the coefficient on the attribute of interest ( $\beta_x$ ) to the negative of the cost coefficient ( $\beta_{cost}$ ), such that:

$$WTP = \frac{\beta_x}{-\beta_{cost}} \quad (5)$$

These WTP estimates reflect the value that individuals place on the attributes, as well as the relative value of the attributes. It is worth highlighting that the magnitude of these WTP estimates is directly related to the fee levels specified in the DCE. Also, these are stand-alone WTP estimates and thus cannot be summed. As shown in Table 6.1, the course reputation attribute is the most valued attribute by individuals in the sample. On average, individuals are willing to pay €5,100 for a HEI with an excellent course reputation, compared to one with a fair course reputation, while they are willing to pay €3,672 for a HEI with a good course reputation relative to a fair reputation. The next most valuable attribute is the availability of work placement opportunities as part of the

degree programmes at the HEI. Students are willing to pay €3,237 for a HEI that offers work placement as part of their degree programmes compared to one that does not offer work placement. With regard to the type of HEI, individuals are willing to pay €1,919 for a university relative to an IoT. Finally, the results suggest that individuals have a negative WTP of -€1,724 for a travel time of 2 hours relative to 1 hour, while they have a negative WTP of -€3,324 for a travel time of 3 hours relative to 1 hour. In other words, these latter findings imply that individuals would need to be compensated by these monetary amounts to travel 2 or 3 hours relative to 1 hour.

As discussed previously, the CL model assumes the IIA property which states that the relative probabilities of two options being chosen are unaffected by the inclusion or removal of other alternatives. If the IIA assumption is violated, the CL results will be biased. To test whether the CL model is appropriate, the Hausman and Mc Fadden (1984) test of IIA was used. The IIA assumption can be rejected at the 95% level which provides justification for applying an additional alternative modelling approach.

### **6.5.2 Latent class model**

In order to overcome the limitations of the CL model and account for preference heterogeneity, a LC model was employed. In this model, preferences are assumed to be 'lumpy', such that broad classes of people exist with similar preferences to each other, but different preferences to everyone else (Hynes et al., 2008). In this study, models with a number of different latent classes were examined to determine what specification provided the best representation of the data. The Akaike information criterion (AIC) and Bayesian information criterion (BIC) were used as guidance for the number of classes to choose. However, this decision also requires the discretion of the researcher. According to Scarpa and Thiene (2005: 435), "the chosen number of classes must also account for significance of parameter estimates and be tempered by the analyst's own judgment on the meaningfulness of the parameter signs". In the present application, the LC model estimates for three classes is reported as a higher number of classes resulted in insignificant and less meaningful attribute coefficients. Thus, the preferred specification was three latent classes, despite models with a higher number of classes having somewhat lower (and preferable) information criteria. It is also possible to examine the socio-demographic factors that determine what types of respondents are probabilistically assigned to each class. After extensive testing of a range of socio-demographic variables,

two variables were found to affect class membership - the socio-economic group of the student's household and the NUTS III region of the student's school.

The household socio-economic group was defined based on the highest parental socio-economic group. For the purpose of this analysis, three socio-economic groups were used, namely:

1. Managers/Employers, Higher professionals or Lower professionals (reference group)
2. Non-manual or Manual skilled
3. Semi-skilled, Unskilled or Farmers

In addition to this, a variable capturing the NUTS III region of the student's school was found to affect class membership<sup>20</sup>. This acts as a reasonable proxy for the NUTS III region in which the student lives. The base region is set as Dublin, with all other regions estimated relative to this. Because of non-response on the socio-economic group variable, 97 individuals were dropped from the sample, resulting in an estimation sample of 996 individuals (11,952 observations). Non-response was not found to be systematic and so the reduced sample remained broadly representative of the population of schools in Ireland. To test the robustness of the estimates, models were estimated using both the full sample and the reduced sample. No significant differences were observed in the estimates and therefore estimates based on the reduced sample are presented here.

The estimation results for the three-class latent class model are reported in Table 6.2. The class probabilities suggest that 40.5% of the sample are probabilistically assigned to Class I, 35.9% are assigned to Class II and 23.6% are assigned to Class III. In most cases, coefficient signs conform to *a priori* expectations and are statistically significant. Thus, classes are mainly characterised by variations in the intensity of preferences. While it may not be completely meaningful to compare coefficients across classes, students in all classes are found to have a very strong preference for superior course reputation (good and excellent relative to fair) and work placement opportunities. With regard to differences across the three classes, students in Class I have a very strong preference for university over IoT. Interestingly, students in Class I also have a very low disutility from fees, which implies that they are relatively insensitive to paying higher student fees. This

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<sup>20</sup> The 8 NUTS III regions in Ireland are: Border, Midlands, West, Mid-East, Mid-West, South-East, South-West and Dublin.

group also has a relatively strong preference for better course reputation compared to any of the other attributes. Looking at the probabilities of class membership, students in the ‘non-manual/manual skilled’ group as well as students in the ‘semi-skilled/unskilled/farmer’ group are shown to be significantly less likely to be assigned to Class I relative to students in the ‘managers or employers/higher professional/lower professional’ group. In other words, students in the lower socio-economic groups are significantly less likely to be assigned to this class relative to students in the highest socio-economic group. In addition to this, students who attend school in the Midlands, Mid-West, South-East and South-West regions are significantly less likely to be assigned to Class I relative to students who attend school in Dublin.

A notable feature of Class II is that the university coefficient is negative, which suggests that students in this class have a preference for an IoT over a university. This is an interesting finding and one which was not evident in the CL model presented in Table 6.1. Students in this class also have a moderate disutility from fees and are relatively insensitive to longer travel times. With regard to the probabilities of class membership, students who attend school in the Border and West regions are significantly more likely to be assigned to Class II than students who attend school in Dublin. The analysis presented in Chapters 2 and 3 (Walsh et al., 2015b; Walsh et al., 2016) showed that geographic accessibility to universities is limited in the Border region, while accessibility is also limited in parts of the West region. This may help explain the preference for IoTs over universities for this group. However, the insensitivity to travel within this group may mean there are cohorts in this region that are willing to travel to attend a university.

**Table 6.2:** 3-class latent class model estimates of preferences for HEIs

Variable	Class I	Class II	Class III
Student fee (000's)	-0.130 (.2395D-04)***	-0.390 (.2279D-04)***	-0.520 (.2674D-04)***
Type of HEI – University	1.43 (0.07)***	-0.10 (0.05)*	0.92 (0.07)***
Travel time from home – 2 hours	-0.76 (0.08)***	-0.21 (0.08)**	-0.23 (0.13)*
Travel time from home – 3 hours	-1.02 (0.10)***	-0.64 (0.09)***	-1.39 (0.11)***
Good course reputation	1.38 (0.10)***	1.03 (0.08)***	1.45 (0.12)***
Excellent course reputation	1.92 (0.10)***	1.51 (0.07)***	1.81 (0.11)***
Work placement is available	1.05 (0.06)***	1.12 (0.04)***	1.62 (0.07)***
ASC	-0.29 (0.23)	-2.69 (0.22)***	1.04 (0.25)***
<b>Class Membership</b>			
Constant	1.31 (0.25)***	-0.23 (0.31)	-
<i>Household socio-economic group</i>			
Managers/Employers, Higher or lower professional	<i>Ref</i>	<i>Ref</i>	-
Non-manual or Manual skilled	-0.59 (0.22)***	0.32 (0.21)	-
Semi-skilled, Unskilled or Farmer	-0.76 (0.35)**	-0.54 (0.36)	-
<i>NUTS III region</i>			
Dublin	<i>Ref</i>	<i>Ref</i>	-
Border	-0.48 (0.33)	1.23 (0.36)***	-
Midlands	-1.20 (0.43)***	0.60 (0.44)	-
West	-0.32 (0.33)	0.69 (0.38)*	-
Mid-East	0.38 (0.48)	-35.73 (.5091D+14)	-
Mid-West	-0.69 (0.39)*	0.48 (0.43)	-
South-East	-1.94 (0.55)***	-0.41 (0.51)	-
South-West	-1.16 (0.35)***	0.38 (0.37)	-
Average class probabilities	0.405	0.359	0.236
No. of observations	11,952		
Log-likelihood	-11138.84		
AIC	22365.68		
BIC	22690.57		

Notes: Standard errors in parenthesis. \* denotes significant at 10% level, \*\* denotes significant at 5% level and \*\*\* denotes significant at 1% level.

Students in Class III are particularly sensitive to the cost elements of higher education; in particular, these individuals have a high disutility from fees and the coefficient on travel time of 3 hours is large and negative which means that students in this class have a strong negative preference for long travel times relative to a shorter travel time (1 hour). Looking at the probabilities of class membership, students in the ‘non-manual/manual skilled’ group, as well as students in the ‘semi-skilled/unskilled/farmer’ group, are significantly more likely to be assigned to Class III relative to students in the ‘managers or employers/higher professional/lower professional’ group. In other words, students in the lower socio-economic groups are significantly more likely to be assigned to this class relative to students in the highest socio-economic group. This suggests that those from the lower socio-economic groups are particularly sensitive to higher costs relative to those from higher socio-economic groups. This is interesting in the context of research by McCoy and Byrne (2011) who find that lack of information and understanding about the financial aspects of college may act as barriers for those from lower socio-economic backgrounds.

Another notable feature of Class III is the positive ASC which indicates that individuals assigned to this class are more likely to choose the opt-out alternative. While it is not possible to ascertain with certainty the reason for this, 57.11% of respondents who chose the opt-out indicated that they did so as they either did not like any of the alternatives or did not know which alternative was best. Thus, the positive ASC in Class III may suggest that students in this class are relatively uncertain regarding their preferences. This in turn may have implications with respect to progression in higher education. A recent study by the HEA showed high levels of non-progression among the traditional working classes, namely the manual skilled, non-manual, semi-skilled and un-skilled groups (HEA, 2016c). The findings of this analysis suggest that those in lower socio-economic groups may be less certain regarding their preferences, which in turn may be contributing to non-progression in higher education.

Table 6.3 reports the mean marginal WTP for each of the HEI attributes across the three latent classes. These implicit prices are estimated using the Wald procedure (Delta method) in NLOGIT 5.0. The WTP estimates allow for comparison across classes with respect to the value placed on each attribute level. It is worth highlighting that the magnitude of these WTP estimates is directly related to the fee levels specified in the DCE. Also, these are stand-alone WTP estimates and thus cannot be summed. Overall,

the WTP estimates corroborate that there is significant preference heterogeneity across the three classes. Class I have the highest WTP for all attributes, which is driven in part by the very low coefficient on student fee. For Class I, the value of a university relative to an IoT is €10,733 which differs significantly from the other two classes. Students in Class II have a negative WTP of -€244, which means that these students would have to be compensated by this amount in order to choose an alternative with a university, while students in Class III have a WTP of €1,770 for a university relative to an IoT. With regard to travel time, a negative WTP ranging from -€451 to -€5,723 for a travel time of 2 hours relative to 1 hour and a negative WTP of between -€1,618 and -€7,620 for 3 hours relative to 1 hour is found. Students are willing to pay between €2,615 and €10,352 for a HEI with a good course reputation relative to fair, while they are willing to pay between €3,471 and €4,387 for a HEI with an excellent course reputation relative to fair. Finally, WTP for work placement opportunities ranges from €2,853 to €7,879. The weighted average WTP is also calculated for an attribute by multiplying each of the WTP estimates by the respective class probabilities and summing the three values. Looking at the weighted average WTP, the ranking of attributes is consistent with the CL model. However, there is evidence of significant heterogeneity in the value placed on attributes across the three classes.

While the WTP estimates reported in Table 6.3 provide a useful means of capturing the value students place on the HEI attributes and how this differs across classes, it does not provide estimates of the compensating surplus from the HEI alternatives (Birol et al., 2006a). In order to explore the compensating surplus for bundles of HEI attributes, two separate analyses were conducted. In the first instance, Table 6.4 shows the welfare gain or loss that would be experienced by students as a result of a change in course reputation and work placement availability. To begin, a base scenario is defined as a HEI (university or IoT), 1 hour from home with a good course reputation and no work placement. By holding the type of HEI constant between the base scenario and the estimated scenario, it is possible to isolate the welfare gain or loss from changes in course reputation and work placement across the three time categories (1 hour, 2 hours and 3 hours). For completeness, all combinations of course reputation and work placement are estimated. However, the discussion will focus on Scenarios 3, 6 and 9.

**Table 6.3:** Willingness to pay for attributes of HEIs from 3-class latent class model

Variable	Class I	Class II	Class III	Weighted average WTP
	WTP (€)	WTP (€)	WTP (€)	WTP (€)
Type of HEI - University	10732.60 (2123.21)***	-243.79 (126.21)*	1769.98 (185.06)***	4676.92 (860.46)***
Travel time from home - 2 hours	-5723.09 (1050.72)***	-523.13 (211.04)**	-450.69 (241.22)*	-2612.02 (433.89)***
Travel time from home - 3 hours	-7619.87 (778.98)***	-1617.82 (165.02)***	-2679.48 (120.68)***	-4299.20 (328.42)***
Good course reputation	10352.40 (2256.20)***	2615.36 (286.24)***	2790.17 (309.97)***	5790.13 (908.85)***
Excellent course reputation	14387.30 (2870.40)***	3820.61 (314.79)***	3471.40 (324.26)***	8017.72 (1155.17)***
Work placement is available	7879.05 (1556.71)***	2852.69 (215.12)***	3109.04 (218.75)***	4948.86 (626.20)***
Average class probabilities	0.405	0.359	0.236	

Notes: Standard errors in parenthesis. \* denotes significant at 10% level, \*\* denotes significant at 5% level and \*\*\* denotes significant at 1% level.

**Table 6.4:** Attribute levels and compensating surplus value estimates for the hypothetical HEIs relative to the base case (€/per student)

Type of HEI	Travel time from home	Course reputation	Work placement	Compensating Surplus (€/per student)			Weighted average across LC model	
				Latent Class I	Latent Class II	Latent Class III		
<b>Base Scenario:</b> Uni/IoT, 1 hour from home, Good course reputation, No work placement								
<b>Estimated Scenario</b>								
1	Uni/IoT	1 hour	Fair	Placement	-2473.38 (804.86)***	237.33 (148.08)	318.87 (175.17)*	-841.26 (327.66)**
2	Uni/IoT	1 hour	Good	Placement	7879.05 (1556.71)***	2852.69 (215.12)***	3109.04 (218.75)***	4948.86 (626.20)***
3	Uni/IoT	1 hour	Excellent	Placement	11914.00 (2204.26)***	4057.94 (274.21)***	3790.26 (271.14)***	7176.46 (886.52)***
4	Uni/IoT	2 hours	Fair	Placement	-8196.47 (1613.97)***	-285.80 (234.37)	-131.83 (231.98)	-3453.28 (660.86)***
5	Uni/IoT	2 hours	Good	Placement	2155.96 (1138.21)*	2329.56 (351.95)***	2658.34 (382.06)***	2336.84 (467.55)***
6	Uni/IoT	2 hours	Excellent	Placement	6190.87 (1643.55)***	3534.82 (409.91)***	3339.57 (428.96)***	4564.44 (666.31)***
7	Uni/IoT	3 hours	Fair	Placement	-10093.20 (1444.60)***	-1380.49 (212.63)***	-2360.61 (187.27)***	-5140.46 (596.16)***
8	Uni/IoT	3 hours	Good	Placement	259.18 (961.99)	1234.87 (360.26)***	429.56 (293.99)	649.66 (396.87)
9	Uni/IoT	3 hours	Excellent	Placement	4294.10 (1555.13)***	2440.13 (416.35)***	1110.79 (338.83)***	2877.26 (628.44)***

Notes: Standard errors in parenthesis. \* denotes significant at 10% level, \*\* denotes significant at 5% level and \*\*\* denotes significant at 1% level.

Scenario 3 is a hypothetical HEI that is the same as the base scenario on the travel time attribute - both are 1 hour from home. The difference between Scenario 3 and the base scenario is that in Scenario 3 work placement is available as part of degree programmes at the HEI and the reputation of the courses on offer is excellent. A move from the base scenario to Scenario 3 would result in a welfare gain of €1,914 for students probabilistically assigned to Class I, while it would provide a much lower welfare gain of €4,058 and €3,790 to Class II and III respectively. Scenario 6 is a HEI that is 2 hours from home with an excellent course reputation and work placement. Thus, the only difference between Scenario 3 and 6 is travel time from home. Interestingly, the disutility associated with a longer travel time results in a significant decrease in welfare gains. A move from the base scenario to Scenario 6 would result in a welfare gain of €6,191 for those assigned to Class I, €3,535 for those in Class II and €3,340 for those in Class III. Furthermore, the welfare gains in Scenario 9 show that the impact of distance on welfare gains is even more pronounced. Scenario 9 depicts a HEI, 3 hours from home with an excellent course reputation and work placement. In this instance, a move from the base scenario to Scenario 9 would result in a welfare gain of €4,294 for those assigned to Class I, €2,440 for those assigned to Class II and €1,111 for those in Class III.

In addition to this, the welfare gain or loss is also estimated when the type of HEI differs between the base scenario and the estimated scenario. Table 6.5 presents the weighted average compensating surplus for bundles of attributes across the three time categories. While a range of different combinations are estimated, the discussion will focus on Scenarios 4 and 12. To begin, the base scenario is defined as an IoT that is 1 hour from home with a good course reputation and no work placement. Relative to this, the weighted average compensating surplus for a series of university bundles is estimated. For instance, Scenario 4 depicts a university with a good course reputation and work placement. A move from the base scenario to Scenario 4 would result in a welfare gain of €9,626 if a university is 1 hour from home. However, as travel time from home increases, this welfare gain would fall to €7,014 at 2 hours and €5,327 at 3 hours. Thus, even after accounting for the negative impact of travel time, a university with the same course reputation as an IoT but which offers work placement as part of degree programmes would provide a substantial welfare gain to students.

**Table 6.5:** Weighted average compensating surplus value estimates for hypothetical HEIs relative to the alternative HEI type

Type of HEI	Course reputation	Work placement	Weighted average compensating surplus (€/per student)			
			1 hour from home	2 hours from home	3 hours from home	
<b>Base Scenario:</b> IoT, 1 hour from home, Good course reputation, No work placement						
<b>Estimated Scenario</b>						
1.	University	Fair	No placement	-1113.21 (209.65)***	-3725.23 (453.31)***	-5412.41 (361.69)***
2.	University	Fair	Placement	3835.65 (615.62)***	1223.63 (422.77)***	-463.55 (351.24)
3.	University	Good	No placement	4676.92 (860.46)***	2064.90 (631.69)***	377.72 (587.02)
4.	University	Good	Placement	9625.78 (1478.58)***	7013.76 (1217.81)***	5326.58 (1203.30)***
5.	University	Excellent	No placement	6904.51 (1122.60)***	4292.49 (866.29)***	2605.31 (841.48)***
6.	University	Excellent	Placement	11853.40 (1737.69)***	9241.36 (1465.60)***	7554.18 (1457.71)***
<b>Base Scenario:</b> University, 1 hour from home, Good course reputation, No work placement						
<b>Estimated Scenario</b>						
7.	IoT	Fair	No placement	-10467.00 (1757.52)***	-13079.10 (2075.97)***	-14766.20 (2045.25)***
8.	IoT	Fair	Placement	-5518.18 (1147.40)***	-8130.20 (1474.97)***	-9817.38 (1438.13)***
9.	IoT	Good	No placement	-4676.92 (860.46)***	-7288.94 (1207.59)***	-8976.12 (1162.72)***
10.	IoT	Good	Placement	271.95 (280.77)	-2340.07 (659.50)***	-4027.25 (589.81)***
11.	IoT	Excellent	No placement	-2449.32 (617.34)***	-5061.34 (964.66)***	-6748.52 (914.48)***
12.	IoT	Excellent	Placement	2499.54 (181.81)***	-112.48 (469.83)	-1799.66 (381.77)***

Notes: Standard errors in parenthesis. \* denotes significant at 10% level, \*\* denotes significant at 5% level and \*\*\* denotes significant at 1% level.

The base scenario is also set as a university, 1 hour from home with a good course reputation and no work placement and IoT bundles are estimated relative to this. Scenario 12 represents an IoT with an excellent course reputation and work placement. This would result in a welfare gain of €2,499 if an IoT is 1 hour from home, while it would lead to a welfare loss of -€12 if an IoT is 2 hours from home and a loss of -€1,800 if an IoT is 3 hours from home. This shows that even if an IoT is superior to a university with regard to both course reputation and work placement, a welfare gain is only observed if travel time is 1 hour from home.

## 6.6 Discussion and conclusion

While much of the research to date has focused on examining the determinants of progression to higher education, relatively little is known about student preferences for HEIs. This chapter presents findings from a DCE examining student preferences for HEIs based on a unique dataset of students in the final year of upper secondary education in Ireland. The results highlight the presence of strong preference heterogeneity for the attributes of HEIs. While coefficient signs conform generally to *a priori* expectations and are statistically significant, latent classes are characterised by variations in the intensity of preferences. This is reflected in students' WTP for attributes of HEIs. In general, young people are willing to pay for particular attributes of HEIs, and there is significant heterogeneity in WTP across both the attributes of HEIs and across socio-economic groups. Interestingly, in the context of the current review of higher education funding in Ireland, WTP for certain attributes is found to be above the current registration fee of €3,000.

