

Determinants of Degree Quality in Ireland

Report to the Higher Education Authority (HEA)

Paul J. Devereux

School of Economics and Geary Institute, University College Dublin

devereux@ucd.ie

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Table of Contents

Chapter 1 Introduction and Methodology	4
Chapter 2 Descriptive Analysis	6
Chapter 3 Regression Results	9
Chapter 4 Grades in English, Irish, and Mathematics.....	13
References.....	16

Executive Summary

- This report builds on work by Pigott and Frawley (2019) and draws on research by Judith Delaney and Paul Devereux (Delaney and Devereux, 2020a; Delaney and Devereux, 2020b).
- This report analyses degree outcomes of undergraduate students who enter an honours degree programme in Irish higher education institutions (HEIs) between 2007 and 2013. We study entrants who took the Leaving Certificate in an Irish second-level school and were aged between 16 and 20 when starting college. We focus on the relationship between degree outcomes and characteristics of students and post-primary schools.
- About 76% of students who entered an honours degree programme in an Irish HEI completed their degree within 1 year of the expected completion date.
- Amongst graduates, about 65% obtained a *good degree* (obtained at least a 2.1 degree) and 16% obtained a *great degree* (first class honours degree).
- There are substantial differences in completion probability and degree class by characteristics of students and by the type of school attended:
 - Performance in third level is generally better for females, students without disability, students who do not receive a grant, and students whose fathers are professionals.
 - Performance is higher for students who attended fee-paying secondary schools rather than non-fee-paying secondary schools. Students from DEIS schools and from grind schools do considerably worse than average; students from mixed-sex and Irish-medium schools do about the same as average.
 - Performance is higher for students who have more Leaving Certificate points.
- When we estimate multivariate models and implicitly compare students who enter the same programme in the same year with the same points, the findings change:
 - In any given entry class and for any particular level of points, degree performance is generally better for females, for disabled students, and for grant recipients. There is little variation in performance by father occupational status.
 - In any given entry class and for any particular level of points, students from vocational schools, community schools, and fee-paying secondary schools perform equally well as the reference category of students from non-fee-paying secondary schools.
 - In any given entry class and for any particular level of points, performance is generally better for students from DEIS schools and students from mixed-sex schools. It is generally worse for students from Irish-medium schools and students from grind schools.
 - Leaving Certificate mathematics grades have greater power than English or Irish grades in predicting the degree performance of students.

Chapter 1 Introduction and Methodology

- This report analyses degree outcomes of undergraduate students who enter an honours degree programme in one of Ireland's universities or institutes of technology (we require the anticipated length of the programme to be at least 3 years).¹ We focus on the relationship between degree outcomes and characteristics of students and their post-primary schools.
- To focus on a relatively homogenous group of students who have recently taken the Leaving Certificate, we restrict the sample to persons aged between 16 and 20 when starting their HEI programme.
- Our data come from the Higher Education Authority (HEA) data registers that compile information on students in Irish third level institutions. We use information on new entrants to higher educational institutions from 2007 onwards and information on students who graduate from these institutions by 2016-17.
- The HEIs report the anticipated (normal) duration of each degree programme, usually 3 or 4 years. When looking at degree completion, we assign students who have graduated within one year of the anticipated length of the programme as degree completers while those who have not graduated within this time frame are denoted as non-completers.
- We use two different definitions of degree quality: *Good Degree* (first class honours or second class honours (upper division)) and *Great Degree* (first class honours).
- We restrict the sample to students who attended an Irish post-primary school because we require information on the school attended for our analysis.
- We delete cases where we do not know the school attended or Leaving Certificate points (in some instances, institutions do not report the schools attended by students, so we have to drop that institution/year). Also, we remove a small number of courses that make admissions decisions based on information other than Leaving Certificate points.
- We first show some descriptive statistics that describe how degree outcomes differ by student and school characteristics.
- The student characteristics we study are:
 - Gender
 - Disability Status
 - Grant Recipient
 - Father's occupation
 - Leaving Certificate points
 - Leaving Certificate grades in mathematics, English, and Irish

¹ The data for the third type of Irish HEI, colleges, were too incomplete to analyse.

