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The Economics of Higher Education Participation

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2.1 Introduction

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

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

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

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

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

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

2.2 Higher Education Participation in Ireland

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.3 Higher Education Participation: Theory and Evidence

2.3.1 Human Capital Theory

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

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

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

2.3.2 Beyond Human Capital Theory

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

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

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

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

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

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

2.4 Evidence from Ireland

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

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

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

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

2.5 An Economic Analysis of Higher Education Participation in Ireland

2.5.1 Progression to Higher Education

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

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

Table 2.3 Probit models of attending university in Ireland

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

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

Source: Adapted from Denny (2014)

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

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

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

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

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

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

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

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

Table 2.4 Binary logit models of higher education participation

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

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

Source: Adapted from Cullinan et al. (2013)

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

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

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

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

Table 2.5 Bivariate probit model of university participation and degree type

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

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

Source: Adapted from Flannery and Cullinan (2014)

2.5.2 Upper Secondary Education Attainment

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

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

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

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

Table 2.6 OLS models of upper secondary attainment

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

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

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

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

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

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

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

2.6 Conclusion

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

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

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

Notes

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

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

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