Course reputation is the most important determinant of institution choice for students in all classes, which suggests that the quality of the courses on offer at a HEI is key to shaping a student's choice of institution. The availability of work placement is also shown to be a highly valued institution attribute. These findings suggest that students place the highest value on attributes that may result in a labour market return. That is, young people seem to be motivated by the investment side of higher education. This is interesting in the context of studies such as Drydakis (2016), Ordine and Rose (2015) and Broecke (2012) which conclude that university rank and quality are related to higher labour market earnings. In other words, institutional reputation is shown to have a direct impact on the labour market outcomes of graduates. Furthermore, Mason et al. (2009)

show that relevant work experience has a positive impact on the ability of graduates to both find employment within six months of graduation and to secure employment in graduate-level jobs. McGuinness et al. (2015) also find that higher education work placements have a very significant impact on reducing the incidence of graduate labour market mismatch. While students may not be explicitly aware of such links, the findings of this chapter suggest the potential financial return to higher education motivates students in choosing a HEI.

In general, universities are preferred to IoTs. This may reflect the course offerings that are specific to universities. It may also be related to the investment motivation described earlier. Kelly et al. (2010) show that the type of institution attended (university or not) can have significant implications for future earnings. Thus, students may perceive universities as helping to provide a better labour market return. However, contrary to this general preference for universities, a certain segment of students in the sample are found to have a preference for an IoT over a university. The potential reasons for this may again be explained by the different subject mixes on offer and serves to highlight the importance of accounting for heterogeneity in preferences. Finally, students have a preference for shorter travel time from home (1 hour) relative to longer travel times (2 or 3 hours), which has implications with respect to spatial equity of access as those living further from a HEI are at a relative disadvantage. Additionally, those in the lower socio-economic groups have the highest disutility from longer travel times. This is in line with Dunnett et al. (2012) who find that those in lower socio-economic groups had a preference for a local university over a non-local one. They suggest that this preference for a HEI close to home may imply that those in lower socio-economic groups are more cost conscious, since living at home is likely to be cheaper.

Related to this, the chapter explores the compensating surplus for bundles of HEI attributes. Firstly, the welfare gain or loss from changes in course reputation and work placement is examined across the three time categories (1 hour, 2 hours and 3 hours). Longer travel times are shown to result in a disutility for students leading to lower welfare gains. However, despite the negative impact of travel time, there is evidence of substantial welfare gains from improvements in course reputation (excellent relative to good), as well as the availability of work placement opportunities. In addition to this, the welfare gain or loss is estimated when the type of HEI differs between the base scenario and the estimated scenario. Even after accounting for the negative impact of travel time,

the results suggest that a university with the same course reputation as an IoT but which offers work placement as part of degree programmes would provide a substantial welfare gain to students. Interestingly, even if an IoT is superior to a university with regard to both course reputation and work placement, a welfare gain is only observed if travel time from home is 1 hour. This has direct policy implications with respect to equality of opportunity, as students with limited geographic accessibility to universities are likely to experience lower welfare gains, which means that they are at a relative disadvantage compared to those living close to a university.

When considering the findings of this chapter, a number of caveats should be borne in mind. Firstly, it is important to note that the DCE methodology is limited in terms of the number of attributes that can be examined. While the literature review identified a wide range of potentially important attributes, not all could be considered using this approach. As discussed in Chapter 4, the final set of attributes chosen for inclusion in the DCE was based on feedback from focus group discussions and a pilot study in order to identify the attributes that are most relevant to our population of interest. Secondly, DCEs may be subject to hypothetical bias which means that WTP for certain attributes may be inflated due to the fact that respondents are not required to substantiate their choices with real commitments. Thirdly, it must be acknowledged that in the majority of cases in Ireland, parents currently pay the annual student fee on behalf of students and thus it could be argued that an examination of parent preferences would have been more appropriate. Indeed, it is likely that parents from different socio-economic backgrounds would have different preferences for HEIs, particularly with regard to attributes that signal higher costs such as fees and travel time. However, given the increasing likelihood of Ireland moving to a system of income-contingent loans in the future (Expert Group, 2016), exploring student preferences and WTP for attributes of HEIs provides an important contribution to the policy debate. Finally, the inclusion of an attribute capturing the type of HEI has the potential to create labelling effects. However, the focus group discussions revealed this as a central attribute in the choice of HEI and participants suggested that they would find the alternatives too abstract if it was not included. In addition to this, analysis of the pilot responses revealed that all of the attributes had a statistically significant effect on the choices made by students. If it was the case that type of HEI had resulted in a labelling effect, the impact of this attribute would have far exceeded the others, which was not the case. Thus, I am satisfied that this is not an issue in this analysis.

# Chapter 7

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## Student preferences for the attributes of higher education institutions: Exploring heterogeneity in willingness to pay

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### 7.1 Introduction

This chapter extends the analysis presented in Chapter 6 by examining heterogeneity in WTP by region, academic ability and socio-economic status. It does so by applying both mixed logit (MXL) and generalised multinomial logit (GMNL) models. To begin, Section 7.2 provides a motivation for the analysis. Section 7.3 then discusses previous studies in the education economics literature that have employed the MXL model to account for preference heterogeneity. In addition to this, the section outlines findings from a number of studies that have compared the performance of the two modelling approaches. Following the literature review, Section 7.4 provides a detailed description of the methods used to analyse heterogeneity in WTP. Applying these models, Section 7.5 then presents a thorough examination of heterogeneity in WTP by region, academic ability and socio-economic status, while Section 7.6 concludes.

### 7.2 Background

Accounting for preference heterogeneity helps lead to unbiased estimates, while also improving the accuracy and reliability of welfare estimates (Birol et al., 2006b). The analysis presented in Chapter 6 highlights the existence of broad group heterogeneity across both the attributes of HEIs and across socio-economic groups. Specifically, the latent class model categorises students into classes and formulates their preference variation with a discrete distribution, in which preferences are assumed to be homogeneous within each class (Tu et al., 2016). The findings from this analysis suggest that socio-economic status, as well as the region in which a student lives, influence the variation in preferences for attributes of HEIs. While this analysis allows for an examination of the socio-demographic factors that determine what types of respondents are probabilistically assigned to each class, it is not possible to explicitly examine variation in WTP across the various student groups. Examining this variation in WTP is

useful to both policymakers and HEI managers, as it provides them with interpretable information on how much different students value the attributes of HEIs. By estimating separate models for different sub-groups, socio-demographic differences in WTP can be identified, while also accounting for individual preference heterogeneity within each group. Given this, the purpose of this chapter is to extend the analysis of heterogeneity in Chapter 6 and provide a more in-depth examination of heterogeneity in WTP by region, socio-economic status and academic ability. To this end, a number of econometric specifications are employed.

In the first instance, a correlated mixed logit model is employed in order to account for unobserved preference heterogeneity. Mixed logit models account for preference heterogeneity by assuming random parameters for model coefficients which follow a specific distribution over the sampled population (Owusu Coffie et al., 2016). According to Greene and Hensher (2003: 697), “the mixed logit model, while fully parametric, is sufficiently flexible that it provides the modeller a tremendous range within which to specify individual, unobserved heterogeneity. To some extent, this flexibility offsets the specificity of the distributional assumptions”. Indeed, Hole and Kolstad (2012) argue that mixed logit models are the state of the art tool in the analysis of discrete choices. With the mixed logit model, the utility coefficients for the non-cost attributes and the cost attribute are estimated and WTP is calculated post-estimation. Such models are parameterised in terms of coefficients and are called ‘models in preference space’ (Train and Weeks, 2005). However, issues can arise with this method and these are discussed in detail in Section 7.3.

As an alternative to this preference space approach, Train and Weeks (2005) suggest re-parameterising the model in terms of WTP, which they refer to as ‘models in WTP space’. According to Greene and Hensher (2010), the WTP space model is nested within the generalised multinomial logit (GMNL) model developed by Fiebig et al. (2010). In the WTP space model, the ratio of the non-cost to cost coefficient is computed in the model, giving direct WTP estimates. In addition to accounting for taste heterogeneity, the GMNL model also decouples preference heterogeneity from scale heterogeneity, which takes account of the degree of randomness in the decision-making process. This is particularly valuable in the context of a DCE as respondents may experience variance in utility over choice situations.

In applying these approaches, this chapter makes a number of distinct contributions to the international literature. It adds to the limited number of studies examining heterogeneity in WTP within the education economics context. Moreover, it improves on such previous empirical applications by employing a correlated specification which has not been applied previously and which has been shown to provide a substantial improvement in model fit over the uncorrelated specification (Hole and Kolstad, 2012). In addition, to my knowledge, this is the first empirical application of the WTP space model in the education economics literature. The estimation of both model specifications also allows for a comparison of WTP as well as model fit. Therefore, the findings of this chapter provide an important contribution to the small but growing literature comparing the two modelling approaches. Finally, the results should be of interest to both policymakers and HEI managers. Accounting for heterogeneity in preferences means that systematic differences across the population of prospective students can be identified, which should be useful in designing policy interventions aimed at increasing participation in higher education.

### **7.3 Literature review**

The previous chapter provided an extensive review of the international empirical literature on the factors influencing institution choice. Given this, this literature review focuses on previous applications of the mixed logit model in the education economics literature, along with studies that have compared the performance of the two modelling approaches (preference and WTP space). There have been a number of applications of the mixed logit model since the seminal work of Revelt and Train (1998), Bhat (1998) and Brownstone and Train (1999). Much of this work has been concentrated in the areas of environmental and transport economics (Greene and Hensher, 2003; Birol et al., 2006a; Hynes et al., 2008; Campbell et al., 2009; Norton and Hynes, 2014), with applications also in health economics (Hole, 2008; Michaels-Igbokwe et al., 2015). However, relatively few education-related studies have used the mixed logit model to account for preference heterogeneity. Jin et al. (2014) employ a mixed logit model to examine undergraduate student preferences for job attributes in Texas. The authors find that in general students prefer jobs that are close to home and would have to be paid a higher salary to induce them to take a job outside of Texas. Related to this, commuting time to the job was also found to be an important determinant of job choice. In particular,

the average student would require \$195 more in annual salary for an additional minute of one-way commuting time (Jin et al., 2014).

In a related study, Humburg and van der Velden (2015) employ a DCE to study employer preferences for the skills and CV attributes of university graduates. CV attributes are considered in the context of a graduate being invited to a job interview, while graduate skills relate to the hiring stage of the graduate recruitment process. Similar to Jin et al. (2014), a mixed logit model is employed in order to account for individual preference heterogeneity. Relevant work experience, along with the match between the job and a graduate's field of study, were found to be the most important CV attributes for determining whether a graduate is invited to interview. These attributes can be thought of as measures of occupation-specific human capital. Thus, the value of the attributes for employers lies in a shorter adjustment period and less company-provided training. Above-average grades are also shown to be an important determinant of employer preferences. Regarding graduate skills, the authors found that professional expertise was the most valued graduate skill, while entrepreneurial skills were the least valued.

In another application of the mixed logit model, Gong and Hyuybers (2015) studied Chinese student preferences for international higher education destinations. The safety of the destination country was found to be the most important determinant of international education choice for Chinese students. In addition to this, university rankings, along with the general standard of education in the destination country were shown to be important. Finally, in a related study, Flannery and O'Donoghue (2013) present a static structural model of higher education participation in Ireland. Using a mixed nested logit model, they find that potential lifecycle earnings, along with household income/direct education cost levels, influence the educational/labour choices of young individuals in Ireland. They also find evidence of significant individual heterogeneity in how such variables influence the higher education participation decision.

Thus, a limited number of studies in the education economics literature have used the mixed logit model to account for preference heterogeneity. However, while the mixed logit model makes it possible to account for preference heterogeneity, issues can arise when estimating WTP. For example, mixed logit models can produce unreasonably large variance in WTP estimates which implies that some respondents are willing to pay very

large amounts of money to obtain or avoid a particular attribute.<sup>21</sup> Given this, Train and Weeks (2005) propose a WTP space model as an alternative to the mixed logit model. While the WTP space method is not widely used, it has been applied in the areas of environmental and health economics (Özdemir et al., 2009; Thiene and Scarpa, 2009; Scarpa and Willis, 2010; Grisolia et al., 2013; Balogh et al., 2016; Tu et al., 2016). However, evidence is mixed regarding which modelling approach is best. Train and Weeks (2005) estimate and compare models in preference space and models in WTP space. Using stated preference data on households' choices among alternative-fuelled vehicles, they find that while models using convenient distributions in preference space fit the data better, the distribution of WTP is more reasonable for the model in WTP space. Specifically, they show that the variance of the distribution of WTP from the preference space is unreasonably large, which suggests that a share of respondents are willing to pay very large amounts of money to obtain or avoid a particular attribute. These findings are echoed in a study by Sonnier et al. (2007) who use stated preference data on the choice of cars and cameras to compare the performance of models in WTP space to models in preference space.

In another comparison study, Scarpa et al. (2008) examine preferences for destination choice in the Alps. Similar to Train and Weeks (2005) and Sonnier et al. (2007), the authors find that models in WTP space produce WTP distributions with less extreme values compared to models in preference space. Specifically, they find that the estimated standard deviations of WTP are consistently lower for the models in WTP space. However, contrary to the other studies, the authors find that models in WTP space also fit the data better than models in preference space. This is in line with Rose and Masiero (2010) who also found a significant improvement in model fit when the models were estimated in WTP space.

In the health economics literature, Hole and Kolstad (2012) used data from a DCE on the choice of health service jobs among Tanzanian final year students to compare models estimated in preference and WTP space. They find significant differences in the estimated WTP distributions between the two models, with the WTP space model producing much lower mean WTP estimates. While the models in preference space are found to fit the data better, the difference is negligible. Interestingly, they show that

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<sup>21</sup> This is discussed in greater detail below.

allowing for correlation between the coefficients affects the model fit more than whether the model is fit in preference or WTP space. Finally, a recent study by Owusu Coffie et al. (2016) adds to the evidence base by providing a comparison of the two modelling approaches in the context of rice production practices in Ghana. Again, they find less variability in WTP estimates derived from the WTP space model. Regarding model fit, they found that the WTP space model outperformed the preference space model, which is consistent with Scarpa et al. (2008) and Rose and Masiero (2010). However, despite the advantages of the WTP space approach, it has never been applied in the education economics literature. Given this, the purpose of this chapter is to examine, for the first time, heterogeneity in WTP for the attributes of HEIs using both the preference space and WTP space approach.

## 7.4 Methodology

### 7.4.1 Mixed logit

As outlined in Chapter 6, analysis of DCE data is grounded in random utility theory in which individuals choose the alternative that provides the highest utility level. In a sample with  $N$  respondents, each respondent  $n$  faces  $T$  choice situations and each choice situation has a choice set with  $J$  alternatives. Random utility theory states that the indirect utility function for individual  $n$  choosing alternative  $j$  in choice situation  $t$  is:

$$U_{njt} = \beta_n X_{njt} + \varepsilon_{njt} \quad (1)$$

where  $X_{njt}$  represents a vector of HEI attributes and  $\beta_n$  is a vector of individual-specific coefficients to be estimated with a density function  $f(\beta_n|\theta)$ , where  $\theta$  is a vector of parameters of a continuous population distribution. The unobserved error term  $\varepsilon_{njt}$  captures unobserved factors that affect choices and is assumed to be Gumbel-distributed. Since we do not observe  $\beta_n$ , the unconditional choice probability is given as an integral over all possible variables of  $\beta_n$ :

$$P_{njt}(\beta_n) = \int \frac{\exp(\beta_n' x_{njt})}{\sum_{j=1}^J \exp(\beta_n' x_{njt})} f(\beta_n|\theta) d\beta_n \quad (2)$$

Due to the integral in the probability function, simulated maximum likelihood is used for estimation (Train, 2003). For the purpose of the analysis in this chapter, the simulation is based on 500 Halton draws.

When employing the mixed logit model, a number of factors need to be considered. Firstly, the analyst must choose the coefficients which are allowed to vary and the distribution they should take (Hole, 2008). By treating an attribute as random, a mean and standard deviation is specified for each  $\beta_n$ , which accounts for unobserved preference heterogeneity in the sampled population. In the models presented in this chapter, all the non-cost attributes are specified as random and the distribution of the random taste variation is specified to have a Normal distribution  $\sim N(\mu, \sigma)$ .<sup>22</sup> Another important decision in the estimation of mixed logit models is the specification of the cost (fee) coefficient. If the cost coefficient is assumed to be random, the ratio of two randomly distributed coefficients can result in heavily skewed WTP distributions (Hole and Kolstad, 2012).

To overcome this, Revelt and Train (1998) propose fixing the cost coefficient. They argue that by doing so, the WTP for each attribute will be distributed in the same way as the attribute's coefficient, which is convenient for interpretation of the model. In other words, if the coefficients are normally distributed, then so is WTP. Another advantage of fixing the fee coefficient is that it guarantees the fee coefficient has the correct sign. A normally distributed fee coefficient implies that some individuals may prefer higher costs, which is counter-intuitive (Hole, 2008). Finally, when all coefficients are allowed to vary in the population, identification is empirically difficult (Revelt and Train, 1998). Thus, fixing at least one of the coefficients in the model helps empirical identification. Given this, the fee coefficient is set to be fixed in the estimation. The analyst must also decide on the parameterisation of the covariance matrix. In this chapter, preference parameters are assumed to be correlated. This allows for a situation in which consumers who like a certain attribute will also tend to like (dislike) some other attribute (Fiebig et al., 2010). All models are estimated with the user-written *mixlogit* package in Stata 13 (Hole, 2007).

As discussed in Chapter 6, the inclusion of a fee attribute allows for the estimation of a marginal value for each of the HEI attributes in the choice experiment. In order to derive

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<sup>22</sup> All models are specified to allow for correlation between coefficients. With the correlated specification, a log-normal distribution for some of the coefficients (good and excellent course reputation) meant that the model failed to converge. Therefore, the estimated models treat all non-cost coefficients as random and normally distributed. This is a common feature in the literature (Hynes et al., 2008).

the marginal WTP for the different HEI attributes, we distinguish between monetary,  $m_{nkt}$ , and non-monetary attributes,  $x_{nkt}$ , in Equation (1), such that:

$$U_{nkt} = \beta_{nm}m_{nkt} + \sum_{k=1}^k \beta_{nk}x_{nkt} + \varepsilon_{nkt} \quad (3)$$

where  $\beta_{nm}$  and  $\beta_{nk}$  are the parameters for the monetary and non-monetary attributes respectively. The WTP for an attribute  $k$  can be written as the ratio of its coefficient to that of the monetary attribute:

$$WTP = \frac{\beta_{nk}}{\beta_{nm}} \quad (4)$$

#### 7.4.2 Generalised multinomial logit

As an alternative to the preference space approach outlined above, Train and Weeks (2005) suggested estimating the mixed logit model in WTP space. According to Train and Weeks (2005), the fixed cost coefficient approach implies that the standard deviation of unobserved utility is the same for all observations. They argue that ignoring this variation can lead to variation in scale being wrongly attributed to variation in WTP. In contrast to the standard approach, the WTP space approach allows for WTP to be directly estimated. As such, the WTP space model represents a re-parameterisation of the preference space model outlined above. Based on Equation (1), the cost attribute is separated from the vector of attributes:

$$\beta_n X_{njt} = \alpha_n P_{njt} + \beta_n X'_{njt} \quad (5)$$

where  $P_{njt}$  denotes the cost attribute and  $X'_{njt}$  denotes a vector of non-monetary attributes.  $\alpha_n$  and  $\beta_n$  are individual-specific coefficients for the fee and the other attributes of the HEI. The utility of individual  $n$  choosing alternative  $j$  in choice situation  $t$  is:

$$U_{njt} = \alpha_n P_{njt} + \beta_n X'_{njt} + \varepsilon_{njt} \quad (6)$$

where  $\varepsilon_{njt}$  is a random term that is Gumbel-distributed with a variance of  $\text{Var}(\varepsilon_{njt}) = k_n^2(\pi^2/6)$ , where  $k_n$  is a scale parameter for the  $n$ th individual.

According to Train and Weeks (2005), dividing Equation (6) by  $k_n$  does not change the individual's behaviour and results in a new error term  $\varepsilon_{njt}$  which is IID extreme value distributed. The variance of  $\varepsilon_{njt}$  is  $\pi^2/6$ , giving:

$$U_{njt} = \lambda_n P_{njt} + c_n X'_{njt} + \varepsilon_{njt} \quad (7)$$

where  $\lambda_n = \alpha_n/k_n$ ,  $c_n = \beta_n/k_n$  and  $\varepsilon_{njt} = \varepsilon_{njt}/k_n$ . Given the fact that the WTP for an attribute is estimated through the ratio  $WTP_n = c_n/\lambda_n = \beta_n/\alpha_n$ , Equation (7) can therefore be rewritten as:

$$U_{njt} = \lambda_n [P_{njt} + \gamma_n X_{njt}] + \varepsilon_{njt} \quad (8)$$

This is referred to as utility in WTP space. The issue of unrealistic skewed distributions can be avoided by directly specifying the distribution of the WTP parameter  $\gamma_n$ , since  $\gamma_n = \beta_n/\alpha_n$  (Tu et al., 2016).

Greene and Hensher (2010) show that this WTP space model can be expressed as a special case of the GMNL model proposed by Fiebig et al. (2010) which takes account of both scale and preference heterogeneity. According to Fiebig et al. (2010), preference heterogeneity can often be better described as scale heterogeneity which means that for some individuals, the scale of the idiosyncratic error term is greater than for other individuals. The GMNL can take account of 'extreme' respondents in the sample who exhibit nearly lexicographic preferences, while it is also better able to explain 'random' choice behaviour. According to the authors, "both of these advantages follow directly from the fact that the GMNL model allows for much greater flexibility in the shape of the posterior distribution of person-specific parameters than does mixed logit" (Fiebig et al., 2010: 396). Given this, all WTP space models are estimated using the GMNL model with the user-written *gmnl* package in Stata 13 (Gu et al., 2013).