- The post-primary school characteristics we study are:
 - Broad type of school (whether a secondary school (non-fee-paying), secondary school (fee-paying), vocational school/community college, comprehensive/community school, or a grind school)
 - whether it is mixed-sex or same-sex school
 - whether it is a DEIS school
 - whether it is an Irish-medium school
- We then employ regression techniques to do multivariate analysis. Our goal is to examine whether there are predictable differences in performance by individual or school characteristics after taking account of the programme entered and the Leaving Certificate points obtained.
- In these regressions, we also control for the age of the student when starting at the HEI and the county of origin of the student.

Chapter 2 Descriptive Analysis

- Table 1 displays degree obtainment by student characteristics and post-primary school characteristics.
- Degree completion refers to the proportion in each group who obtain a degree within one year of the anticipated completion date. The other two measures (Good Degree, Great Degree) are for the sample of people who completed a degree programme.

Table 1: Descriptive Statistics

Sample	(1) Degree Completion	(2) Good Degree	(3) Great Degree
All	0.76	0.65	0.16
Male	0.71	0.62	0.16
Female	0.81	0.68	0.15
Disabled	0.71	0.62	0.13
Not disabled	0.77	0.66	0.16
Grant recipient	0.73	0.62	0.14
Not grant recipient	0.77	0.67	0.16
Father SES: Professional	0.81	0.71	0.20
Father SES: Managerial and Technical	0.79	0.68	0.17
Father SES: Non-manual	0.79	0.66	0.15
Father SES: Manual	0.74	0.63	0.15
Secondary school (non-fee-paying)	0.77	0.65	0.16
Vocational school/Community college	0.73	0.63	0.15
Community/Comprehensive school	0.74	0.65	0.16
Secondary school (fee-paying)	0.79	0.71	0.16
Grind school	0.71	0.61	0.12
Mixed-sex school	0.74	0.64	0.15
DEIS school	0.69	0.62	0.15
Irish-medium school	0.75	0.65	0.16

- Females are 10 percentage points more likely than males to complete and 6 percentage points more likely to get a 2.1 or better. However, they are slightly less likely than males to get a 1st class honours degree.
- Disabled students do worse in all respects than non-disabled students.
- Grant recipients do worse in all respects than non-recipients.

- There is a clear SES gradient with children of professionals doing best and children from manual backgrounds doing worst.
- Outcomes differ across type of post-primary school. When we split schools into five mutually exclusive and exhaustive types, we find the best outcomes in fee-paying secondary schools, then non-fee-paying secondary schools, then community/comprehensive schools, then vocational schools/community colleges, and the worst outcomes are for students who attended grind schools.
- When we look at further school characteristics, we find that students from DEIS schools do considerably worse than average; students from mixed-sex and Irish-medium schools do about the same as average.
- The pictures below show the relationship between Leaving Certificate points and degree completion and degree quality. We plot the relationship between each points level and each of our three dependent variables. Because very low points are rare, when doing this plot, we omit cases with points below 300. We also restrict the sample to pre-2012 entrants (before the introduction of bonus points for mathematics).

Figure 1: Leaving Certificate Points and Degree Completion

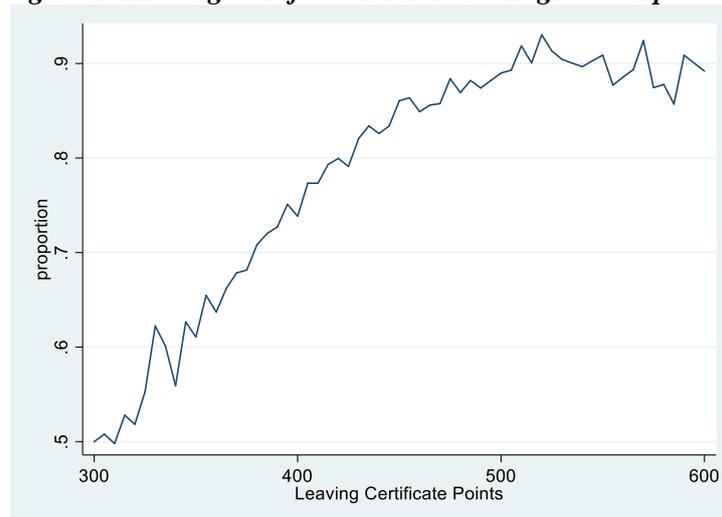


Figure 2: Leaving Certificate Points and Proportion of Completers Obtaining a Good Degree