## 7.5 Empirical results

This section examines preference heterogeneity by region, academic ability and socio-economic status. To begin, the estimation results for the correlated mixed logit model are reported in Table 7.1. The model is well specified with regard to statistical significance and the mean estimates follow *a priori* expectations. *Ceteris paribus*, students prefer a HEI with good or excellent course reputation relative to a fair course reputation. The impact of a good course reputation on student preferences for HEIs is comparable to the

availability of work placement as part of degree programmes at the HEI. Regarding travel time, students have a negative preference for longer travel times (2 and 3 hours) relative to a shorter travel time (1 hour). All else being equal, students prefer a university as opposed to an IoT, while the coefficient on fee is negative, suggesting that students prefer lower fees. The estimated standard deviations are both statistically significant and large relative to the mean, which indicates the existence of substantial preference heterogeneity for the attributes of HEIs.

**Table 7.1:** Results from correlated mixed logit model

Variable	Correlated mixed logit
<i>Random parameters: Mean</i>	
Type of HEI – University	1.06 (0.07)***
Travel time from home - 2 hours	-0.65 (0.08)***
Travel time from home - 3 hours	-2.14 (0.10)***
Work placement is available	1.88 (0.07)***
Good course reputation	1.78 (0.09)***
Excellent course reputation	2.66 (0.11)***
<i>Non-random parameters</i>	
Student fee	-0.58 (0.02)***
ASCD	-0.96 (0.16)***
<i>StDev of random parameters</i>	
Type of HEI – University	1.97 (0.07)***
Travel time from home - 2 hours	1.39 (0.08)***
Travel time from home - 3 hours	1.91 (0.07)***
Work placement is available	1.47 (0.06)***
Good course reputation	1.53 (0.08)***
Excellent course reputation	2.18 (0.09)***
<i>Willingness-to-pay (€)</i>	
Type of HEI – University	1,736 (3,287)
Travel time - 2 hours	-1,383 (2,457)
Travel time - 3 hours	-3,624 (3,341)
Placement available	3,267 (2,545)
Good course reputation	3,282 (2,692)
Excellent course reputation	4,644 (3,723)
No. of individuals	991
No. of observations	11,896
Log-likelihood	-10223.28
AIC	20504.57
BIC	20758.90

*Notes:* For preference coefficients, standard errors are shown in parentheses. \* denotes significant at 10% level, \*\* denotes significant at 5% level, \*\*\* denotes significant at 1% level. For willingness-to-pay estimates, standard deviations are presented in parentheses.

Using this preference space approach, WTP is calculated post-estimation as the ratio of the non-cost to cost coefficients. For comparison, Table 7.2 shows the results of the correlated GMNL model. In this case, the ratio of the non-cost to cost coefficient is computed in the model, giving direct WTP estimates. A comparison of the log-likelihood, AIC and BIC between the two models suggests that the WTP space model statistically outperforms the model in preference space. This is consistent with Scarpa et al. (2008), Rose and Masiero (2010) and Owusu Coffie et al. (2016) who also found that the WTP space model fit their data better. With regard to the mean marginal WTP estimates, the preference space models produce higher estimates than those estimated using the WTP space model.

**Table 7.2:** Results from correlated generalised multinomial logit model

Variable	Correlated GMNL
<i>Random parameters: Mean willingness-to-pay (€)</i>	
Type of HEI - University	1,689 (124.20)***
Travel time - 2 hours	-894 (107.24)***
Travel time - 3 hours	-3,605 (111.20)***
Placement available	3,090 (137.69)***
Good course reputation	2,936 (167.17)***
Excellent course reputation	4,349 (195.03)***
<i>StDev of willingness-to-pay (€)</i>	
Type of HEI - University	2,999 (113.44)***
Travel time - 2 hours	1,784 (100.02)***
Travel time - 3 hours	2,744 (101.41)***
Placement is available	2,178 (88.98)***
Good course reputation	2,417 (101.82)***
Excellent course reputation	3,359 (128.42)***
Scale parameter ( $\tau$ )	0.77 (0.03)***
No. of individuals	991
No. of observations	11,896
Log-likelihood	-10188.47
AIC	20436.95
BIC	20700.05

*Notes:* Standard errors are presented in parentheses. \* denotes significant at 10% level, \*\* denotes significant at 5% level, \*\*\* denotes significant at 1% level.

In addition to this, the standard deviations are generally larger than those estimated in WTP space. The larger standard deviations implies that models in preference space

produce WTP distributions with more extreme values compared to models in WTP space. This is a significant finding and one that is in line with those in Hole and Kolstad (2012), Train and Weeks (2005), Sonnier et al. (2007), Scarpa et al. (2008) and Owusu Coffie et al. (2016). In addition to preference heterogeneity, scale heterogeneity is also found to be statistically significant under the GMNL model. Therefore, the assumption of identical scales across individuals should be rejected (Balogh et al., 2016). Given the fact that the correlated GMNL model is found to outperform the correlated mixed logit model, and scale heterogeneity is statistically significant, the remainder of the discussion is focussed on the GMNL models.<sup>23</sup>

All GMNL models were first estimated with uncorrelated coefficients. However, models that allow for correlation in the random coefficients fit the data better than models in which coefficients are assumed to be independent. Thus, models presented in this chapter allow for correlation in the random parameters.<sup>24</sup> The coefficients for university, travel time, work placement and course reputation are assumed to be normally distributed. However, the fee coefficient is normalised to 1, which allows the coefficients to be interpreted as WTP estimates. The start values for the correlated models are taken from the analogous uncorrelated specifications and all models are estimated using 500 Halton draws.

### **7.5.1 Sub-group analysis: Region**

In order to further explore preference heterogeneity, analysis is undertaken across a range of sub-groups, specifically; region, academic ability and socio-economic status. For each sub-group analysis, a likelihood ratio test was conducted. The results indicate that the null hypothesis that preferences are the same across subgroups can be rejected. To begin, preferences are examined by geographic location. For the purpose of the analysis, three regions are used, namely:

1. Border, Midlands and West (BMW)
2. South and East (SE)
3. Dublin

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<sup>23</sup> Correlated mixed logit models are given in Appendix F.

<sup>24</sup> Appendix G presents the results of the correlated GMNL model, along with the uncorrelated version for comparison. As an additional means of confirming the suitability of the correlated specification, Appendix G also presents the covariance matrix for the random parameters from the correlated GMNL model.

Estimation results for the correlated GMNL model by region are presented in Table 7.3. WTP estimates are statistically significant, while the standard deviations are large and statistically significant, indicating the presence of preference heterogeneity within each region. While respondents in all three regions have a strong preference for both a good and excellent course reputation, significant differences emerge with regard to the magnitude of respondents' WTP. For instance, students in the BMW region are willing to pay €3,063 for a good course reputation relative to a fair reputation, while students in the SE region are willing to pay €2,233 and those in Dublin are willing to pay €7,527. The same pattern emerges with regard to excellent course reputation, with WTP ranging from €3,485 in the SE region to €10,376 in the Dublin region. Thus, students in Dublin are willing to pay substantially more for both a good and excellent course reputation relative to a fair course reputation. This is interesting given that this region has the largest number of HEIs within a relatively small geographic area (see Figure 1.1). In other words, in a region where students have the most choice with respect to HEIs, WTP for course reputation is highest. With regard to work placement, students in the BMW region are willing to pay €3,260 for a HEI that offers work placement as part of degree programmes relative to one that does not, while students in the SE region are willing to pay €2,660 and those in Dublin are willing to pay €4,824 on average.

Interestingly, students in the BMW region have the lowest disutility from a travel time of 2 hours and 3 hours relative to 1 hour, while student in Dublin have the highest. These findings are in line with those in Chapter 6 which showed that students in the Border and West regions are more likely than students in Dublin to be assigned to a class with a relatively low disutility from travel time. As discussed in Chapter 6, the insensitivity to travel in the BMW region may suggest that there are cohorts in this region that are willing to travel to attend higher education. However, the large and statistically significant standard deviations indicate that there is substantial preference heterogeneity with respect to travel time within the region. Students in the BMW have a negative WTP of -€707 for a HEI 2 hours from home relative to 1 hour from home, which means that students would have to be compensated by this amount in order to choose a HEI 2 hours from home. Students in the SE have a negative WTP of -€785 which is slightly higher than the BMW region, while students in Dublin have a negative WTP of -€1,532. For a travel time of 3 hours relative to 1 hour, students have a negative WTP ranging from -€2,571 in the BMW region to -€7,466 in the Dublin region. On average, students in all

regions have a preference for a university relative to an IoT. WTP for a university relative to an IoT ranges from €1,230 in the SE, to €2,323 in the BMW and €4,282 in Dublin.

**Table 7.3:** Results from correlated generalised multinomial logit models, by region

Variable	BMW region	SE region	Dublin region
<i>Random parameters: Mean willingness-to-pay (€)</i>			
Type of HEI - University	2,323 (207.96)***	1,230 (163.27)***	4,282 (631.87)***
Travel time - 2 hours	-707 (173.76)***	-785 (176.90)***	-1,532 (388.53)***
Travel time - 3 hours	-2,571 (137.52)***	-3,747 (181.04)***	-7,466 (554.61)***
Placement available	3,260 (223.64)***	2,660 (180.13)***	4,824 (717.59)***
Good course reputation	3,063 (296.82)***	2,233 (251.57)***	7,527 (1291.58)***
Excellent course reputation	4,599 (362.12)***	3,485 (308.85)***	10,376 (1572.84)***
<i>StDev of willingness to pay (€)</i>			
Type of HEI - University	3,718 (188.74)***	2,504 (152.62)***	3,328 (410.06)***
Travel time - 2 hours	1,753 (155.05)***	1,567 (172.56)***	2,132 (362.35)***
Travel time - 3 hours	2,433 (138.34)***	2,722 (175.74)***	4,431 (578.64)***
Placement available	2,517 (189.08)***	1,946 (142.32)***	3,071 (383.47)***
Good course reputation	2,536 (251.79)***	2,057 (171.91)***	3,766 (663.30)***
Excellent course reputation	3,304 (268.92)***	3,105 (194.58)***	4,243 (733.11)***
Scale ( $\tau$ )	0.73 (0.05)***	0.54 (0.06)***	1.31 (0.13)***
No. of individuals	486	318	187
No. of observations	5,836	3,815	2,245
Log-likelihood	-4942.85	-3274.77	-1825.73
AIC	9945.70	6609.53	3711.45
BIC	10187.45	6838.52	3924.54

*Notes:* BMW stands for the Border, Midlands and West region, while SE stands for the South and East region. Standard errors are presented in parentheses. \* denotes significant at 10% level, \*\* denotes significant at 5% level, \*\*\* denotes significant at 1% level.

### 7.5.2 Sub-group analysis: Academic ability

As an additional means of examining heterogeneity in preferences, analysis is also undertaken across three sub-samples defined according to student academic ability. These results are presented in Table 7.4. Academic ability is defined based on the number of honours level subjects (highest level at which subjects are examined) that students intend to sit in the Leaving Certificate (LC) examination. For the purpose of the analysis, the number of subjects is divided into three categories: 0-3 honours subjects, 4-6 honours subjects and >6 honours subjects. It is important to note that each student must sit a

minimum of six subjects, with the majority of students sitting seven subjects (National Council for Curriculum and Assessment, 2017). Therefore, students in the >6 honours subjects category intend to sit all subjects at higher level, with some students also choosing to take additional higher level subjects.

An interesting finding from this analysis is that students intending to sit between 0 and 3 honours subjects have a negative WTP for a university relative to an IoT. Conversely, students intending to sit more than six honours subjects have a very strong positive preference for a university relative to an IoT. Specifically, students in the 0-3 LC honours group have a negative WTP of -€545 which implies that they would have to be paid this amount to choose a university over an IoT. In contrast, students in the 4-6 LC honours category are willing to pay €1,428 for a university relative to an IoT, while students in the >6 LC honours category are willing to pay €4,392.

While students in all categories of academic ability have a preference for both a good and excellent course reputation relative to fair, the strength of these preferences varies significantly across groups. This is reflected in the WTP across the groups which increases along with academic ability. Specifically, students in the 0-3 LC honours category are willing to pay €337 for a good course reputation relative to fair, while students in the 4-6 LC honours group are willing to pay €2,719, and those intending to sit more than six LC honours subjects are willing to pay €6,586. Similar results are found with regard to excellent course reputation, with WTP increasing from €1,696 for those in the 0-3 LC honours group to €4,050 for those intending to sit 4-6 LC honours subjects. Students in the >6 LC honours category are willing to pay €8,703, which represents a substantial WTP on the part of high achieving students. Interestingly, students in the 0-3 LC honours group are willing to pay more for a HEI that offers a work placement (€1,972) compared to one that does not, than they are for a HEI with an excellent course reputation relative to fair (€1,696). Regarding travel time from home, students in all categories of academic ability have a preference for shorter travel times, with those in the >6 LC honours group experiencing the highest disutility from longer travel times. These students have a negative WTP of -€1,240 for a travel time of 2 hours relative to 1 hour, compared to -€700 for those in the 4-6 LC honours group.

**Table 7.4:** Results from correlated generalised multinomial logit model, by academic ability

Variable	0-3 LC Honours	4-6 LC Honours	>6 LC Honours
<i>Random parameters: Mean willingness-to-pay (€)</i>			
Type of HEI - University	-545 (221.56)***	1,428 (174.98)***	4,392 (420.63)***
Travel time - 2 hours	-1,161 (253.29)***	-700 (130.87)***	-1,240 (273.73)***
Travel time - 3 hours	-3,228 (260.59)***	-3,430 (142.83)***	-3,790 (267.01)***
Placement available	1,972 (310.24)***	3,093 (159.78)***	3,168 (313.28)***
Good course reputation	837 (300.09)***	2,719 (198.65)***	6,586 (666.61)***
Excellent course reputation	1,696 (320.99)***	4,050 (198.6)***	8,703 (752.26)***
<i>StDev of willingness to pay (€)</i>			
Type of HEI - University	1,780 (203.31)***	2,700 (118.58)***	2,833 (191.55)***
Travel time - 2 hours	1,326 (209.53)***	1,588 (136.72)***	1,695 (217.86)***
Travel time - 3 hours	1,839 (234.78)***	2,473 (125.70)***	3,446 (236.79)***
Placement available	2,104 (240.91)***	1,849 (97.89)***	2,785 (195.82)***
Good course reputation	1,766 (274.21)***	2,100 (112.17)***	3,207 (248.72)***
Excellent course reputation	2,512 (277.54)***	2,827 (121.42)***	4,042 (280.52)***
Scale ( $\tau$ )	0.67 (0.11)***	0.77 (0.04)***	-0.91 (0.08)***
No. of individuals	105	590	278
No. of observations	1,255	7,098	3,339
Log-likelihood	-1070.46	-6153.75	-2595.61
AIC	2200.93	12367.51	5251.23
BIC	2396.57	12615.12	5476.22

*Notes:* LC Honours refers to the number of honours subjects that students intend to sit in the Leaving Certificate examination. Standard errors are presented in parentheses. \* denotes significant at 10% level, \*\* denotes significant at 5% level, \*\*\* denotes significant at 1% level.

### 7.5.3 Sub-group analysis: Socio-economic status

Finally, heterogeneity in preferences by socio-economic group is examined. The socio-economic groups are defined based on the highest parental socio-economic group, which is in line with the classification used in Chapter 6. Specifically, the three socio-economic groups are:

4. Managers/employers, higher professionals or lower professionals (SE Group 1)
5. Non-manual or manual skilled (SE Group 2)
6. Semi-skilled, unskilled or farmers (SE Group 3)

Estimation results are shown in Table 7.5. Students in the ‘managers/employers, higher professionals or lower professionals’ group have the strongest preference for a university,

with a WTP of €2,871 for a university relative to an IoT. Compared to this, students in lower socio-economic groups are willing to pay significantly less for a university. Those in the ‘non-manual or manual skilled’ group are willing to pay €1,112, while students in the ‘semi-skilled, unskilled or farmers’ group are willing to pay €1,532. As regards travel time, students in the ‘managers/employers, higher professionals or lower professionals’ group experience the highest disutility from a travel time, while those in the ‘semi-skilled, unskilled or farmers’ group experience the lowest disutility.

Table 7.5 shows a negative WTP ranging from -€17 to -€846 for a travel time of 2 hours relative to 1 hour and a negative WTP of between -€2,816 and -€3,872 for 3 hours relative to 1 hour. Another notable finding from the analysis is that while students in all socio-economic groups have a strong preference for a good and excellent course reputation, those in the ‘managers/employers, higher professionals or lower professionals’ group have substantially higher WTP. For instance, students in this group are willing to pay €6,004 for an excellent course reputation relative to fair, compared to €2,063 for students in the ‘semi-skilled, unskilled or farmers’ group.

**Table 7.5:** Results from correlated generalised multinomial logit model, by socio-economic status

Variable	SE Group 1	SE Group 2	SE Group 3
<i>Random parameters: Mean willingness-to-pay (€)</i>			
Type of HEI - University	2,871 (213.78)***	1,112 (160.09)***	1,532 (411.65)***
Travel time - 2 hours	-846 (140.89)***	-748 (176.13)***	-417 (371.47)
Travel time - 3 hours	-3,872 (175.63)***	-3,086 (156.52)***	-2,816 (287.90)***
Placement available	3,779 (207.73)***	2,798 (182.44)***	2,937 (447.67)***
Good course reputation	4,376 (312.38)***	2,145 (217.92)***	2,063 (445.94)***
Excellent course reputation	6,004 (362.48)***	3,475 (256.13)***	3,109 (524.94)***
<i>StDev of willingness to pay (€)</i>			
Type of HEI - University	3,482 (176.26)***	2,768 (160.82)***	2,594 (322.89)***
Travel time - 2 hours	592 (200.33)***	1,714 (183.17)***	2,045 (285.30)***
Travel time - 3 hours	3,522 (199.20)***	2,670 (149.25)***	2,469 (332.44)***
Placement available	2,845 (165.03)***	1,909 (138.50)***	1,741 (225.40)***
Good course reputation	3,040 (178.53)***	1,996 (147.18)***	2,193 (353.04)***
Excellent course reputation	4,233 (207.28)***	2,783 (176.93)***	2,562 (333.52)***
Scale ( $\tau$ )	0.86 (0.04)***	0.73 (0.05)***	0.52 (0.13)***
No. of individuals	554	360	77
No. of observations	6,647	4,330	919
Log-likelihood	-5553.18	-3763.53	-800.24
AIC	11166.37	7587.07	1660.49
BIC	11412.01	7819.85	1846.78

*Notes:* SE Group 1 denotes the household socio-economic group - managers/employers, higher professionals or lower professionals. SE Group 2 denotes the household socio-economic group - non-manual or manual skilled. SE Group 3 denotes the household socio-economic group - semi-skilled, unskilled or farmers. Standard errors are presented in parentheses. \* denotes significant at 10% level, \*\* denotes significant at 5% level, \*\*\* denotes significant at 1% level.

Overall, to conclude, this analysis points to the presence of substantial preference and scale heterogeneity across region, academic ability and socio-economic status, and marks a significant contribution to the literature on student preferences for HEI attributes.

## 7.6 Discussion and conclusion

While a limited number of studies have examined student preferences for the attributes of HEIs, relatively little is known about preference heterogeneity. Indeed, the analysis presented in Chapter 6 marks a major contribution to the literature in this regard. While this analysis identified the socio-demographic factors that determine what types of respondents are probabilistically assigned to the specific latent classes, it was not possible to explicitly examine variation in WTP across these groups. As a consequence, the

purpose of this chapter is to extend the analysis presented in Chapter 6 by examining heterogeneity in WTP by region, socio-economic status and academic ability. To my knowledge, this is the first empirical application of the WTP space model in the education economics literature. By employing a GMNL model, it is possible to account for both scale and preference heterogeneity. Such models also allow for WTP to be directly estimated, which overcomes some of the limitations of the standard mixed logit approach in which WTP is generated post-estimation.

Based on the analysis presented in Chapters 2 and 3, it is interesting to first consider geographic variation in WTP. Regional variation in WTP for the attributes of HEIs is found to be substantial, which suggests that preferences are shaped by the characteristics of the region in which a student lives. Of particular note, students living in Dublin are found to have substantially higher WTP for course reputation compared to those living in the BMW and SE regions. Students in Dublin have a range of HEIs from which to choose, which could be driving this preference for higher quality. This finding may be of interest to policymakers seeking to improve the quality of higher education provision, as the competition between HEIs in Dublin appears to generate a demand for higher quality on the part of the student (Barr, 2012). While a range of school types were surveyed in Dublin, two were fee-paying schools in affluent areas in Dublin. Thus, the higher WTP in this region may also be driven in part by geographical differences in ‘ability’ to pay. It is also worth noting that students in the BMW region have a high WTP for a university relative to an IoT. This is interesting in the context of the analysis presented in Chapters 2 and 3, which showed limited geographic accessibility to universities in the Border and North-West regions. In other words, despite the fact that students in the BMW region have a preference for a university relative to an IoT, these students are at a relative disadvantage with regard to geographic accessibility, which raises concerns regarding equity of access.

Significant heterogeneity in WTP is also found based on a student’s academic ability. Interestingly, higher ability students are willing to pay considerably more for both a good and excellent course reputation compared to lower ability students. This may have interesting implications from the perspective of human capital accumulation. The theoretical work of Mincer (1958), Becker (1964) and Ben Porath (1967) identified a link between lifecycle earnings and an individual’s decision to invest in human capital. They argue that the decision to invest in human capital will be determined by the expected

costs and returns from that investment. In the context of course reputation, those with higher expected returns and lower costs are likely to demand a higher quality education. Thus, higher ability students may be willing to pay more for higher quality due to a higher expected return. The finding that lower ability students place substantially less value on a superior course reputation compared to higher ability students may also suggest that they face higher costs, such as a greater time investment in academic work. This is in line with Card (2001) who found that lower ability students face higher marginal costs which is likely to affect their participation decisions.

Another interesting finding to emerge from the analysis is that lower ability students have a negative WTP for a university relative to an IoT, which may be driven by the fact that entry requirements for universities tend to be higher than those applied in IoTs. In addition to this, the staff to student ratio is lower in IoTs than universities (HEA, 2016b). This is likely to result in smaller class sizes and a higher level of academic support for students, which may be especially attractive to students of lower ability. From a policy perspective, this may have implications for the mix of higher education provision. In particular, there may be significant value in maintaining diverse higher education provision in Ireland. Finally, the availability of work placement is shown to be highly valued by students of all academic ability. Interestingly, lower ability students are willing to pay more for a HEI that offers work placements than for a HEI with an excellent course reputation, which suggests that these students may be more interested in courses that provide practical labour-market skills.

Interesting findings also emerge with regard to differences in WTP by socio-economic status. Consistent with expectations, students in the highest socio-economic group are willing to pay more for all attributes compared to those in the lower socio-economic groups, which may reflect a greater ability to pay on the part of these students (or their perceptions of their family's ability to pay). Notably, students in the highest socio-economic group are willing to pay twice the current fee level for an excellent course reputation relative to a fair course reputation. However, students in the lower socio-economic groups *are* willing to pay for HEI attributes which is notable given that the student fee attribute was presented as an annual upfront cost. Interestingly, the highest WTP for students in SE Group 3 is €3,109, which is roughly equivalent to the current student fee (€3,000 in 2016/17) and the current non-adjacent grant (€3,025 in 2016/17). According to Barr (2012), lack of information on the benefits of higher education may

cause students in lower socio-economic group to be risk averse, which in turn is likely to impact on the value that these students place on the attributes of a HEI.

When considering the findings of this analysis, a number of caveats should be borne in mind. Firstly, from a theoretical perspective, the course reputation attribute could be assumed to follow a log-normal distribution, as students are likely to prefer a good and excellent course reputation relative to a fair course reputation. However, with a correlated specification, a log-normal distribution for course reputation meant that the model failed to converge. Nonetheless, it is worth highlighting that a comparison of the log-likelihood, AIC and BIC between analogous uncorrelated models suggests that a model assuming all normal distributions produces a better model fit than a model in which course reputation is assumed to be log-normally distributed. Secondly, the use of interaction terms was considered for this analysis. However, given that the focus of the analysis is on comparing WTP across the various cohorts, it was felt that estimating separate models on the sub-groups would be more appropriate. Despite these caveats, the chapter makes an important methodological contribution to the education economic literature by examining heterogeneity in WTP for the attributes of HEIs using both the MXL and GMNL models. The analysis presented should also be useful to policymakers and institution managers seeking to design policy interventions aimed at increasing participation in higher education, as it provides them with interpretable information on how much different students value the attributes of HEIs.

# Chapter 8

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## Conclusion

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### 8.1 Introduction

This chapter provides a summary of the thesis and its main findings, as well as some conclusions relating to the limitations of the research and potential avenues for future research. To begin, Section 8.2 contains a summary of the key findings and policy implications from each chapter as they relate to the overall research goals stated in Chapter 1. Section 8.3 then discusses some limitations of the methodologies employed in the thesis, as well as some data issues. In Section 8.4, possible future research to address these limitations and to consider broader research issues in relation to higher education participation are discussed. Some final comments are then made in Section 8.5.

### 8.2 Main findings and policy implications

This thesis presented a body of research on the economics of higher education participation in Ireland, with a particular focus on geographic accessibility and student preferences. Within this context, Chapter 1 first provided a motivation for the research undertaken and identified the gaps in the literature which were addressed in subsequent chapters. A description of the institutional context within higher education in Ireland was provided and the current policy context for higher education in Ireland was also discussed. While a range of policy issues were outlined, issues of relevance to higher education participation form the motivation for this thesis. Empirical work investigating the key factors influencing progression to higher education has identified geographic accessibility to HEIs as one factor that may impact this decision. Related to this, 'localised' patterns of progression to HEIs have been identified in Ireland, which means that proximity to a specific HEI is a key factor in a student choosing to study at that institution. If geographic accessibility is limited, these localised patterns of progression will mean that proximity to a certain type of HEI will have a strong influence on the type of higher education, if any, an individual pursues. Despite this, no comprehensive measure of geographic accessibility has been developed for Ireland, and so the first aim

of this thesis was to fill this gap in the literature and shed some light on the extent and nature of geographic accessibility to higher education in Ireland.

To this end, Chapter 2 presented comprehensive measures of geographic accessibility to higher education on the island of Ireland. As an extension to this analysis, the chapter also explored the enrolment rates and mobility of those attending higher education in both jurisdictions, as this served to highlight trends in participation from a spatial viewpoint. Accessibility to higher education was shown to be relatively good in Northern Ireland, with certain regional disparities evident in the West, North-West, South-West and along the border counties in the Republic of Ireland. However, when differentiated by the type of HEI, geographic accessibility to universities in the Republic of Ireland was found to be poor relative to Northern Ireland. In addition to this, the analysis of enrolment and mobility rates suggested that there is an association between proximity to different types of HEIs and the type of education received by individuals, which provided further evidence of localised patterns of progression to HEIs in Ireland.

Building on this analysis, Chapter 3 employed a more sophisticated range of techniques and measures to examine geographic accessibility to university education in Ireland, with a particular focus on analysing the effects of recently proposed higher education policy reforms. The results showed significant variation in geographic accessibility to university across Ireland under the current system. Post-reform, the analysis revealed an improvement in accessibility to universities in the South-East and South-West of the country, while the Border and North-West regions continue to experience relatively poor accessibility. In terms of geographic inequality, the analysis suggested only a small reduction in system-wide inequalities. This is because while there are regions where relative accessibility will improve (e.g. the South-East), there are other regions that continue to face relatively poor accessibility post-reform (e.g. the North-West). From a policy perspective, Chapters 2 and 3 posed questions around the suitability of current geographically-adjusted financial supports available to students for higher education. The distance decay patterns in geographic accessibility that emerged from the spatial analysis suggested that a more step-wise and nuanced grant system would better address differences in geographic accessibility. In addition to this, the spatial analysis suggested that the proposed reforms to the higher education sector will do little to remove geographical impediments to university participation for those that are currently most disadvantaged from a spatial standpoint.

While geographic accessibility has been found to impact on a range of higher education decisions, other factors are also likely to play a role, both in the decision to progress to higher education, and in the institution choice of those who proceed to higher education. In order to understand what attributes of higher education provision are valued by students, the second aim of this thesis was to elicit student preferences for HEIs in Ireland using a DCE methodology. Chapter 4 of the thesis provided a detailed description of the design, development and administration of the DCE questionnaire. Following this, Chapter 5 used the data collected from the survey to provide descriptive statistics on some of the key variables of interest. The chapter also examined the importance and correlates of peer, sibling and parental influence on HEI choice, as well as the factors associated with whether or not an individual plans to live at home while attending higher education. Males were found to be more likely than females to be influenced by their peers, while mother's education and grant eligibility were found to be correlated with parental influence. With regard to the decision to live at home while attending higher education, friend and parental influence were found to play a role, while grant eligibility too was important.

Following this, Chapter 6 analysed responses from the choice experiment to provide a detailed examination of the preferences of prospective students for the attributes of HEIs. A latent class model was employed to account for heterogeneity in preferences and WTP estimates were derived for specific HEI attributes, while compensating surplus was estimated for different bundles of attributes. The results highlighted the presence of strong preference heterogeneity for the attributes of HEIs. Course reputation was found to be the most important determinant of institution choice, while the availability of work placement was also shown to be a highly valued institution attribute. These findings suggested that students place the highest value on attributes that are likely to lead to a labour market return, which implies that young people are motivated by the investment side of higher education. The estimation of compensating surplus highlighted that longer travel times result in a disutility for students leading to lower welfare gains. However, even with long travel times, students experienced substantial welfare gains from improvements in course reputation, as well as the availability of work placement opportunities. This suggests that students are willing to travel for a higher quality education.

Following on from this, Chapter 7 applied both mixed logit and generalised multinomial logit models to examine heterogeneity in WTP by region, academic ability and socio-economic status. This analysis showed that regional variation in WTP for the attributes of HEIs is substantial, which suggests that preferences are shaped by the characteristics of the region in which a student lives. For example, students living in the BMW region were found to have a high WTP for a university relative to an IoT. Thus, despite the limited geographic accessibility to university education in the Border and North-West regions, students in these regions place a high value on a university level education, which raises important equity of access issues. From a policy perspective, this finding suggests that more could be done to address accessibility to university education in the region.

Significant heterogeneity in WTP was also found based on a student's academic ability, with higher ability students willing to pay considerably more for both a good and excellent course reputation compared to lower ability students. Lower ability students were also found to have a negative WTP for a university relative to an IoT, which may have policy implications regarding the mix of higher education provision in Ireland. Finally, students in the highest socio-economic group were willing to pay more for all attributes compared to those in the lower socio-economic groups. However, there is a WTP on the part of students in the lower socio-economic group, which may prove insightful in the current debate surrounding higher education funding in Ireland.

### **8.3 Limitations of the research**

While this thesis provided a thorough examination of some of the factors influencing higher education participation in Ireland, there are a number of potential shortcomings that should be acknowledged. Although the main limitations of the research have already been acknowledged within the specific chapters, this section considers the limitations of the work at a more general level. Some of the limitations are directly related to the methodologies employed in the thesis, while others relate to the availability of appropriate data.

The methodologies employed in Chapters 2 and 3 are inter-related, and so there is crossover in terms of limitations of this analysis. Firstly, the analysis did not account for the availability of public transport, a factor which is likely to be very relevant for the population of interest. This omission is due to the lack of appropriate publically available

data on public transport in Ireland that is spatially referenced. However, if and when this data become available, the issue could be re-examined. Secondly, the analysis did not explore the types of individuals experiencing limited geographic accessibility. For example, it did not take account of the income level or socio-economic status of the individuals. This may be important as limited geographic accessibility is likely to have less of an impact on high-income households compared to low-income households. Thirdly, while the analysis presented is valuable in identifying regions experiencing poor accessibility, it does not include a multivariate analysis of the role of distance on higher education participation. Such analysis has been undertaken previously in Ireland (Cullinan et al., 2013). However, no new data has been made available in the interim, and so it is not possible to update this analysis. Finally, the analysis presented in Chapter 3 does not consider the full impact of the proposed policy reform on the higher education sector in Ireland. In particular, it does not take account of potential changes in the structure and composition of courses offered by the HEIs.

With regard to the analysis of preferences for the attributes of HEIs, no attempt was made in this thesis to estimate the economic value that parents may assign to HEIs. The research was limited in time and budget and therefore the values from this group were not explicitly captured. It is possible that their preferences may differ from those of prospective students and this could be examined in future research. A second possible weakness of the research is that the DCE methodology is limited in terms of the number of attributes that can be examined. While the literature review identified a wide range of potentially important attributes, not all could be considered using this approach. For example, attributes such as campus climate and extra-curricular activities may influence institution choice, but are not included in this analysis. Another potentially important factor which was not explicitly examined in the choice experiment was the cost and availability of rental accommodation. As this is currently an important public policy issue in Ireland, it may be useful to explore student preferences with respect to rental accommodation in the future.

However, there are a number of reasons why rental accommodation was not included as an attribute in the DCE. Firstly, given the findings from the spatial analysis, I was interested in exploring the importance of travel time relative to other attributes of HEIs. This was also informed by feedback from focus group discussion which identified travel time as important in determining institution choice. Secondly, rental accommodation

would only be relevant to respondents who planned to move away from home while attending higher education. This could result in attribute non-attendance on the part of respondents for whom renting is not a concern. Finally, and perhaps most importantly, including travel time as an attribute in the choice experiment precluded the use of a rental accommodation attribute due to correlation between the two attributes. Such correlation may have led to implausible combinations of attributes which in turn would require restrictions to be imposed on the experimental design.

## **8.4 Future research**

In order to address some of the limitations outlined above and in the specific chapters, as well as some broader research questions related to the economics of higher education participation in Ireland, this section considers some possible future research. Firstly, future research could consider preferences for the attributes of postgraduate education in Ireland. While Meginnis and Campbell (2017) explore preferences for attributes of postgraduate economics modules in Scotland, a valuation exercise could be employed to examine preferences for postgraduate education more generally. Another possibility would be to employ a DCE to explore parent preferences for HEIs, the results of which could be compared to the present study. Given the current policy debate surrounding the financing of higher education in Ireland, future work could also employ a DCE to assess student preferences for different higher education funding models in Ireland with a view to helping inform policy in the area.

A further avenue for research would be to consider alternative definitions of the HEI attributes than those used in this analysis. For example, institution rankings could be used in place of the course reputation attribute. There are a number of reasons why such a ranking attribute was not used in this analysis. Firstly, there is not the breadth of publically available rankings that specifically target student undergraduate choices in Ireland as exists in, say, the US. Also, the rankings that are available do not include IoTs (they cover universities only). In addition to this, feedback from focus group discussions suggested that students were largely unfamiliar with university rankings in Ireland. If and when rankings become available and widely used in Ireland, this issue could be re-examined. Moreover, future research could focus on student preferences for the quality and/or type of work placements available in HEIs, rather than on the availability of work placement as part of degree programmes at the HEI. Another possibility would be to conduct a

revealed preference study to examine student preferences for HEIs. However, access to appropriate data would be required which is not publically available in Ireland at present. While this is beyond the scope of this thesis, it could be considered in future work.

Finally, from an estimation point of view, the econometric analysis of preference heterogeneity for HEIs could be extended to allow for heterogeneous price sensitivities. To address this, a 'Mixture of Normals' approach could be employed to allow for different sensitivities to cost. This approach combines a standard continuous mixture approach with a discrete mixture approach. Specifically, the mixing distribution is itself a discrete mixture of more than one independently distributed Normal distribution. Thus, more than one distribution is allowed as not every respondent may be located on the same distribution (for example, a distribution may have more than one mode). This alternative representation could then be compared to the fixed cost models in preference and WTP space models.

## **8.5 Concluding remarks**

The strong public policy focus on increasing participation in higher education, along with the important benefits of higher education for both individuals and society, make the findings of this thesis both policy relevant and timely. The purpose of the thesis was to explore the economics of higher education participation in Ireland, looking specifically at geographic accessibility and student preferences for HEIs. The spatial analysis provided a context for the stated preference study, while also addressing important gaps in the literature relating to geographic accessibility to higher education in Ireland. A DCE was then used to explore student preferences for HEIs in Ireland, and travel time was included as an attribute in order to explore the importance of accessibility relative to other HEI attributes. The purpose of this analysis was to inform both HEI managers and policymakers on the aspects of higher education service provision most valued by students. The thesis also makes an important methodological contribution to the education economics literature regarding the way the stated preference data is modelled and, more importantly, how the assumptions underpinning the models can affect resulting welfare estimates. While some caveats to this research are identified, it nonetheless provides valuable insights into the role of geographic accessibility and HEI attributes in higher education participation decisions, which can help inform higher education policy in Ireland.

## Bibliography

- Adamowicz, W., Louviere, J. J. & Williams, M. 1994. Combining revealed and stated preference methods for valuing environmental amenities. *Journal of Environmental Economics and Management*, 26(3), 271-92.
- Apparicio, P., Abdelmajid, M., Riva, M. & Shearmur, R. 2008. Comparing alternative approaches to measuring the geographical accessibility of urban health services: Distance types and aggregation-error issues. *International Journal of Health Geographics*, 7(7), 1-14.
- Apparicio, P., Cloutier, M.-S. & Shearmur, R. 2007. The case of Montréal's missing food deserts: Evaluation of accessibility to food supermarkets. *International Journal of Health Geographics*, 6(4), 1-13.
- Appiah, S. & McMahon, W. W. 2002. The social outcomes of education and feedbacks on growth in Africa. *The Journal of Development Studies*, 38(4), 27-68.
- Balcombe, K., Bitzios, M., Fraser, I. & Haddock-Fraser, J. 2014. Using attribute importance rankings within discrete choice experiments: An application to valuing bread attributes. *Journal of Agricultural Economics*, 65(2), 446-462.
- Balogh, P., Békési, D., Gorton, M., Popp, J. & Lengyel, P. 2016. Consumer willingness to pay for traditional food products. *Food Policy*, 61(May), 176-184.
- Barr, N. 2012. *Economics of a welfare state*, Oxford: Oxford University Press.
- Barro, R. J. & Lee, J. W. 1993. International comparisons of educational attainment. *Journal of Monetary Economics*, 32(3), 363-394.
- Bateman, I. J., Jones, A. P., Lovett, A. A., Lake, I. R. & Day, B. H. 2002. Applying geographical information systems (GIS) to environmental and resource economics. *Environmental and Resource Economics*, 22(1), 219-269.

- Becker, G. 1964. *Human capital theoretical analysis with special reference to education*, New York: Columbia University Press for NBER.
- Ben Porath, Y. 1967. The production of human capital and the life cycle of earnings. *The Journal of Political Economy*, 75(4 (Part 1)), 352-365.
- Bhat, C. R. 1998. Accommodating flexible substitution patterns in multi-dimensional choice modeling: Formulation and application to travel mode and departure time choice. *Transportation Research Part B: Methodological*, 32(7), 455-466.
- Birol, E., Karousakis, K. & Koundouri, P. 2006a. Using a choice experiment to account for preference heterogeneity in wetland attributes: The case of Cheimaditida wetland in Greece. *Ecological Economics*, 60(1), 145-56.
- Birol, E., Smale, M. & Gyovai, A. 2006b. Using a choice experiment to estimate farmers' valuation of agrobiodiversity on Hungarian small farms. *Environmental and Resource Economics*, 34(4), 439-469.
- Bliemer, M. C. J. & Rose, J. M. 2011. Experimental design influences on stated choice outputs: An empirical study in air travel choice. *Transportation Research Part A*, 45(1), 69-79.
- Bliemer, M. C. J., Rose, J. M. & Hess, S. 2008. Approximation of bayesian efficiency in experimental choice designs. *Journal of Choice Modelling*, 1(1), 98-126.
- Blundell, R., Dearden, L., Goodman, A. & Reed, H. 2000. The returns to higher education in Britain: Evidence from a British cohort. *The Economic Journal*, 110(February), F82-F99.
- Boxall, P., Adamowicz, W. L. & Moon, A. 2009. Complexity in choice experiments: Choice of the status quo alternative and implications for welfare measurement. *The Australian Journal of Agricultural and Resource Economics*, 53(4), 503-519.
- Brabyn, L. & Skelly, C. 2002. Modeling population access to New Zealand public hospitals. *International Journal of Health Geographics*, 1(3), 1-9.

- Bridges, J. F. P., Hauber, A. B., Marshall, D., Lloyd, A., Prosser, L. A., Regier, D. A., Johnson, F. R. & Mauskopf, J. 2011. Conjoint analysis applications in health - a checklist: A report of the ISPOR good research practices for conjoint analysis task force. *Value in Health*, 14(4), 403-413.
- Briggs, S. 2006. An exploratory study of the factors influencing undergraduate student choice: The case of higher education in Scotland. *Studies in Higher Education*, 31(6), 705-722.
- Briggs, S. & Wilson, A. 2007. Which university? A study of the influence of cost and information factors on Scottish undergraduate choice. *Journal of Higher Education Policy and Management*, 29(1), 57-72.
- British Council 2012. The shape of things to come: Higher education global trends and emerging opportunities to 2020. London: British Council.
- Broecke, S. 2012. University selectivity and earnings: Evidence from UK data on applications and admissions to university. *Economics of Education Review*, 31(3), 96-107.
- Broekemier, G. M. & Seshadri, S. 2000. Differences in college choice criteria between deciding students and their parents. *Journal of Marketing for Higher Education*, 9(3), 1-13.
- Brownstone, D. & Train, K. 1999. Forecasting new product penetration with flexible substitution patterns. *Journal of Econometrics*, 89(1-2), 109-129.
- Burge, P., Woo Kim, C., Rohr, C., Frearson, M. & Guerin, B. 2014. Understanding the impact of differential university fees in England. Cambridge: RAND Europe.
- Burgess, L. & Street, D. J. 2003. Optimal designs for 2k choice experiments. *Communications in Statistics – Theory & Methods*, 32(11), 2185-2206.
- Callender, C. & Jackson, J. 2008. Does the fear of debt constrain choice of university and subject of study? *Studies in Higher Education*, 33(4), 405-429.