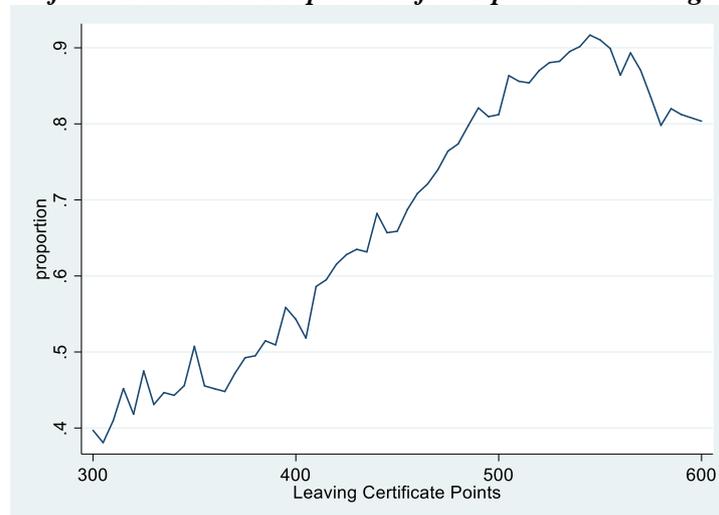
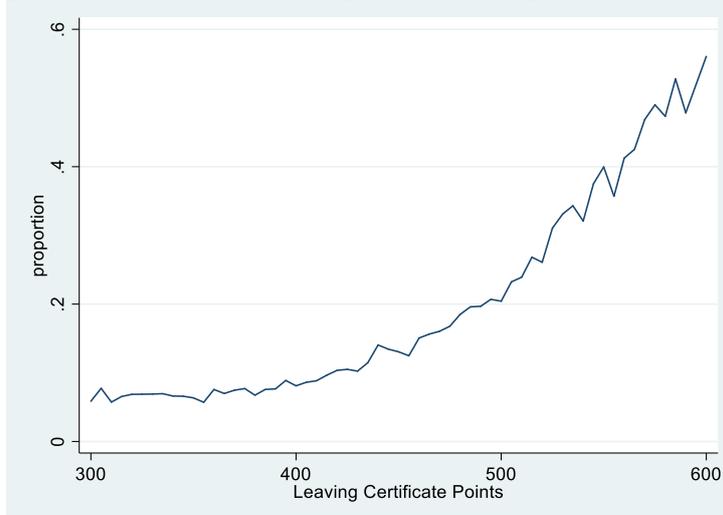


Figure 3: Leaving Certificate Points and Proportion of Completers Obtaining a Great Degree



We plot the relationship between each points level and each of our three outcome variables. We omit cases with points below 300 and restrict the sample to pre-2012 observations.

- The figures show that, in general, higher points are associated with better college performance.
- About 50% of entrants with 300 points complete their degree, compared to 75% with 400 points and 90% with 500 or 600 points.
- Amongst completers, about 40% of entrants with 300 points get a 2.1 or better, compared with 55% of persons with 400 points and 80% of persons with 500 points or 600 points.
- Amongst completers, about 5% of entrants with 300 points get a 1st class honours degree, compared with 10% of persons with 400 points, 20% of persons with 500 points, and 50% of persons with 600 points.
- For completion, greater points are more important at lower points levels; for 1st class honours, greater points are more important at higher points levels.
- The relationship between points and obtaining a 2.1 or better degree is approximately linear but actually declines at very high points. This decline occurs because these high-points students disproportionately enter more difficult and challenging courses where it is relatively difficult to obtain a good degree.

Chapter 3 Regression Results

- In order to separate out the effect of different individual and school factors, we use multivariate regression analysis.
- Our goal is to examine whether there are predictable differences in performance after taking account of the programme entered and Leaving Certificate points obtained.
- In the regressions, we include control variables for
 - a quadratic in age at entry
 - county of origin indicators (with a separate category for students from abroad)
 - course-by-year indicators
 - indicator variables for Leaving Certificate points obtained
- By including course-by-year indicators, we allow for the fact that the degree of difficulty or grading practices may differ across college courses and are effectively comparing the outcomes of students who are in the same entering class. The number of people in a course varies from fewer than 10 up to hundreds, depending on the course. On average, in our sample, there are 32 people in a course-year cell (actual course sizes are somewhat larger as we exclude entrants aged 21 or older and foreign students who did not do the Leaving Certificate).
- By adding controls for Leaving Certificate points, we make a comparison between people in the same class who have the same points. We have seen that points are a major predictor of degree performance; we want to see whether there are predictable differences in performance between groups when we take account of differences in points between groups.
- We estimate linear regressions (linear probability models) and report robust standard errors and cluster the standard errors by post-primary school attended. Results are in Table 2.
- The estimates show the effect on the dependent variable of changing each variable by one unit.

Table 2: Relationship between Individual and School Characteristics and College Performance

	(1) Finish	(2) Good Degree	(3) Great Degree
Female	0.046*** (0.003)	0.045*** (0.004)	0.009*** (0.003)
Disabled	-0.001 (0.006)	0.021*** (0.008)	0.024*** (0.006)
Grant recipient	0.002 (0.003)	0.013*** (0.004)	0.011*** (0.003)
Father Occupation (reference: Professional)			
Managerial and Technical	-0.008* (0.005)	0.002 (0.006)	-0.009 (0.005)
Non-manual	0.002 (0.005)	0.008 (0.007)	-0.009 (0.006)
Manual	-0.016*** (0.005)	0.004 (0.006)	-0.001 (0.005)
School Type (reference: non-fee-paying secondary school)			
Vocational school/Community college	-0.003 (0.006)	-0.001 (0.008)	0.000 (0.006)
Community/Comprehensive school	0.002 (0.006)	0.006 (0.008)	0.003 (0.005)
Fee-paying school	-0.008 (0.006)	-0.007 (0.007)	-0.004 (0.006)
Grind school	-0.075*** (0.014)	-0.061*** (0.020)	-0.041*** (0.006)
Irish-medium school	-0.034*** (0.007)	-0.038*** (0.011)	-0.032*** (0.008)
DEIS school	-0.004 (0.006)	0.033*** (0.008)	0.024*** (0.006)
Mixed-sex school	-0.002 (0.004)	0.014** (0.006)	0.014*** (0.004)
Observations	99,337	73,997	75,479
R-squared	0.185	0.266	0.240
Course-by-year FE	Yes	Yes	Yes
LC points FE	Yes	Yes	Yes

All regressions include indicators for county of origin and a quadratic in age when starting the college programme. We also include a missing dummy for father occupation and for disabled. Robust standard errors clustered by school in parentheses. *** p<0.01 ** p<0.05 * p<0.1

Results for Individual Characteristics

- In the multivariate models, taking account of the controls, the following findings emerge:
 - Women are 5 percentage points more likely to finish, 5 percentage points more likely to get a good degree, and 1 percentage point more likely to get a great degree. The first two effects are smaller than the raw gaps in Table 1 because women have higher points on average.
 - Disabled students are equally likely to finish and are about 2 percentage points *more* likely to get a good or a great degree. A plausible interpretation is that disabled students face barriers in post-primary schooling that lead them to under-perform in the Leaving Certificate but the supports available in college enable them to do relatively better than other students who have the same points.
 - Grant recipients are slightly more likely to obtain a good degree or a great degree and about equally likely to finish. The positive effect of having a grant may indicate that financial support plays a role in enabling students to do better, perhaps due to greater financial security that reduces the likelihood of working while in college. Also, students with grants may study harder as they may lose eligibility for their grants if they fail and need to repeat a year (McCoy and Byrne, 2010).
 - Students from a manual background are less likely to finish than persons from a professional background. However, there is no evidence that father's occupation matters for degree performance.