- Campbell, D., Hensher, D. A. & Scarpa, R. 2011. Non-attendance to attributes in environmental choice analysis: A latent class specification. *Journal of Environmental Planning and Management*, 54(8), 1061-1076.
- Campbell, D., Hutchinson, W. G. & Scarpa, R. 2008. Incorporating discontinuous preferences into the analysis of discrete choice experiments. *Environmental and Resource Economics*, 41, 401–417.
- Campbell, D., Hutchinson, W. G. & Scarpa, R. 2009. Using choice experiments to explore the spatial distribution of willingness to pay for rural landscape improvements. *Environment and Planning A*, 41(1), 97-111.
- Card, D. 2001. Estimating the returns to schooling: Progress on some persistent econometric problems. *Econometrica*, 69(5), 1127-1160.
- Carlsson, F. & Martinsson, P. 2003. Design techniques for stated preference methods in health economics. *Health Economics*, 12(4), 281–294.
- Carson, R. T., Mitchell, R. C., Hanemann, M., Kopp, R. J., Presser, S. & Ruud, P. A. 2003. Contingent valuation and lost passive use: Damages from the Exxon Valdez oil spill. *Environmental and Resource Economics*, 25(3), 257–86.
- Castriota, S. 2006. Education and happiness: A further explanation to the Easterlin Paradox? *CEIS Working Paper No. 246*.
- Central Statistics Office. 2016. *Government Finance Statistics - Annual* [Online]. Dublin: Central Statistics Office. Available: <http://www.cso.ie/en/releasesandpublications/er/gfsa/governmentfinancestatisticapril2016/> [Accessed 31/05/2016].
- Central Statistics Office (CSO). 2011a. *Census 2011: This is Ireland (Part 2)* [Online]. Dublin: Central Statistics Office. Available: <http://www.cso.ie/en/census/census2011reports/census2011thisisirelandpart2/> [Accessed 27/06/2016].

- Central Statistics Office (CSO) 2011b. Census of population. Dublin.
- Chapman, D. W. 1981. A model of student college choice. *The Journal of Higher Education*, 52(5), 490-505.
- Cheng, S. & Long, J. S. 2007. Testing for IIA in the multinomial logit model. *Sociological Methods & Research*, 35(4), 583-600.
- Citizen Information. 2016. *Third level student fees and charges* [Online]. Available: [http://www.citizensinformation.ie/en/education/third\\_level\\_education/fees\\_and\\_supports\\_for\\_third\\_level\\_education/fees.html](http://www.citizensinformation.ie/en/education/third_level_education/fees_and_supports_for_third_level_education/fees.html) [Accessed 31/01/2017].
- Citizens Information. 2016. *Student grant scheme* [Online]. Available: [http://www.citizensinformation.ie/en/education/third\\_level\\_education/fees\\_and\\_supports\\_for\\_third\\_level\\_education/maintenance\\_grant\\_schemes\\_for\\_students\\_on\\_third\\_level\\_courses.html](http://www.citizensinformation.ie/en/education/third_level_education/fees_and_supports_for_third_level_education/maintenance_grant_schemes_for_students_on_third_level_courses.html) [Accessed 31/01/2017].
- Clancy, P. 1995. *Access to college: Patterns of continuity and change*, Dublin: Higher Education Authority.
- Cullinan, J. 2011. A spatial microsimulation approach to estimating the total number and economic value of site visits in travel cost modelling. *Environmental and Resource Economics*, 50(1), 27-47.
- Cullinan, J., Flannery, D., Walsh, S. & McCoy, S. 2013. Distance effects, social class and the decision to participate in higher education in Ireland. *The Economic and Social Review*, 44(1), 19-51.
- Cullinan, J. & Halpin, B. 2017. A spatial economic perspective on higher education choices. In: Cullinan, J. & Flannery, D. (eds.) *Economic insights on higher education policy in Ireland: Evidence from a public system*. London: Palgrave MacMillan.
- Cullinan, J., Hynes, S. & O'Donoghue, C. 2008. Estimating catchment area population indicators using network analysis. *Irish Geography*, 41, 279-294.

- Cullinan, J., Hynes, S. & O'Donoghue, C. 2011. Using spatial microsimulation to account for demographic and spatial factors in environmental benefit transfer. *Ecological Economics*, 70(4), 813-824.
- Dao, M. T. N. & Thorpe, A. 2015. What factors influence Vietnamese students' choice of university? *International Journal of Educational Management*, 29(5), 666 - 681.
- DARE. 2014. *Disability Access Route to Education* [Online]. Available: <http://accesscollege.ie/dare/> [Accessed 12/04/2017].
- de Bekker-Grob, E. W., Hol, L., Donkers, B., van Dam, L., Habbema, J. D. F., van Leerdam, M. E., Kuipers, E. J., Essink-Bot, M. L. & Steyerberg, E. W. 2010. Labeled versus unlabeled discrete choice experiments in health economics: An application to colorectal cancer screening. *Value in Health*, 13(2), 315-323.
- Denny, K. 2014. The effect of abolishing university tuition costs: Evidence from Ireland. *Labour Economics*, 26(January), 26-33.
- Department of Education 1965. *Investment in education: Report of the survey team appointed by the Minister of Education in October, 1962*. Dublin: Stationary Office.
- Department of Education and Science 2005. *DEIS (Delivering Equality of Opportunity in Schools): An action plan for educational inclusion*. Dublin: Department of Education and Science.
- Department of Education and Skills 2000. *Key education statistics 1989/90 to 1999/2000*. Dublin: Department of Education and Skills.
- Department of Education and Skills 2013. *Key statistics 2012-2013*. Dublin: Department of Education and Skills.
- Department of Education and Skills 2016a. *Ireland's National Skills Strategy 2025*. Dublin: Department of Education and Skills.

Department of Education and Skills 2016b. Key Statistics 2014/2015 and 2015/2016. Dublin: Department of Education and Skills.

Department of Employment and Learning 2016a. Enrolments on higher education courses at Northern Ireland higher education institutions and Northern Ireland further education colleges - 1985/86 to 2014/15. Belfast: Department of Employment and Learning.

Department of Employment and Learning 2016b. Securing a sustainable solution for higher education in Northern Ireland: An options paper. Belfast: Department of Employment and Learning.

Department of Employment and Learning & Department of Education and Skills 2015. An analysis of existing statistics on student flows between Northern Ireland and the Republic of Ireland in higher education and further education. Dublin: Department of Education and Skills.

Department of Social and Family Affairs 2007. National Action Plan for Social Inclusion 2007-2016. Dublin: Stationary Office.

Drewes, T. & Michael, C. 2006. How do students choose a university? An analysis of applications to universities in Ontario, Canada. *Research in Higher Education*, 47(7), 781-800.

Drydakis, N. 2016. The effect of university attended on graduates' labour market prospects: A field study of Great Britain. *Economics of Education Review*, 52(June), 192-208.

Dunnett, A., Moorhouse, J., Walsh, C. & Barry, C. 2012. Choosing a university: A conjoint analysis of the impact of higher fees on students applying for university in 2012. *Tertiary Education and Management*, 18(3), 199-220.

Expert Group 2016. Investing in national ambition: A strategy for funding higher education. Dublin: Department of Education and Skills.

- Fiebig, D. G., Keane, M. P., Louviere, J. & Wasi, N. 2010. The generalized multinomial logit model: Accounting for scale and coefficient heterogeneity. *Marketing Science*, 29(3), 393-421.
- Finch, H., Lewis, J. & Turley, C. 2014. Focus Groups. *In: Ritchie, J., Lewis, J., Mcnaughton Nicholls, C. & Ormston, R. (eds.) Qualitative research practice: a guide for social science students and researchers*. London: SAGE Publications Ltd.
- Flannery, D. & Cullinan, J. 2014. Where they go, what they do and why it matters: The importance of geographic accessibility and social class for decisions relating to higher education institution type, degree level and field of study. *Applied Economics*, 46(24), 2952-2965.
- Flannery, D., Doris, A. & Chapman, B. 2017. Student financing of higher education. *In: Cullinan, J. & Flannery, D. (eds.) Economic insights on higher education policy in Ireland: Evidence from a public system*. London: Palgrave MacMillan.
- Flannery, D., Kennelly, B., Doherty, E., Hynes, S. & Considine, J. 2013. Of mice and pens: A discrete choice experiment on student preferences for assignment systems in economics. *International Review of Economics Education*, 14(September), 57-70.
- Flannery, D. & O'Donoghue, C. 2009. The determinants of higher education participation in Ireland: A micro analysis. *The Economic and Social Review*, 40(1), 73-107.
- Flannery, D. & O'Donoghue, C. 2013. The demand for higher education: A static structural approach accounting for individual heterogeneity and nesting patterns. *Economics of Education Review*, 34(June), 243-257.
- Flynn, T. N., Louviere, J. J., Peters, T. J. & Coast, J. 2010. Using discrete choice experiments to understand preferences for quality of life. Variance-scale heterogeneity matters. *Social Science & Medicine*, 70(12), 1957-1965.

- Forsyth, A. & Furlong, A. 2000. *Socioeconomic disadvantage and access to higher education*, Bristol: Policy Press.
- Frenette, M. 2006. Too far to go on? Distance to school and university participation. *Education Economics*, 14(1), 31-58.
- Gastner, M. T. & Newman, M. E. J. 2004. Diffusion-based method for producing density-equalising maps. *Proceedings of the National Academy of Sciences*, 101(20), 7499-7504.
- Gibbons, S. & Vignoles, A. 2012. Geography, choice and participation in higher education in England. *Regional Science and Urban Economics*, 42(1-2), 98-113.
- Gong, X. & Hyuybers, T. 2015. Chinese students and higher education destinations: Findings from a choice experiment. *Australian Journal of Education*, 59(2), 196-218.
- Government of Ireland 2012. Qualifications and Quality Assurance (Education and Training) Act 2012. Dublin: Government of Ireland.
- Greene, W. & Hensher, D. A. 2010. Does scale heterogeneity across individuals matter? An empirical assessment of alternative logit models. *Transportation*, 37(3), 413-428.
- Greene, W. H. & Hensher, D. A. 2003. A latent class model for discrete choice analysis: Contrasts with mixed logit. *Transportation Research Part B*, 37(8), 681-698.
- Grisolía, J. M., Longo, A., Boeri, M., Hutchinson, G. & Kee, F. 2013. Trading off dietary choices, physical exercise and cardiovascular disease risks. *Social Science and Medicine*, 93(September), 130-138.
- Grossman, M. 2006. Education and non-market outcomes. In: Hanushek, E. & Welch, F. (eds.) *Handbook of the Economics of Education*. Amsterdam: Elsevier-North.

- Grubb, W. 1993. The varied economic returns to postsecondary education: New evidence from the class of 1972. *Journal of Human Resources*, 28(2), 365-382.
- Gu, Y., Hole, A. R. & Knox, S. 2013. Fitting the generalized multinomial logit model in Stata. *The Stata Journal*, 13(2), 382-397.
- Hagel, P. & Shaw, R. N. 2010. How important is study mode in student university choice? *Higher Education Quarterly*, 64(2), 161-182.
- Hanley, N., Ryan, M. & Wright, R. 2003. Estimating the monetary value of health care: Lessons from environmental economics. *Health Economics*, 12(1), 3-16.
- Hausman, J. & Mc Fadden, D. 1984. Specification tests for the multinomial logit model. *Econometrica*, 52(5), 1219-1240.
- HEA 2010a. Review of student charge. Dublin: Higher Education Authority.
- HEA 2010b. A study of progression in Irish higher education. Dublin: Higher Education Authority.
- HEA 2013a. Age of all full-time undergraduate new entrants at 1st January 2013 in universities. Dublin: Higher Education Authority.
- HEA 2013b. Report to the Minister for Education and Skills on system reconfiguration, inter-institutional collaboration and system governance in Irish higher education. Dublin: Higher Education Authority.
- HEA 2013c. Towards a performance evaluation framework: Profiling Irish higher education. Dublin: Higher Education Authority.
- HEA 2014a. Consultation Paper: Towards the development of a new National Plan for Equity of Access to Higher Education. Dublin: Higher Education Authority.
- HEA 2014b. Higher education system performance: First report 2014-16: Institutional and sectoral profiles 2011-12. Dublin: Higher Education Authority.

- HEA 2015a. Higher education: Key facts and figures 2014-15. Dublin: Higher Education Authority.
- HEA 2015b. National Plan for Equity of Access to Higher Education 2015-2019. Dublin: Higher Education Authority.
- HEA 2015c. Student grant recipients from a first year full-time undergraduate new entrant cohort for the academic year 2013/14 in HEA funded institutions. Dublin: Higher Education Authority.
- HEA 2016a. Brexit and Irish higher education and research: Challenges and opportunities. Dublin: Higher Education Authority.
- HEA 2016b. Higher education system performance: Institutional and sectoral profiles 2013/14. Dublin: Higher Education Authority.
- HEA 2016c. A study of progression in Irish higher education 2012/13 to 2013/14. Dublin: Higher Education Authority.
- HEAR. 2014. *Higher Education Access Route* [Online]. Available: <http://accesscollege.ie/hear/> [Accessed 12/04/2017].
- HEFCE 2012. POLAR 3: Young participation rates in higher education. London: Higher Education Funding Council for England.
- HEFCW 2009. Participation rates for Welch students in higher education within the UK during 2006/07. Cardiff: Higher Education Funding Council for Wales.
- Hensher, D. A., Rose, J. & Greene, W. H. 2005. The implications on willingness to pay of respondents ignoring specific attributes. *Transportation*, 32(3), 203-222.
- Hensher, D. A., Rose, J. M. & Greene, W. H. 2012. Inferring attribute non-attendance from stated choice data: Implications for willingness to pay estimates and a warning for stated choice experiment design. *Transportation*, 39(2), 235-245.

- Hensher, D. A., Rose, J. M. & Greene, W. H. 2015. *Applied choice analysis*, Cambridge: Cambridge University Press.
- Hess, S. & Hensher, D. A. 2013. Making use of respondent reported processing information to understand attribute importance: A latent variable scaling approach. *Transportation* 40(2), 397-412.
- Holdsworth, D. K. & Nind, D. 2006. Choice modeling New Zealand high school seniors' preferences for university education. *Journal of Marketing for Higher Education*, 15(2), 81-102.
- Hole, A. R. 2007. Fitting mixed logit models by using maximum simulated likelihood. *The Stata Journal*, 7(3), 388-401.
- Hole, A. R. 2008. Modelling heterogeneity in patients' preferences for the attributes of a general practitioner appointment. *Journal of Health Economics*, 27(4), 1078–1094.
- Hole, A. R. 2011. A discrete choice model with endogenous attribute attendance. *Economics Letters*, 110(3), 203-205.
- Hole, A. R. & Kolstad, J. R. 2012. Mixed logit estimation of willingness to pay distributions: A comparison of models in preference and WTP space using data from a health-related choice experiment. *Empirical Economics*, 42(2), 445-469.
- Hole, A. R., Kolstad, J. R. & Gyrd-Hansen, D. 2013. Inferred vs. stated attribute non-attendance in choice experiments: A study of doctors' prescription behaviour. *Journal of Economic Behavior & Organization*, 96(December), 21-31.
- Hooley, G. J. & Lynch, J. E. 1981. Modelling the student university choice process through the use of conjoint measurement techniques. *European Research*, 9(4), 158-170.

- Hossler, D. & Gallagher, K. S. 1987. Studying student college choice: A three-phase model and the implications for policymakers. *College and university*, 62(3), 207-621.
- Houses of the Oireachtas 2014. Report on the general scheme of a Technological Universities Bill. Dublin: Joint Committee on Education and Social Protection.
- Huber, J. & Zwerina, K. 1996. The importance of utility balance in efficient choice designs. *Journal of Marketing Research*, 33(August), 307-317.
- Humburg, M. & van der Velden, R. 2015. Skills and the graduate recruitment process: Evidence from two discrete choice experiments. *Economics of Education Review*, 49(December), 24-41.
- Huybers, T., Louviere, J. & Islam, T. 2015. What determines student satisfaction with university subjects? A choice-based approach. *The Journal of Choice Modelling*, 17(December), 52-65.
- Hynes, S., Hanley, N. & Scarpa, R. 2008. Effects on welfare measures of alternative means of accounting for preference heterogeneity in recreational demand models. *American Journal of Agricultural Economics* 90(4), 1011-1027.
- Jin, Y., Mjelde, J. W. & Litzenberg, K. K. 2014. Economic analysis of job-related attributes in undergraduate students' initial job selection. *Education Economics*, 22(3), 305-327.
- Johnes, G. 1993. *The economics of education*, London: The MacMillan Press Ltd.
- Johnes, G. & Johnes, J. 2004. *International handbook on the economics of education*, Cheltenham, UK: Edward Elgar Publishing Ltd.
- Johnson, F. R., Lancsar, E., Marshall, D., Kilambi, V., Muhlbacher, A., Regier, D. A., Bresnahan, B. W., Kanninen, B. & Bridges, J. F. P. 2013. Constructing experimental designs for discrete-choice experiments: Report of the ISPOR

- conjoint analysis experimental design good research practices task force. *Value in Health*, 16(1), 3-13.
- Joseph, M. & Joseph, B. 1998. Identifying needs of potential students in tertiary education for strategy development. *Quality Assurance in Education*, 6(2), 90-96.
- Kalogirou, S. & Foley, R. 2006. Health, place and Hanly: Modelling accessibility to hospitals in Ireland. *Irish Geography*, 39(1), 52-68.
- Kanninen, B. J. 2002. Optimal design for multinomial choice experiments. *Journal of Marketing Research*, 39(2), 214-227.
- Kaplowitz, M. D. & Hoehn, J. P. 2001. Do focus groups and individual interviews reveal the same information for natural resource valuation? *Ecological Economics*, 36(2), 237-247.
- Kavrouidakis, D., Ballas, D. & Birkin, M. 2013. Using spatial microsimulation to model social and spatial inequalities in educational attainment. *Applied Spatial Analysis and Policy*, 6(1), 1-23.
- Kee, J. & Sia, M. 2013. University choice: Implications for marketing and positioning. *Education*, 3(1), 7-14.
- Kelly, E., O'Connell, P. J. & Smyth, E. 2010. The economic returns to field of study and competencies among higher education graduates in Ireland. *Economics of Education Review*, 29(4), 650-657.
- Krueger, R. A. & Casey, M. A. 2009. *Focus groups: A practical guide for applied research*, London: Sage Publications Ltd.
- Lagarde, M. 2013. Investigating attribute non-attendance and its consequences in choice experiments with latent class models. *Health Economics*, 22(5), 554-567.

- Lancaster, K. J. 1966. A new approach to consumer theory. *The Journal of Political Economy*, 74(2), 132-157.
- Lancsar, E. & Louviere, J. 2008. Conducting discrete choice experiments to inform healthcare decision making. *Pharmacoeconomics*, 26(8), 661-677.
- Lillis, D. & Lynch, M. 2014. New challenges for strategy development in Irish higher education institutions. *Higher Education Policy*, 27(2), 279-300.
- Lochner, L. 2011. Nonproduction benefits of education: Crime, health and good citizenship. In: Hanushek, E., Machin, S. & Woessmann, L. (eds.) *Handbook of the Economics of Education*. Amsterdam: North Holland.
- Long, B. T. 2004. How have college decisions changed over time? An application of the conditional logistic choice model. *Journal of Econometrics*, 121(1-2), 271-296.
- Long, J. S. & Freese, J. 2001. *Regression models for categorical dependent variables using Stata*, Texas: Stata Press.
- López, R., Thomas, V. & Wang, Y. 1998. Addressing the education puzzle: The distribution of education and economic reforms. *World Bank Working Papers*, (2031).
- Louviere, J. J., Flynn, T. N. & Carson, R. T. 2010. Discrete choice experiments are not conjoint analysis. *Journal of Choice Modelling*, 3(3), 57-72.
- Louviere, J. J., Hensher, D. A. & Swait, J. D. 2000. *Stated choice methods: Analysis and application*, New York: Cambridge University Press.
- Lucas, R. E. 1988. On the mechanisms of economic development. *Journal of Monetary Economics*, 22(July), 3-42.
- Luce, R. D. 1959. *Individual choice behavior: A theoretical analysis*, New York: Wiley.

- Maas, J. v. L. & Criel, G. 1982. Distribution of primary school enrollments in eastern Africa. *World Bank Staff Working Papers*, 511.
- Manski, C. F. 1977. The structure of random utility models. *Theory and Decision*, 8(3), 229-254.
- Maringe, F. 2006. University and course choice. *International Journal of Educational Management*, 20(6), 466-479.
- Mas-Colell, A., Whinston, M. D. & Green, J. R. 1995. *Microeconomic theory*, New York: Oxford University Press.
- Mason, G., Williams, G. & Cranmer, S. 2009. Employability skills initiatives in higher education: What effects do they have on graduate labour market outcomes? *Education Economics*, 17(1), 1-30.
- McCoy, S. & Byrne, D. 2011. 'The sooner the better I could get out of there': Barriers to higher education access in Ireland. *Irish Educational Studies*, 30(2), 141-157.
- McCoy, S., Calvert, E., Smyth, E. & Darmody, M. 2009. Study on the costs of participation in higher education. Dublin: Higher Education Authority.
- McCoy, S. & Smyth, E. 2011. Higher education expansion and differentiation in the Republic of Ireland. *Higher Education*, 61(3), 243-260.
- McCoy, S., Smyth, E., Watson, D. & Darmody, M. 2014. Leaving school in Ireland: A longitudinal study of post-school transitions. *ESRI Research Series*, Number 36.
- McFadden, D. 1974. Conditional logit analysis of qualitative choice behaviour. In: Zarembka, P. (ed.) *Frontiers in econometrics*. New York: Academic Press.
- McGuinness, S. 2003. University quality and labour market outcomes. *Applied Economics*, 35(18), 1943-1955.

- McGuinness, S., Bergin, A., Kelly, E., McCoy, S., Smyth, E. & Timoney, K. 2013. A study of future demand for higher education in Ireland. *ESRI Research Series*. Dublin.
- McGuinness, S., Whelan, A. & Bergin, A. 2015. Recruitment methods and educational provision effects on graduate over-education and over-skilling. *STYLE Working Papers*, WP 5.4.
- McMahon, W. W. 2004. The social and external benefits of education *In: Johnes, G. & Johnes, J. (eds.) International Handbook on the Economics of Education*. Cheltenham: Edward Elgar Publishing Ltd.
- McMahon, W. W. & Oketch, M. 2013. Education's effects on individual life chances and on development: An overview. *British Journal of Educational Studies*, 61(1), 79-107.
- McQuaid, R. & Hollywood, E. 2008. Educational migration and non-return in Northern Ireland: A report prepared for the equality commission for Northern Ireland. Belfast: The Equality Commission for Northern Ireland.
- Meginnis, K. & Campbell, D. 2017. Students' preferences for attributes of postgraduate economics modules: Evidence from a multi-profile best-worst scaling survey. *International Review of Economics Education*, 24(January), 18-27.
- Metcalf, A. S. 2009. The geography of access and excellence: Spatial diversity in higher education system design. *Higher Education*, 58(2), 205–220.
- Michaels-Igbokwe, C., Lagarde, M. & Cairns, J. 2015. Designing a package of sexual and reproductive health and HIV outreach services to meet the heterogeneous preferences of young people in Malawi: Results from a discrete choice experiment. *Health Economics Review*, 5(1), 1-19.
- Mincer, J. 1958. Investment in human capital and personal income redistribution. *Journal of Political Economy*, 66(4), 281-302.

- Munley, V. G., Garvey, E. & McConnell, M. J. 2010. The effectiveness of peer tutoring on student achievement at the university level. *The American Economic Review*, 100(2), 277-282.
- National Council for Curriculum and Assessment. 2017. *The Leaving Certificate (Established)* [Online]. Available: [http://ncca.ie/en/Curriculum and Assessment/Post-Primary Education/Senior Cycle/Overview-of-Senior-Cycle/Leaving Certificate Established /The Leaving Certificate Established .html](http://ncca.ie/en/Curriculum_and_Assessment/Post-Primary_Education/Senior_Cycle/Overview-of-Senior-Cycle/Leaving_Certificate_Established_/The_Leaving_Certificate_Established_.html) [Accessed 10/03/2017].
- Newman, C. 2011. Education: Market failure and Government interventions. In: O' Hagan, J. & Newman, C. (eds.) *The economy of Ireland: National and sectoral policy issues*. Dublin: Gill & Macmillan.
- Ninth Level Ireland 2016. Sunday Times league table.
- Nora, A. 2004. The role of habitus and cultural capital in choosing a college, transitioning from high school to higher education, and persisting in college among minority and nonminority students. *Journal of Hispanic Higher Education*, 3(2), 180-208.
- Northern Ireland Statistics and Research Agency (NISRA) 2011. Census 2011. Belfast.
- Norton, D. & Hynes, S. 2014. Valuing the non-market benefits arising from the implementation of the EU Marine Strategy Framework Directive. *Ecosystem Services*, 10(December), 84–96.
- O'Connell, P. J., Clancy, D. & McCoy, S. 2006. Who went to college in 2004? A national survey of new entrants to higher education. Dublin: Higher Education Authority.
- Obermeit, K. 2012. Students' choice of universities in Germany: Structure, factors and information sources used. *Journal of Marketing for Higher Education*, 22(2), 206-230.

- OECD 2006. Reviews of national policies for education - higher education in Ireland. Paris: OECD Publishing.
- Ordine, P. & Rose, G. 2015. The effect of family background, university quality and educational mismatch on wage: An analysis using a young cohort of Italian graduates. *Education Economics*, 23(2), 213-237.
- Osborne, R. 2006. Access to and participation in higher education in Northern Ireland. *Higher Education Quarterly*, 60(4), 333-348.
- Owusu Coffie, R., Burton, M. P., Gibson, F. L. & Hailu, A. 2016. Choice of rice production practices in Ghana: A comparison of willingness to pay and preference space estimates. *Journal of Agricultural Economics*, 67(3), 799-819.
- Özdemir, S., Johnson, F. R. & Hauber, A. B. 2009. Hypothetical bias, cheap talk and stated willingness to pay for health care. *Journal of Health Economics*, 28(4), 894-901.
- Paulsen, M. B. 1990. College choice: Understanding student enrolment behaviour. *ASHE-ERIC Higher Education Reports*. Washington D.C.: The George Washington University.
- Pindyck, R. S. & Rubinfeld, D. L. 2013. *Microeconomics*, New York: Pearson.
- Price, I., Matzdorf, F., Smith, L. & Agahi, H. 2003. The impact of facilities on student choice of university. *Facilities*, 21(10), 212-222.
- Psacharopoulos, G. & Patrinos, H. A. 2004. Returns to investment in education: A further update. *Education Economics*, 12(2), 111-134.
- Psacharopoulos, G. & Patrinos, H. A. 2008. Education and human capital. In: Dutt, A. K. & Ros, J. (eds.) *International Handbook of Development Economics*. Cheltenham: Edward Elgar.

- Qian, X. & Smyth, R. 2008. Measuring regional inequality of education in China: Widening coast-inland gap or widening rural-urban gap. *Journal of International Development*, 20(2), 132–144.
- Reay, D., David, M. E. & Ball, S. J. 2005. *Degrees of choice: Social class, race and gender in higher education*, Staffordshire: Trentham Books Limited.
- Revelt, D. & Train, K. 1998. Mixed logit with repeated choices: Households' choices of appliance efficiency level. *The Review of Economics and Statistics*, 80(4), 647-657.
- Rey, S. J. & Smith, R. J. 2013. A spatial decomposition of the Gini coefficient. *Letters in Spatial and Resource Sciences*, 6(2), 55-70.
- Romer, P. M. 1990. Endogenous technological change. *Journal of Political Economy*, 98(5), S71-S102.
- Rose, J. M. & Bliemer, M. C. J. 2009. Constructing efficient stated choice experimental designs. *Transport Reviews: A Transnational Transdisciplinary Journal*, 29(5), 587-617.
- Rose, J. M. & Masiero, L. 2010. A comparison of the impacts of aspects of prospect theory on WTP/WTA estimated in preference and WTP/WTA space. *European Journal of Transport and Infrastructure Research*, 10(4), 330-346.
- Ryan, J. 2017. Time to get moving on technological universities. *The Irish Times*.
- Ryan, M., Bate, A., Eastmond, C. J. & Ludbrook, A. 2001. Use of discrete choice experiments to elicit preferences. *Quality in Health Care*, 10(Supplement D), i55–i60.
- Ryan, M. & Gerard, K. 2003. Using discrete choice experiments to value health care programmes: Current practice and future research reflections. *Applied Health Economics and Health Policy*, 2(1), 55-64.

- Ryan, M., Gerard, K. & Amaya-Amaya, M. 2008. *Using discrete choice to value health and health care*, Dordrecht: Springer.
- Sá, C., Florax, R. J. G. M. & Rietveld, P. 2006. Does accessibility to higher education matter? Choice behaviour of high school graduates in the Netherlands. *Spatial Economic Analysis*, 1(2), 155-174.
- Sá, C., Florax, R. J. G. M. & Rietveld, P. 2012. Living arrangements and university choice of Dutch prospective students. *Regional Studies*, 46(5), 651-667.
- Sá, C., Tavares, D. A., Justino, E. & Amaral, A. 2011. Higher education (related) choices in Portugal: Joint decisions on institution type and leaving home. *Studies in Higher Education*, 36(6), 689-703.
- Sándor, Z. & Wedel, M. 2001. Designing conjoint choice experiments using managers' prior beliefs. *Journal of Marketing Research*, 38(4), 430-444.
- Scarpa, R., Campbell, D. & Hutchinson, W. G. 2007. Benefit estimates for landscape improvements: Sequential Bayesian design and respondents' rationality in a choice experiment. *Land Economics*, 83(4), 617-634.
- Scarpa, R., Gilbride, T. J., Campbell, D. & Hensher, D. A. 2009. Modelling attribute non-attendance in choice experiments for rural landscape valuation. *European Review of Agricultural Economics*, 36(2), 151-174.
- Scarpa, R. & Thiene, M. 2005. Destination choice models for rock climbing in the Northeastern Alps: A latent class approach based on intensity of preferences. *Land Economics*, 81(3), 426-444.
- Scarpa, R., Thiene, M. & Train, K. 2008. Utility in willingness to pay space: A tool to address confounding random scale effects in destination choice to the Alps. *American Journal of Agricultural Economics*, 90(4), 994-1010.

- Scarpa, R. & Willis, K. 2010. Willingness-to-pay for renewable energy: Primary and discretionary choice of British households' for micro-generation technologies. *Energy Economics*, 32(1), 129-136.
- Scarpa, R., Zanolì, R., Bruschi, V. & Naspètti, S. 2012. Inferred and stated attribute non-attendance in food choice experiments. *American Journal of Agricultural Economics*, 95(1), 165-180.
- Schofer, J. P. 1975. Determining optimal college locations. *Higher Education*, 4(2), 227-232.
- Schuller, T., Bynner, J., Green, A., Blackwell, L., Hammond, C., Preston, J. & Gough, M. 2001. *Modelling and measuring the wider benefits of learning: A synthesis*: Institution of Education: Centre for research on the wider benefits of learning.
- Schultz, T. W. 1961. Investment in human capital. *The American Economic Review*, 51(1), 1-17.
- Senadza, B. 2012. Education inequality in Ghana: Gender and spatial dimensions. *Journal of Economic Studies*, 39(6), 724 - 739.
- Shah, M., Nair, C. S. & Bennett, L. 2013. Factors influencing student choice to study at private higher education institutions. *Quality Assurance in Education*, 21(4), 402 - 416.
- Sheret, M. 1988. Equality trends and comparisons for the education system of Papua New Guinea. *Studies in Educational Evaluation*, 14(1), 91-112.
- Simões, C. & Soares, A. M. 2010. Applying to higher education: Information sources and choice factors. *Studies in Higher Education*, 35(4), 371-389.
- Smith, H. 2007. Playing a different game: The contextualised decision-making processes of minority ethnic students in choosing a higher education institution. *Race Ethnicity and Education*, 10(4), 415-437.

- Solow, R. 1956. A contribution to the theory of economic growth. *Quarterly Journal of Economics*, February, 65-94.
- Sonnier, G., Ainslie, A. & Otter, T. 2007. Heterogeneity distributions of willingness-to-pay in choice models. *Quantitative Marketing and Economics*, 5(3), 313-331.
- Soutar, G. N. & Turner, J. P. 2002. Students' preferences for university: A conjoint analysis. *International Journal of Educational Management*, 16(1), 40-45.
- Spiess, C. K. & Wrohlich, K. 2010. Does distance determine who attends a university in Germany? *Economics of Education Review*, 29(3), 470-479.
- Stewart, D. A. & Shamdasani, P. N. 2007. *Focus groups: Theory and practice*, Thousand Oaks: SAGE Publications.
- Stopher, P. 2012. *Collecting, managing and assessing data using sample surveys*, New York: Cambridge University Press.
- Strategy Group for Higher Education 2011. National strategy for higher education to 2030. Dublin: Department of Education and Skills.
- Street, D. J. & Burgess, L. 2004. Optimal and near-optimal pairs for the estimation of effects in 2-level choice experiments. *Journal of Statistical Planning and Inference*, 118(1-2), 185-199.
- Street, D. J., Burgess, L., Viney, R. & Louviere, J. J. 2008. Designing discrete choice experiments for health care. *In: Ryan, M., Gerard, K. & Amaya-Amaya, M. (eds.) Using discrete choice experiments to value health and health care*. Dordrecht: Springer.
- Student Finance Northern Ireland. 2017. *Financial support for new students in 2016/17* [Online]. Available: [http://www.studentfinanceni.co.uk/portal/page?\\_pageid=54,1266217&\\_dad=portal&\\_schema=PORTAL#section2](http://www.studentfinanceni.co.uk/portal/page?_pageid=54,1266217&_dad=portal&_schema=PORTAL#section2) [Accessed 30/01/2017].

- Swait, J. D. & Adamowicz, W. 2001. The influence of task complexity on consumer choice: A latent class model of decision strategy switching. *Journal of Consumer Research* 28(1), 135-148.
- Teljeur, C., Barry, J. & Kelly, A. 2004. The potential impact on travel times of closure and redistribution of A&E units in Ireland. *Irish Medical Journal*, 97(6), 173-175.
- The Complete University Guide. 2017. *Going to university in Northern Ireland: Tuition fees* [Online]. Available: <http://www.thecompleteuniversityguide.co.uk/university-tuition-fees/going-to-university-in-northern-ireland/> [Accessed 30/01/2017].
- Thiene, M. & Scarpa, R. 2009. Deriving and testing efficient estimates of WTP distributions in destination choice models. *Environmental and Resource Economics*, 44(3), 379-395.
- Thomas, V., Wang, Y. & Fan, X. 2000. Measuring education inequality: Gini coefficients of education. *Policy Research Working Papers*, November.
- Thurstone, L. L. 1927. A law of comparative judgment. *Psychological Review*, 34(4), 273-286.
- Tight, M. 2011. How many universities are there in the United Kingdom? How many should there be? *Higher Education*, 62(5), 649–663.
- Times Higher Education 2016. World university rankings.
- Tomul, E. 2009. Measuring regional inequality of education in Turkey: An evaluation by Gini index. *Procedia Social and Behavioral Sciences* 1(1), 949–952.
- Topel, R. 1999. Labour markets and economic growth. In: Ashenfelter, O. & Card, D. (eds.) *Handbook of Labour Economics*. Amsterdam: North Holland.

- Train, K. & Weeks, M. 2005. Discrete choice models in preference space and willingness-to-pay space. *In: Scarpa, R. & Alberini, A. (eds.) Application of simulation methods in environmental and resource economics*. Dordrecht: Springer.
- Train, K. E. 2003. *Discrete choice methods with simulation*, Cambridge: Cambridge University Press.
- Tu, G., Abildtrup, J. & Garcia, S. 2016. Preferences for urban green spaces and peri-urban forests: An analysis of stated residential choices. *Landscape and Urban Planning*, 148(April), 120-131.
- Verghese, A. & Kamalanabhan, T. J. 2015. Attributes influencing information search for college choice: An exploratory study. *International Journal of Business Innovation and Research*, 9(1), 34-51.
- Walsh, C., Moorhouse, J., Dunnett, A. & Barry, C. 2015a. University choice: Which attributes matter when you are paying the full price. *International Journal of Consumer Studies*, 39(6), 670-681.
- Walsh, S., Cullinan, J. & Flannery, D. 2016. The impact of proposed higher education reforms on geographic accessibility to universities in Ireland. *Applied Spatial Analysis and Policy*, 10.1007/s12061-016-9193-3.
- Walsh, S., Flannery, D. & Cullinan, J. 2015b. Geographic accessibility to higher education on the island of Ireland. *Irish Educational Studies*, 34(1), 5-23.
- Wang, F. & Luo, W. 2005. Assessing spatial and nonspatial factors for healthcare access: Towards an integrated approach to defining health professional shortage areas. *Health & Place*, 11(2), 131-146.
- Winston, G. C. & Zimmerman, D. J. 2004. Peer effects in higher education. *In: Hoxby, C. (ed.) College choices: The economics of where to go, when to go, and how to pay for it*. Chicago: University of Chicago Press.

Witten, K., Exeter, D. & Field, A. 2003. The quality of urban environments: Mapping variation in access to community resources. *Urban Studies*, 40(1), 161–177.

## **Appendix A: Open day survey**

## A Study of Preferences for Different Third Level Institutions in Ireland



Are you a: Pupil  Parent  Teacher

What county are you from? \_\_\_\_\_

The following is a list of characteristics which describe third level institutions in Ireland.

Please consider each characteristic and indicate to what extent it would influence your preference for a third level institution.

	Very important	Important	Neither important nor unimportant	Unimportant	Very unimportant
Graduate employment					
Type of third level institution					
Travel time from home					
Work placement opportunities					
Cost of living					
Course offering					
Academic reputation					
Where friends/family went					
Social opportunities					
Teaching quality					
Availability of accommodation					
Facilities					
Other (please state) _____					

**Thank you for your cooperation and assistance!**

E-mail: [s.walsh65@nuigalway.ie](mailto:s.walsh65@nuigalway.ie)

Address: Discipline of Economics, NUI Galway, University Rd., Co. Galway

## **Appendix B: Sample questionnaire**

**FOR ADMIN USE:**

**School ID:**

**ID:**

**Block: 1**

# **A study of student preferences for characteristics of third level institutions in Ireland**

## **Introduction**

Hello, my name is Sharon Walsh and I am carrying out a questionnaire as part of my PhD research in collaboration with the National University of Ireland, Galway regarding student's preferences for different third level institutions in Ireland. The purpose of this survey is to find out which characteristics of a third level institution are important to you when choosing between different institutions. The questionnaire will take you about 20 minutes and you should find it interesting. The answers that you provide will be kept completely confidential. Thank you for taking part in this survey.

The survey is split into four parts.

<b>Section A</b>	Plans for third level education
<b>Section B</b>	Choice cards
<b>Section C</b>	Post choice card questions
<b>Section D</b>	Background information

**Section A: Plans for third level education**

**A1.** How important do you think having a degree/third level education will be for your future career?

- Very important
- Important
- Neither important or unimportant
- Unimportant
- Very unimportant
- Don't know

**A2.** Do you plan to apply to third level education?

- Yes
- No
- Don't know

*If you answered "Yes" to Question A2, please continue to Question A3. Otherwise, skip to Section B.*

**A3.** Which third level institution is likely to be your first choice?

*Please choose ONE option from the list below*

- |  |  |   |
|--|--|---|
| Dublin City University..... <input type="checkbox"/> | Athlone IT..... <input type="checkbox"/>         | Church of Ireland College of Education.. <input type="checkbox"/> |
| NUI Galway..... <input type="checkbox"/>             | Cork IT..... <input type="checkbox"/>            | Froebel College of Education..... <input type="checkbox"/>        |
| NUI Maynooth..... <input type="checkbox"/>           | Dublin IT..... <input type="checkbox"/>          | Marino Institute of Education..... <input type="checkbox"/>       |
| Trinity College Dublin..... <input type="checkbox"/> | Dundalk IT..... <input type="checkbox"/>         | Mary Immaculate College..... <input type="checkbox"/>             |
| University College Cork... <input type="checkbox"/>  | Dun Laoghaire Institute <input type="checkbox"/> | Mater Dei Institute..... <input type="checkbox"/>                 |
| University College Dublin <input type="checkbox"/>   | Galway/Mayo IT..... <input type="checkbox"/>     | St. Angela's College..... <input type="checkbox"/>                |
| University of Limerick.... <input type="checkbox"/>  | IT, Blanchardstown..... <input type="checkbox"/> | St. Patrick's College..... <input type="checkbox"/>               |
|  | IT, Carlow..... <input type="checkbox"/>         |   |
|  | IT, Sligo..... <input type="checkbox"/>          |   |
|  | IT, Tallaght..... <input type="checkbox"/>       |   |
|  | IT, Tralee..... <input type="checkbox"/>         |   |
|  | Letterkenny IT..... <input type="checkbox"/>     |   |
|  | Limerick IT ..... <input type="checkbox"/>       |   |
|  | Waterford IT..... <input type="checkbox"/>       |   |

Other (please specify) \_\_\_\_\_

**A4.** What field of study are you interested in applying for?

- |   |                          |
|---|--------------------------|
| Education                                   | <input type="checkbox"/> |
| Humanities and Arts                         | <input type="checkbox"/> |
| Social Science, Business and Law            | <input type="checkbox"/> |
| Science, Mathematics and Computing          | <input type="checkbox"/> |
| Engineering, Manufacturing and Construction | <input type="checkbox"/> |
| Agriculture                                 | <input type="checkbox"/> |
| Health and Welfare                          | <input type="checkbox"/> |
| Services                                    | <input type="checkbox"/> |
| Other (please specify)                      | _____                    |
| Don't know                                  | <input type="checkbox"/> |

**A5.** Would your decision on which third level institution to attend be influenced by where your friends plan to go?

- |            |                          |
|------------|--------------------------|
| Yes        | <input type="checkbox"/> |
| No         | <input type="checkbox"/> |
| Don't know | <input type="checkbox"/> |

**A6.** Do you plan to live at home with your parents/guardians while attending third level education?

- |            |                          |
|------------|--------------------------|
| Yes        | <input type="checkbox"/> |
| No         | <input type="checkbox"/> |
| Don't know | <input type="checkbox"/> |

**A7.** Do you think you are likely to take a part-time job during term time to help you manage financially while in third level education?

- |            |                          |
|------------|--------------------------|
| Yes        | <input type="checkbox"/> |
| No         | <input type="checkbox"/> |
| Don't know | <input type="checkbox"/> |

**A8.** How much do you think you will depend on your parents/guardians financially while in third level education?

- Entirely dependent on them
- Partly dependent on them
- Not dependent on them at all
- Don't know

**A9.** What is the level of your parents/guardians influence on your choice of third level institution?

- Very high
- High
- Moderate
- Low
- Very low
- Don't know

**A10.** Do you think you will be eligible for a student grant?

- Yes
- No
- Don't know

## Section B: Choice cards

In the following choice cards, we will present you with hypothetical third level education options. Each third level institution is described by its characteristics. We are asking you to take into account all of the characteristics of each third level institution as described below and to pick which institution you would prefer.

We will present you with a total of **12 choice cards** which look like the sample choice card below. You will have the choice between 4 options. For example, if you choose option A, you would attend a university, 1 hour from your home, with a good course reputation, no work placement opportunities and a student fee of €1,500 per year.

	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>	<b>Option D</b>
<b>Type</b>	University	University	Institute of Technology	Prefer not to attend any of the third level institution presented here
<b>Travel time from <u>home</u></b>	1 hour	3 hours	2 hours	
<b>Course reputation</b>	Fair course reputation	Good course reputation	Excellent course reputation	
<b>Work placement</b>	No work placement	Work placement	work placement	
<b>Student fee (per year)</b>	€1,500	€1,500	€6,000	
Please tick the one option you prefer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Option A, Option B and Option C* will vary in terms of the type of 3<sup>rd</sup> level institution, travel time from home to the 3<sup>rd</sup> level institution, course reputation, work placement and student fee.

*Option D* is the same throughout the survey. This is like an opt-out option. You can choose this option if you do not like what the other options have to offer. By choosing this option, you are stating that you would prefer not to attend any of the third level institution presented here.

Now let me outline and explain the characteristics that describe each third level institution option:

**Type:** This refers to the type of third level institution that you would attend. This could be a University or an Institute of Technology.

**NOTE: For the purpose of this study, “University” includes the 7 universities in Ireland as well as Mary Immaculate College, St. Patrick’s College, St. Angela’s College, Mater Dei Institute, Froebel College of Education, Marino College of Education and Church of Ireland College of Education.**

**Travel time from home:** This describes the time it would take to travel from your family home (as opposed to your college residence) to the third level institution. This ranges from 1 hour to 3 hours.

**Course reputation:** This indicates the reputation of the courses on offer at the third level institution. Excellent means that the courses on offer have an exceptional reputation in providing the knowledge and skills required for future employment and/or study. Good means that the courses on offer have a good reputation in providing the knowledge and skills required for future employment and/or study. Fair means that they have a reasonable reputation in providing the knowledge and skills required for future employment and/or study.

**Work Placement:** This describes whether or not work placement opportunities are available as part of degree programmes at the third level institution.

**Student Fee:** Each of the third level institution options will come at a cost to you, referred to as a student fee. Although in reality you may not have to pay this fee, as you may be entitled to a grant, for the purposes of the questionnaire you are asked to imagine that you would have to pay. This can help us to find out how much you would value the third level institutions. In our questions, the student fee ranges from €1,500 up to €6,000. **Note that the current student fee is €3,000.**

You will now be presented with a series of choice cards and on each choice card you will see four options like the sample card shown above. I would like you to pick which option on each choice card you would prefer. Please consider each choice card separately and consider all of the characteristics that describe each option.

There are no wrong or right answers. We are just interested in your opinion.

**CHOICE CARD 1**

	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>	<b>Option D</b>
<b>Type</b>	University	University	Institute of Technology	Prefer not to attend any of the third level institutions presented here
<b>Travel time <u>from home</u></b>	2 hours	1 hour	3 hours	
<b>Course reputation</b>	Fair course reputation	Good course reputation	Excellent course reputation	
<b>Work placement</b>	No work placement	No work placement	Work placement	
<b>Student fee (per year)</b>	€4,500	€4,500	€1,500	
Please tick the one option you <b>prefer</b> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**CHOICE CARD 2**

	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>	<b>Option D</b>
<b>Type</b>	University	Institute of Technology	Institute of Technology	Prefer not to attend any of the third level institutions presented here
<b>Travel time <u>from home</u></b>	3 hours	2 hours	1 hour	
<b>Course reputation</b>	Excellent course reputation	Fair course reputation	Good course reputation	
<b>Work placement</b>	No work placement	Work placement	Work placement	
<b>Student fee (per year)</b>	€1,500	€6,000	€6,000	
Please tick the one option you <b>prefer</b> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**CHOICE CARD 3**

	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>	<b>Option D</b>
<b>Type</b>	Institute of Technology	Institute of Technology	University	Prefer not to attend any of the third level institutions presented here
<b>Travel time <u>from home</u></b>	3 hours	2 hours	1 hour	
<b>Course reputation</b>	Fair course reputation	Excellent course reputation	Good course reputation	
<b>Work placement</b>	Work placement	No work placement	Work placement	
<b>Student fee (per year)</b>	€3,000	€3,000	€3,000	
Please tick the one option you <b>prefer</b> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**CHOICE CARD 4**

	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>	<b>Option D</b>
<b>Type</b>	Institute of Technology	University	University	Prefer not to attend any of the third level institutions presented here
<b>Travel time <u>from home</u></b>	3 hours	2 hours	1 hour	
<b>Course reputation</b>	Good course reputation	Fair course reputation	Excellent course reputation	
<b>Work placement</b>	Work placement	No work placement	No work placement	
<b>Student fee (per year)</b>	€1,500	€4,500	€6,000	
Please tick the one option you <b>prefer</b> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**CHOICE CARD 5**

	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>	<b>Option D</b>
<b>Type</b>	University	University	Institute of Technology	Prefer not to attend any of the third level institutions presented here
<b>Travel time <u>from home</u></b>	2 hours	1 hour	3 hours	
<b>Course reputation</b>	Fair course reputation	Good course reputation	Excellent course reputation	
<b>Work placement</b>	Work placement	No work placement	Work placement	
<b>Student fee (per year)</b>	€4,500	€3,000	€1,500	
Please tick the one option you <b>prefer</b> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**CHOICE CARD 6**

	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>	<b>Option D</b>
<b>Type</b>	Institute of Technology	University	Institute of Technology	Prefer not to attend any of the third level institutions presented here
<b>Travel time <u>from home</u></b>	1 hour	3 hours	2 hours	
<b>Course reputation</b>	Excellent course reputation	Fair course reputation	Good course reputation	
<b>Work placement</b>	No work placement	Work placement	No work placement	
<b>Student fee (per year)</b>	€6,000	€1,500	€4,500	
Please tick the one option you <b>prefer</b> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**CHOICE CARD 7**

	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>	<b>Option D</b>
<b>Type</b>	University	Institute of Technology	University	Prefer not to attend any of the third level institutions presented here
<b>Travel time <u>from home</u></b>	1 hour	3 hours	2 hours	
<b>Course reputation</b>	Good course reputation	Excellent course reputation	Fair course reputation	
<b>Work placement</b>	No work placement	Work placement	No work placement	
<b>Student fee (per year)</b>	€4,500	€1,500	€4,500	
Please tick the one option you <b>prefer</b> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**CHOICE CARD 8**

	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>	<b>Option D</b>
<b>Type</b>	University	Institute of Technology	University	Prefer not to attend any of the third level institutions presented here
<b>Travel time <u>from home</u></b>	2 hours	1 hour	3 hours	
<b>Course reputation</b>	Fair course reputation	Excellent course reputation	Good course reputation	
<b>Work placement</b>	Work placement	Work placement	No work placement	
<b>Student fee (per year)</b>	€6,000	€6,000	€1,500	
Please tick the one option you <b>prefer</b> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**CHOICE CARD 9**

	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>	<b>Option D</b>
<b>Type</b>	University	Institute of Technology	University	Prefer not to attend any of the third level institutions presented here
<b>Travel time <u>from home</u></b>	1 hour	3 hours	2 hours	
<b>Course reputation</b>	Excellent course reputation	Good course reputation	Fair course reputation	
<b>Work placement</b>	Work placement	No work placement	No work placement	
<b>Student fee (per year)</b>	€4,500	€1,500	€4,500	
Please tick the one option you <b>prefer</b> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**CHOICE CARD 10**

	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>	<b>Option D</b>
<b>Type</b>	Institute of Technology	University	University	Prefer not to attend any of the third level institutions presented here
<b>Travel time <u>from home</u></b>	1 hour	2 hours	3 hours	
<b>Course reputation</b>	Excellent course reputation	Good course reputation	Fair course reputation	
<b>Work placement</b>	Work placement	No work placement	Work placement	
<b>Student fee (per year)</b>	€3,000	€3,000	€3,000	
Please tick the one option you <b>prefer</b> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**CHOICE CARD 11**

	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>	<b>Option D</b>
<b>Type</b>	Institute of Technology	University	Institute of Technology	Prefer not to attend any of the third level institutions presented here
<b>Travel time <u>from home</u></b>	2 hours	1 hour	2 hours	
<b>Course reputation</b>	Good course reputation	Excellent course reputation	Fair course reputation	
<b>Work placement</b>	No work placement	Work placement	No work placement	
<b>Student fee (per year)</b>	€3,000	€3,000	€3,000	
Please tick the one option you <b>prefer</b> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**CHOICE CARD 12**

	<b>Option A</b>	<b>Option B</b>	<b>Option C</b>	<b>Option D</b>
<b>Type</b>	Institute of Technology	Institute of Technology	University	Prefer not to attend any of the third level institutions presented here
<b>Travel time <u>from home</u></b>	3 hours	3 hours	1 hour	
<b>Course reputation</b>	Good course reputation	Fair course reputation	Excellent course reputation	
<b>Work placement</b>	No work placement	Work placement	Work placement	
<b>Student fee (per year)</b>	€1,500	€4,500	€6,000	
Please tick the one option you <b>prefer</b> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Section C: Post choice card questions

I would now like to ask you a few questions about the choice cards you have just completed.

**C1.** Please indicate how easy or difficult you found it to pick your preferred option on each choice card.

- Very easy
- Fairly easy
- Neither easy or difficult
- Fairly difficult
- Very difficult

**C2.** Thinking about the choices you have made, and the information presented earlier, please state whether the following statements are true or false.

<i>When I made my choices:</i>	True	False
I always ignored the University	<input type="checkbox"/>	<input type="checkbox"/>
I always ignored the Institute of Technology	<input type="checkbox"/>	<input type="checkbox"/>
I always ignored the course reputation	<input type="checkbox"/>	<input type="checkbox"/>
I always ignored student fees	<input type="checkbox"/>	<input type="checkbox"/>
I always ignored work placement opportunities	<input type="checkbox"/>	<input type="checkbox"/>
I always ignored travel time from home to the third level institution	<input type="checkbox"/>	<input type="checkbox"/>

**C3.** How confident were you when making your decisions?

- Not very confident
- Somewhat confident
- Fairly confident
- Confident
- Very confident

**C4.** Please indicate the **most** important factor to you when considering a third level institution?

*Please tick ONE option below.*

- Whether it is a university or institute of technology
- Course reputation
- Student fees
- Work placement opportunities
- Travel time from home to third level institution
- Other (please specify) \_\_\_\_\_

**C5.** Please indicate the **least** important factor to you when considering a third level institution?

*Please tick ONE option below.*

- Whether it is a university or institute of technology
- Course reputation
- Student fees
- Work placement opportunities
- Travel time from home to third level institution
- Other (please specify) \_\_\_\_\_

**C6.** Did you consider all of the different attributes when making your choices?

- Yes
- No

**C7.** When completing the choice cards, did you assume that work placements were paid?

- Yes
- No
- Don't know

**C8.** Is travel time from home to the third level institution an important factor for you?

Yes

No

**C9.** Why is this an important/unimportant factor for you?

*Please tick ONE option below*

Rental costs are too high

There is lack of availability of rental accommodation

I want to live at home while attending third level education

I really want to move away from home while attending third level education

I want to avoid high travel costs

Other (please specify )

---

**C10.** If you chose option D (prefer not to attend any of the third level institution presented here) in the choice cards, why did you choose this option?

*Please tick all relevant options*

I cannot afford to pay fees out-of-pocket

The fees are too high

I object to paying fees

The Government should pay my fees

I didn't know which option was best, so I chose option D

I didn't like any of the options, so I chose option D

Other (please specify)\_\_\_\_\_

<b>Section D: Background information</b>
--

In this section of the questionnaire, we would like to ask you some background questions about yourself so that we can see how views and preferences differ between different groups.

**D1.** Are you:

Male

Female

**D2.** How old are you? \_\_\_\_\_

**D3.** In which **county** do you live? (E.g. Co. Galway) \_\_\_\_\_

**D4.** How many brothers and sisters do you have?

None

1

2

3

4 or more

*If you answered "None" to Question D4, please skip to Question D7. Otherwise, continue to Question D5.*

**D5.** Are/Were any of your brothers or sisters engaged in third level education?

Yes

No

Not applicable

*If you answered "Yes" to Question D5, continue to Question D6. Otherwise, please skip to Question D7.*

**D6. Which third level institutions do/did your brothers or sisters attend?**

- |                             |                          |                         |                          |  |                          |
|-----------------------------|--------------------------|-------------------------|--------------------------|--|--------------------------|
| Dublin City University..... | <input type="checkbox"/> | Athlone IT.....         | <input type="checkbox"/> | Church of Ireland College of Education | <input type="checkbox"/> |
| NUI Galway.....             | <input type="checkbox"/> | Cork IT.....            | <input type="checkbox"/> | Froebel College of Education.....      | <input type="checkbox"/> |
| NUI Maynooth.....           | <input type="checkbox"/> | Dublin IT.....          | <input type="checkbox"/> | Marino Institute of Education.....     | <input type="checkbox"/> |
| Trinity College Dublin..... | <input type="checkbox"/> | Dundalk IT.....         | <input type="checkbox"/> | Mary Immaculate College.....           | <input type="checkbox"/> |
| University College Cork...  | <input type="checkbox"/> | Dun Laoghaire Institute | <input type="checkbox"/> | Mater Dei Institute.....               | <input type="checkbox"/> |
| University College Dublin   | <input type="checkbox"/> | Galway/Mayo IT.....     | <input type="checkbox"/> | St. Angela's College.....              | <input type="checkbox"/> |
| University of Limerick....  | <input type="checkbox"/> | IT, Blanchardstown..... | <input type="checkbox"/> | St. Patrick's College.....             | <input type="checkbox"/> |
|                             |                          | IT, Carlow.....         | <input type="checkbox"/> |  |                          |
|                             |                          | IT, Sligo.....          | <input type="checkbox"/> |  |                          |
|                             |                          | IT, Tallaght.....       | <input type="checkbox"/> |  |                          |
|                             |                          | IT, Tralee.....         | <input type="checkbox"/> |  |                          |
|                             |                          | Letterkenny IT.....     | <input type="checkbox"/> |  |                          |
|                             |                          | Limerick IT .....       | <input type="checkbox"/> |  |                          |
|                             |                          | Waterford IT.....       | <input type="checkbox"/> |  |                          |

Other (please specify) \_\_\_\_\_

**D7. Thinking back to your Junior Certificate examination, please indicate how many honours, pass and foundation subjects you sat?**

*Please do not include CSPE as this is a common level subject.*

Level	No of subjects
Higher level (Honours)	
Ordinary level (Pass)	
Foundation Level	

**D8. Please indicate below how many honours, pass and foundation subjects you intend to take for the Leaving Certificate exam?**

Level	No. of subjects
Higher level (Honours)	
Ordinary level (Pass)	
Foundation Level	

**D9.** Which of the following best describes the current work status of your parents / guardians?

	Mother	Father
Working full-time	<input type="checkbox"/>	<input type="checkbox"/>
Working part-time	<input type="checkbox"/>	<input type="checkbox"/>
Unemployed	<input type="checkbox"/>	<input type="checkbox"/>
Student	<input type="checkbox"/>	<input type="checkbox"/>
Home maker	<input type="checkbox"/>	<input type="checkbox"/>
Retired	<input type="checkbox"/>	<input type="checkbox"/>
Unable to work due to health reasons	<input type="checkbox"/>	<input type="checkbox"/>
Not applicable	<input type="checkbox"/>	<input type="checkbox"/>

**D10.** Have your parents/guardians completed third level education?

	Mother	Father
Yes	<input type="checkbox"/>	<input type="checkbox"/>
No	<input type="checkbox"/>	<input type="checkbox"/>
Don't Know	<input type="checkbox"/>	<input type="checkbox"/>

**D11.** What is (or was) your Father's main occupation?

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**D12.** What is (or was) your Mother's main occupation?

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**D13.** To which of these ethnic groups would you say you belong?

Irish	<input type="checkbox"/>
Irish traveller	<input type="checkbox"/>
Any other white background	<input type="checkbox"/>
African	<input type="checkbox"/>
Any other black background	<input type="checkbox"/>
Chinese	<input type="checkbox"/>
Any other Asian background	<input type="checkbox"/>
Other	<input type="checkbox"/>

**Thank you for taking part in this survey.**

## **Appendix C: School cover letter and information sheet**

19<sup>th</sup> October 2015

### **A study of student preferences for different third level institutions in Ireland**

Dear Principal,

My name is Sharon Walsh and I am a PhD student at the Department of Economics, NUI Galway. I am writing to invite your school to take part in a research project that forms part of my PhD thesis. This research seeks to examine student preferences for third level institutions in Ireland. The study focuses on 6<sup>th</sup> year students and the attributes of a third level institution that are important in shaping their choice between the different institutions. This research is important as it will help to identify the key drivers influencing young people in Ireland in their choice of third level institution which has significant implications both for schools wishing to provide guidance to their students regarding their third level options and for third level policy makers. The study will also help students to think about what is important to them in their choice of which third level institution to attend. The research will be carried out prior to the CAO deadline and should thus aid students in their CAO decision.

Your school has been selected randomly from a list of all post-primary schools in Ireland. I would really appreciate it if you could take the time to assist with this study. My aim is to coordinate with your school in order to conduct the research, ideally in the next couple of weeks. By allowing students the time to complete the survey, your school's input will make an important contribution to the success of this study. The survey will take about 20 minutes to complete. I will administer the survey in person and so there is no extra workload for your school to get involved. Ideally, I would like a class of Leaving Certificate students to complete the survey during school hours.

Enclosed is an information leaflet outlining what would be involved should your school wish to take part in the study. I would be grateful if you could forward this information to the guidance counsellor, or any other teacher you feel may be interested in facilitating the research. I will be in contact with you and/or the relevant teacher in the coming days to discuss. Alternatively, if you would like to discuss any matters relating to the study, please do not hesitate to contact me at any time.

Sincerely,

*Sharon Walsh*

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Sharon Walsh

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**E-mail:** [s.walsh65@nuigalway.ie](mailto:s.walsh65@nuigalway.ie)      **Telephone:** (085) 2745727  
**Address:** Department of Economics, NUI Galway, University Rd., Co. Galway

## **Study of Student Preferences for Different Third Level Institutions in Ireland**

*A research study funded by the NUI Galway Hardiman Research Scholarship and the  
Dr. Mary L. Thornton Scholarship (NUI)*

### **School Information Sheet**

#### **Research Team:**

Ms. Sharon Walsh, Discipline of Economics, NUIG  
Dr. John Cullinan, Discipline of Economics, NUIG  
Dr. Darragh Flannery, Department of Economics, UL

#### **Project Contact:**

Ms. Sharon Walsh  
Discipline of Economics,  
National University of Ireland,  
Galway

*E-mail:* [s.walsh65@nuigalway.ie](mailto:s.walsh65@nuigalway.ie)

*Phone:* 085-2745727

#### **Project Title:**

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A study of student preferences for different third level institutions in Ireland

#### **Purpose:**

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The Discipline of Economics, National University of Ireland, Galway are conducting research which examines student preferences for different third level institutions in Ireland. In particular, the research will examine which attributes of a third level institution are important in shaping a school leaver's choice between the different institutions. This research is important as it will help to identify the key drivers influencing young people in Ireland in their choice of third level institution which has significant implications both for schools wishing to provide guidance to their students

regarding their third level options and for higher education policy makers. The study will also help students to think about what is important to them in their choice of which third level institution to attend. The research will be carried out prior to the CAO deadline (from October - December 2015) and should thus aid students in their CAO decision.

---

**If the school decides to take part, what will it involve?**

If you agree to have your school take part in the project, the researcher involved in the study will visit the school and distribute the survey to a class of leaving certificate students. The researcher will distribute the survey in the classroom at a time which is convenient to the school. It is at the discretion of the teacher whether or not they wish to be present during this time as the researcher will be there to distribute the survey and answer any questions that the students may have.

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**Has ethical approval been granted for this study?**

Ethical approval has been granted by the Research Ethics Committee at NUI, Galway and the researcher has received Garda clearance for the purpose of the research.

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**How long will the study last?**

The survey will take approximately 20 minutes to complete.

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**Consent and confidentiality**

- Students will be reassured that they can decline to participate in the study if they wish and can withdraw from the study at any time.
- All students taking part in the study will be assigned a study ID number, so their data will be stored anonymously. All individual student data will be stored securely and only accessed by a member of the research team.

**We thank you for your help and interest in this project.**

**If you would like any further information or clarification, please contact**

**Sharon Walsh at [s.walsh65@nuigalway.ie](mailto:s.walsh65@nuigalway.ie)**

## **Appendix D: Parental information sheets and consent forms**

# **A study of student preferences for characteristics of third level institutions in Ireland**

*A research study funded by the NUI Galway Hardiman Research Scholarship and the Dr. Mary L. Thornton Scholarship in Education*

## **Parent Information Sheet**

### **Research Team:**

Ms. Sharon Walsh, Discipline of Economics, NUIG  
Dr. John Cullinan, Discipline of Economics, NUIG  
Dr. Darragh Flannery, Department of Economics, UL

### **Project Contact:**

Ms. Sharon Walsh  
Discipline of Economics,  
National University of Ireland,  
Galway  
**E-mail:** [s.walsh65@nuigalway.ie](mailto:s.walsh65@nuigalway.ie)

### **Project Title:**

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A study of student preferences for characteristics of third level institutions in Ireland

### **Purpose:**

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It has been well documented that higher education has important economic and societal benefits. Given the numerous potential benefits of education, increased participation in higher education has become a stated policy aim in Ireland and elsewhere. The Higher Education Authority has recently published a report providing institutional profiles of third level institutions in Ireland. These profiles provide useful information on teaching and learning, research and institutional engagement which is comparable across all HEA funded institutions. However, to date there is no direct evidence on how students value the attributes of different third level institutions in their choice of institution. Therefore, we propose to examine in detail how students think about the different characteristics of third level institutions in Ireland. Your child's school has agreed to take part in the forthcoming project.

### **Aims and objectives:**

---

#### **Aim:**

- To obtain student preferences for characteristics of third level institutions in Ireland

#### **Objectives:**

1. To examine the influence of a range of institution- and individual-level characteristics on the decision of school leavers to choose between third level institutions in Ireland.

2. To provide a deeper insight into the factors which are important to students when they choose between different third level institutions.

### **If your child takes part, what will it involve?**

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- If you agree to have your child take part in the project, we would ask you to please complete the enclosed consent form and return it to the school in the next week.
- The researcher will distribute the survey in the classroom at a time which is convenient to the school in order to minimize disruption to the school day. Your child will then be asked to fill out a survey which will take about 25 minutes to complete.
- The study will help your child to think about what is important to them in their choice of which third level institution to attend. The research will be carried out prior to the CAO deadline and should therefore aid students in their CAO decision.

### **Has ethical approval been granted for this study?**

---

Ethical approval has been granted by the Research Ethics Committee at NUI, Galway.

### **How long will the study last?**

---

The survey will take approximately 20 minutes to complete.

### **Consent and confidentiality**

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- If you agree to have your child take part, they will be given an information sheet and consent form to sign. However, they will not be allowed to take part in the study without your prior consent.
- Your child will be reassured that they can decline to participate in the study if they wish and can withdraw from the study at any time.
- All students taking part in the study will be assigned a study ID number, so their data will be stored anonymously. All individual student data will be stored securely and only accessed by a member of the research team.

**We thank you for your help and interest in this project.**

**If you would like any further information or clarification,  
please email Sharon Walsh at [s.walsh65@nuigalway.ie](mailto:s.walsh65@nuigalway.ie)**



National University of Ireland, Galway  
*Ollscoil na hÉireann, Gaillimh*

School Number:

Participant Identification Number:

### Consent form for Parents/Guardians

#### A study of student preferences for characteristics of third level institutions in Ireland

*National University of Ireland, Galway*

	Yes	No
I confirm that I have read the information sheet dated for the above study and have had the opportunity to ask questions.	<input type="checkbox"/>	<input type="checkbox"/>
I am satisfied that I understand the information provided and have had enough time to consider the information.	<input type="checkbox"/>	<input type="checkbox"/>
I am willing to allow my child to take part in the study	<input type="checkbox"/>	<input type="checkbox"/>
I understand that information about me will be available only to members of the research team	<input type="checkbox"/>	<input type="checkbox"/>
I understand that my participation in this study is voluntary and I can withdraw from the study at any time.	<input type="checkbox"/>	<input type="checkbox"/>

Name (block capitals)

Signature

Date

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## **Appendix E:** Participant information sheets and assent forms

## INFORMATION SHEET FOR PARTICIPANTS

You have been chosen to take part in a new study of school leavers in Ireland.

### What is the study about?

This is a study of school leavers in secondary schools in Ireland. This study is the first of its kind ever to take place in this country. The purpose of the study is to examine which characteristics of a third level institution are important in shaping a school leaver's choice between the different institutions.

### How was I selected?

We have selected a number of schools across Ireland on a random basis. We have worked with the principal of your school who has agreed for us to conduct the research at your school. We are now contacting you to invite you to take part.

### Why should I take part?

This is a unique opportunity for you to take part in this important study. By taking part, you will play a crucial role in helping us to find out how school leavers value and trade-off characteristics of different third level institutions. We hope this information will help the Government to make decisions on how to tailor the third level sector to the preferences of students.

### What happens if I take part?

Taking part in the study is very simple!

**First:** You sign the consent form enclosed with this information leaflet and return it to your school. There is also a consent form for your parent(s) to fill in and be sent back.

**Second:** You will fill out a questionnaire which takes about 25 minutes to complete.

We will use an ID number on all the questionnaires and this will help to ensure that all your information is kept anonymous.

### What kinds of questions will I be asked?

You will be asked questions about:

- You will be asked about your current plans for third level education.
- You will be asked to complete a choice exercise in which you will be asked to choose between a hypothetical set of third level institutions. Each third level institution will be described by a number of characteristics and you will be asked to choose which one you prefer best. This choice exercise will be repeated a number of times.
- You will be asked some questions about the choice exercise. This will help us to figure out if you understood the choice exercise.
- Finally, you will be asked some background information about yourself (age, gender, where you live and so on).

### Who is running the study?

The NUI Galway Hardiman Scholarship and the Dr Mary L Thornton Scholarship in Education are funding the Department of Economics at NUI Galway to do this study. The study team will include Ms. Sharon Walsh and Dr. John Cullinan of NUI Galway and Dr. Darragh Flannery of UL. The main researcher on this project is a PhD student in the Department of Economics in NUI Galway. The researcher has been trained for the study and has been subject to security vetting by An Garda Síochána. This is for the protection of you and the researcher.

### Confidentiality

All the information given to the study team is treated in the strictest confidence. It will be used exclusively for research purposes. The information given by you will not be seen by anyone except the researchers. Under no circumstances could anyone be able to identify information given by you.

### What are my rights if I decide to take part?

If you decide to take part, you may choose to withdraw from the study at any time. If there are any question(s) on the questionnaire you do not wish to answer, you do not have to do so.

### What do I do next?

Enclosed with this information leaflet you will find two consent forms, one for you (marked 'Participant Consent Form') and one for your parent(s) which is marked 'Parent's/Guardian's Consent Form'.

We would like you to read and sign the form, and then return it and the consent form signed by parents to your school.

### Your participation counts!

Taking part in study is voluntary. Your participation will play a major role in the success of the study. It is only by carrying out studies such as these that we can understand which characteristics of a third level institution are important in shaping a school leaver's choice between the different third level institutions. We hope that you can support us in our work and we would like to thank you, in anticipation, for your help.



National University of Ireland, Galway  
*Ollscoil na bÉireann, Gaillimh*

School Number:

Participant Identification Number:

### **Participant Assent Form**

#### **A study of student preferences for characteristics of third level institutions in Ireland**

*National University of Ireland, Galway*

	Yes	No
I confirm that I have read the information sheet for the above study and have had the opportunity to ask questions.	<input type="checkbox"/>	<input type="checkbox"/>
I am satisfied that I understand the information provided and have had enough time to consider the information.	<input type="checkbox"/>	<input type="checkbox"/>
I am willing to take part in the study	<input type="checkbox"/>	<input type="checkbox"/>
I understand that information about me will be available only to members of the research team	<input type="checkbox"/>	<input type="checkbox"/>
I understand that my participation in this study is voluntary and I can withdraw from the study at any time.	<input type="checkbox"/>	<input type="checkbox"/>

Name (block capitals)

Signature

Date

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**Appendix F:** Supplementary material for Chapter 7:  
Correlated mixed logit models

**Table F.1:** Results from mixed logit models in preference space

Variable	Uncorrelated mixed logit	Correlated mixed logit
<i>Random parameters: Mean</i>		
Type of HEI - University	1.01 (0.08)***	1.06 (0.07)***
Travel time from home - 2 hours	-0.66 (0.07)***	-0.65 (0.08)***
Travel time from home - 3 hours	-1.94 (0.10)***	-2.14 (0.10)***
Work placement is available	1.89 (0.07)***	1.88 (0.07)***
Good course reputation	1.65 (0.07)***	1.78 (0.09)***
Excellent course reputation	2.49 (0.09)***	2.66 (0.11)***
<i>Non-random parameters</i>		
Student fee	-0.51 (0.02)***	-0.58 (0.02)***
ASCD	-0.43 (0.15)***	-0.96 (0.16)***
Type of HEI - University	2.00 (0.07)***	1.97 (0.07)***
Travel time from home - 2 hours	1.21 (0.07)***	1.39 (0.08)***
Travel time from home - 3 hours	1.91 (0.07)***	1.91 (0.07)***
Work placement is available	1.47 (0.06)***	1.47 (0.06)***
Good course reputation	0.90 (0.06)***	1.53 (0.08)***
Excellent course reputation	1.49 (0.06)***	2.18 (0.09)***
No. of individuals	991	991
No. of observations	11,896	11,896
Log-likelihood	-10638.51	-10223.28
AIC	21305.02	20504.57
BIC	21427.80	20758.90

*Note:* Standard errors in parentheses. \* denotes significant at 90% level, \*\* denotes significant at 95% level and \*\*\* denotes significant at 99% level

**Table F.2:** Covariance matrix for correlated mixed logit

Attribute	Correlated mixed logit
University: University	3.90 (0.28)***
2 hours: University	-0.60 (0.16)***
3 hours: University	-0.78 (0.18)***
Work placement: University	-0.55 (0.15)***
Good reputation: University	-0.22 (0.15)
Excellent reputation: University	-0.001 (0.19)
2 hours: 2 hours	1.94 (0.21)***
3 hours: 2 hours	1.37 (0.17)***
Work placement: 2 hours	0.51 (0.13)***
Good reputation: 2 hours	1.01 (0.14)***
Excellent reputation: 2 hours	0.87 (0.18)***
3 hours: 3 hours	3.64 (0.27)***
Work placement: 3 hours	-0.17 (0.15)
Good reputation: 3 hours	-0.15 (0.16)
Excellent reputation: 3 hours	-0.57 (0.20)
Work placement: Work placement	2.17 (0.19)***
Good reputation: Work placement	0.20 (0.13)
Excellent reputation: Work placement	0.22 (0.18)
Good reputation: Good reputation	2.34 (0.23)***
Excellent reputation: Good reputation	3.22 (0.27)***
Excellent reputation: Excellent reputation	4.76 (0.38)***

**Table F.3:** Results from correlated mixed logit models in preference space, by region

Variable	BMW	SE	Dublin
<i>Random parameters: Mean</i>			
Type of HEI - University	1.15 (0.12)***	0.96 (0.13)***	1.28 (0.16)***
Travel time - 2 hours	-0.40 (0.11)***	-0.79 (0.15)***	-0.68 (0.17)***
Travel time - 3 hours	-1.29 (0.13)***	-2.85 (0.19)***	-2.90 (0.29)***
Placement available	1.98 (0.10)***	2.07 (0.13)***	1.56 (0.15)***
Good course reputation	1.78 (0.13)***	1.60 (0.15)***	2.17 (0.24)***
Excellent course reputation	2.64 (0.14)***	2.59 (0.18)***	2.96 (0.28)***
<i>Non-random parameters</i>			
Student fee	-0.54 (0.03)***	-0.76 (0.04)***	-0.35 (0.05)***
ASCD	-0.54 (0.22)**	-1.56 (0.29)***	-0.32 (0.44)
<i>StDev of random parameters</i>			
Type of HEI - University	2.22 (0.11)***	1.92 (0.12)***	1.35 (0.13)***
Travel time - 2 hours	1.24 (0.10)***	1.47 (0.14)***	1.07 (0.15)***
Travel time - 3 hours	1.42 (0.08)***	2.06 (0.13)***	2.09 (0.20)***
Placement available	1.53 (0.09)***	1.44 (0.10)***	1.23 (0.14)***
Good course reputation	1.67 (0.11)***	1.47 (0.12)***	1.52 (0.17)***
Excellent course reputation	2.26 (0.12)***	2.24 (0.14)***	2.04 (0.19)***
<i>Willingness-to-pay (€)</i>			
Type of HEI - University	2,023 (3,960)	1,189 (2,442)	3,562 (3,751)
Travel time - 2 hours	-987 (2,354)	-1,250 (1,978)	-2,289 (3,151)
Travel time - 3 hours	-2,342 (2,668)	-3,696 (2,750)	-8,193 (6,101)
Placement available	3,705 (2,840)	2,746 (1,898)	4,527 (3,530)
Good course reputation	3,546 (3,157)	2,268 (1,977)	6,592 (4,437)
Excellent course reputation	4,941 (4,137)	3,452 (2,917)	8,576 (5,798)
No. of individuals	486	318	187
No. of observations	5,836	3,815	2,245
Log-likelihood	-4940.30	-3286.59	-1855.74
AIC	9938.61	6631.18	3769.49
BIC	10172.29	6852.54	3975.47

*Notes:* BMW stands for the Border, Midlands and West region, while SE stands for the South and East region. For preference coefficients, standard errors are shown in parentheses. \* denotes significant at 90% level, \*\* denotes significant at 95% level, \*\*\* denotes significant at 99% level. For willingness-to-pay estimates, standard deviations are presented in parentheses.

**Table F.4:** Results from correlated mixed logit models in preference space, by academic ability

Variable	0-3 LC Honours	3-6 LC Honours	>6 LC Honours
<i>Random parameters: Mean</i>			
Type of HEI - University	-0.52 (0.21)**	0.94 (0.10)***	2.27 (0.18)***
Travel time - 2 hours	-0.96 (0.23)***	-0.53 (0.10)***	-0.57 (0.18)***
Travel time - 3 hours	-2.57 (0.29)***	-1.94 (0.12)***	-2.02 (0.23)***
Placement available	1.63 (0.22)***	1.93 (0.08)***	2.10 (0.16)***
Good course reputation	0.60 (0.22)***	1.68 (0.11)***	3.03 (0.22)***
Excellent course reputation	1.27 (0.28)***	2.44 (0.13)***	4.29 (0.26)***
<i>Non-random parameters</i>			
Student fee	-0.78 (0.06)***	-0.57 (0.03)***	-0.52 (0.04)***
ASCD	-3.30 (0.46)***	-1.07 (0.20)***	1.29 (0.37)***
<i>StDev of random parameters</i>			
Type of HEI - University	1.67 (0.20)***	1.94 (0.09)***	2.01 (0.14)***
Travel time - 2 hours	1.27 (0.30)***	1.30 (0.09)***	1.53 (0.16)***
Travel time - 3 hours	1.71 (0.21)***	1.76 (0.09)***	2.68 (0.19)***
Placement available	1.55 (0.20)***	1.27 (0.07)***	1.75 (0.13)***
Good course reputation	1.32 (0.21)***	1.44 (0.09)***	2.04 (0.18)***
Excellent course reputation	1.96 (0.24)***	2.07 (0.10)***	2.79 (0.21)***
<i>Willingness-to-pay (€)</i>			
Type of HEI - University	-527 (2,150)	1,861 (3,410)	4,620 (3,913)
Travel time - 2 hours	-1,128 (1,612)	-796 (2,265)	-925 (2,945)
Travel time - 3 hours	-3,153 (2,179)	-3,216 (3,065)	-3,607 (5,177)
Placement available	2,152 (2,003)	3,445 (2,234)	4,189 (3,407)
Good course reputation	797 (1,684)	2,972 (2,503)	5,931 (3,938)
Excellent course reputation	1,731 (2,565)	4,424 (3,701)	8,530 (5,531)
No. of individuals	105	590	278
No. of observations	1,255	7,098	3,339
Log-likelihood	-1087.71	-6205.59	-2597.05
AIC	2233.43	12469.17	5252.10
BIC	2422.54	12708.54	5469.59

*Notes:* LC Honours refers to the number of honours subjects that students intend to sit in the Leaving Certificate examination. For preference coefficients, standard errors are shown in parentheses. \* denotes significant at 90% level, \*\* denotes significant at 95% level, \*\*\* denotes significant at 99% level. For willingness-to-pay estimates, standard deviations are presented in parentheses.

**Table F.5:** Results from correlated mixed logit models in preference space, by socio-economic status

Variable	SE Group 1	SE Group 2	SE Group 3
<i>Random parameters: Mean</i>			
Type of HEI - University	1.41 (0.11)***	0.74 (0.12)***	0.63 (0.29)**
Travel time - 2 hours	-0.63 (0.10)***	-0.67 (0.13)***	-0.47 (0.33)
Travel time - 3 hours	-2.07 (0.14)***	-2.10 (0.17)***	-2.26 (0.38)***
Placement available	1.94 (0.10)***	1.81 (0.11)***	2.34 (0.27)***
Good course reputation	2.09 (0.13)***	1.31 (0.13)***	1.28 (0.32)***
Excellent course reputation	2.95 (0.15)***	2.18 (0.16)***	2.13 (0.37)***
<i>Non-random parameters</i>			
Student fee	-0.49 (0.03)***	-0.66 (0.03)***	-0.81 (0.08)***
ASCD	-0.24 (0.23)	-1.77 (0.26)***	-1.86 (0.58)***
<i>StDev of random parameters</i>			
Type of HEI - University	1.95 (0.09)***	1.92 (0.12)***	2.18 (0.28)***
Travel time - 2 hours	1.24 (0.10)***	1.57 (0.13)***	2.04 (0.33)***
Travel time - 3 hours	1.91 (0.09)***	2.02 (0.13)***	2.02 (0.28)***
Placement available	1.53 (0.09)***	1.43 (0.10)***	1.56 (0.22)***
Good course reputation	1.61 (0.10)***	1.50 (0.12)***	1.81 (0.26)***
Excellent course reputation	2.31 (0.12)***	1.99 (0.13)***	2.27 (0.27)***
<i>Willingness-to-pay (€)</i>			
Type of HEI - University	2,840 (4,030)	1,094 (2,939)	755 (2,725)
Travel time - 2 hours	-1,263 (2,448)	-987 (2,299)	-556 (2,450)
Travel time - 3 hours	-4,121 (3,884)	-3,087 (3,049)	-2,727 (2,491)
Placement available	3,851 (3,168)	2,662 (2,204)	2,836 (1,961)
Good course reputation	4,360 (3,282)	2,037 (2,269)	1,642 (2,243)
Excellent course reputation	5,857 (4,677)	3,203 (2,980)	2,547 (2,784)
No. of individuals	554	360	77
No. of observations	6,647	4,330	919
Log-likelihood	-5557.56	-3796.35	-804.01
AIC	11173.12	7650.71	1666.02
BIC	11410.58	7875.74	1846.10

*Notes:* SE Group 1 denotes the household socio-economic group - managers/employers, higher professionals or lower professionals. SE Group 2 denotes the household socio-economic group - non-manual or manual skilled. SE Group 3 denotes the household socio-economic group - semi-skilled, unskilled or farmers. For preference coefficients, standard errors are shown in parentheses. \* denotes significant at 90% level, \*\* denotes significant at 95% level, \*\*\* denotes significant at 99% level. For willingness-to-pay estimates, standard deviations are presented in parentheses.

**Appendix G:** Supplementary material for Chapter 7: Correlated and uncorrelated generalised multinomial logit models

**Table G.1:** Results from generalised multinomial logit model

Variable	Uncorrelated GMNL	Correlated GMNL
<i>Random parameters: Mean willingness-to-pay (€)</i>		
Type of HEI - University	1,681 (150.23)***	1,689 (124.20)***
Travel time from home - 2 hours	-848 (99.75)***	-894 (107.24)***
Travel time from home - 3 hours	-3,714 (111.75)***	-3,605 (111.20)***
Work placement is available	3,007 (147.87)***	3,090 (137.69)***
Good course reputation	2,794 (155.88)***	2,936 (167.17)***
Excellent course reputation	4,142 (190.25)***	4,349 (195.03)***
<i>StDev of willingness-to-pay (€)</i>		
Type of HEI - University	2,892 (113.30)***	2,999 (113.44)***
Travel time from home - 2 hours	1,532 (105.24)***	1,784 (100.02)***
Travel time from home - 3 hours	2,845 (118.04)***	2,744 (101.41)***
Work placement is available	2,288 (96.66)***	2,178 (88.98)***
Good course reputation	1,148 (85.60)***	2,417 (101.82)***
Excellent course reputation	1,902 (83.04)***	3,359 (128.42)***
Scale parameter ( $\tau$ )	0.79 (0.03)***	0.77 (0.03)***
No. of individuals	991	991
No. of observations	11,896	11,896
Log-likelihood	-10634.68	-10188.47
AIC	21299.37	20436.95
BIC	21430.92	20700.05

*Note:* Standard errors in parentheses. \* denotes significant at 90% level, \*\* denotes significant at 95% level and \*\*\* denotes significant at 99% level

**Table G.2:** Covariance matrix for correlated GMNL

Attribute	Correlated GMNL
University: University	8.99 (0.68)***
2 hours: University	-1.15 (0.31)***
3 hours: University	-2.42 (0.43)***
Work placement: University	-0.22 (0.31)
Good reputation: University	-0.68 (0.31)**
Excellent reputation: University	-0.51 (0.37)
2 hours: 2 hours	3.18 (0.36)***
3 hours: 2 hours	2.09 (0.27)***
Work placement: 2 hours	1.27 (0.19)***
Good reputation: 2 hours	1.49 (0.25)***
Excellent reputation: 2 hours	1.18 (0.34)***
3 hours: 3 hours	7.53 (0.56)***
Work placement: 3 hours	0.27 (0.27)
Good reputation: 3 hours	-0.64 (0.27)**
Excellent reputation: 3 hours	-1.64 (0.38)***
Work placement: Work placement	4.74 (0.39)***
Good reputation: Work placement	0.18 (0.24)
Excellent reputation: Work placement	0.20 (0.28)
Good reputation: Good reputation	5.84 (0.49)***
Excellent reputation: Good reputation	7.67 (0.59)***
Excellent reputation: Excellent reputation	11.28 (0.86)***