Results for School Characteristics

- In the multivariate models, taking account of the controls, the following findings emerge:
 - Relative to students from non-fee-paying secondary schools, students from community/comprehensive schools, vocational schools/community colleges, and fee-paying secondary schools do about equally well.
 - Students from grind schools perform less well at third-level in all respects. They are 8 percentage points less likely to finish, 6 percentage points less likely to get a good degree, and 4 percentage points less likely to get a great degree (compared to the excluded category of entrants from non-fee-paying secondary schools). This may not be surprising as there are reasons to believe that their Leaving Certificate points attainment may overstate their preparedness for college, leading them to do worse in college than others with the same points.
 - Students from Irish-medium schools are 3 percentage points less likely to finish, 4 percentage points less likely to get a good degree, and 3 percentage points less likely to obtain a great degree. This may be because students who sit the exams

through Irish receive extra points and, so, perform less well in college compared to other students with the same number of points.

- Coming from a DEIS school is associated with *better* performance in terms of getting a good degree (3 percentage points) or a great degree (2 percentage points). The positive DEIS effect may be related to university support programmes that are often targeted to students from DEIS schools. It may also reflect disadvantages that make it more difficult for students from DEIS schools to achieve their full potential in the Leaving Certificate.
- Students who went to mixed-sex schools tend to do better in college. They are about 1 percentage points more likely to get a good or great degree. A possible explanation is that students from these schools assimilate better into the mixed-gender college environment.

Points Equivalence

- One way to understand the magnitudes of the coefficients is to compare them to the effect of Leaving Certificate points.
- If we use Figures 1 to 3 to calculate the change in average outcomes as points go from 300 to 550 (a points range that includes almost 91% of students), we find that an extra 10 points increases the probability of obtaining a good degree by 2.04 percentage points.
- So, using our estimates for good degree:
 - being female rather than male equalizes to 22 extra points
 - being disabled 10 extra points
 - being a grant recipient 6 extra points
 - being from a DEIS school (rather than a non-fee-paying secondary school) 16 extra points
 - being from a mixed-sex school (rather than a single-sex school) 7 extra points
 - being from an Irish-medium school is equivalent to having 18 fewer points
 - and being from a grind school compared to a non-fee-paying secondary school is equivalent to having 29 fewer points

Chapter 4 Grades in English, Irish, and Mathematics

- In this section, instead of accounting for Leaving Certificate points, we use grades in English, Irish, and mathematics (compulsory subjects for Leaving Certificate) to study the relative role of scoring well in these subjects.
- In this analysis, we drop observations where we do not observe Leaving Certificate grades for English, Irish, or mathematics (we now have 81,762 observations).
- We use indicator variables for scoring, at the higher level, 90-100 (A1 grade), 80-89 (A2 or B1 grade), 70-79 (B2 or B3 grade), 60-69 (C1 or C2 grade), 50-59 (C3 or D1 grade), or less than 50 (D2, D3, E, or F grade). For subjects taken at lower level, we include indicators for scoring 90-100 (A1 grade), 80-89 (A2 or B1 grade), 70-79 (B2 or B3 grade) or those scoring less than 70 (C1, C2, C3, D1, D2, D3, E, or F grade).²
- We show estimates using our baseline control variables and controls for individual and school characteristics and for programme-year indicators. We do not control for Leaving Certificate points.
- We show the estimates in Figures 4-6. The omitted category is scoring 60-69 at higher level so all effects are interpreted relative to persons who score 60-69 at higher level in that subject. The dots represent point estimates and the bars represent confidence intervals.

² Since scoring less than 70 percent at the lower level is uncommon in our sample, we pool all those with less than 70 in to one category.

Figure 4: Relationship between Subject Grades and College Completion (relative to scoring 60-69% at higher level)

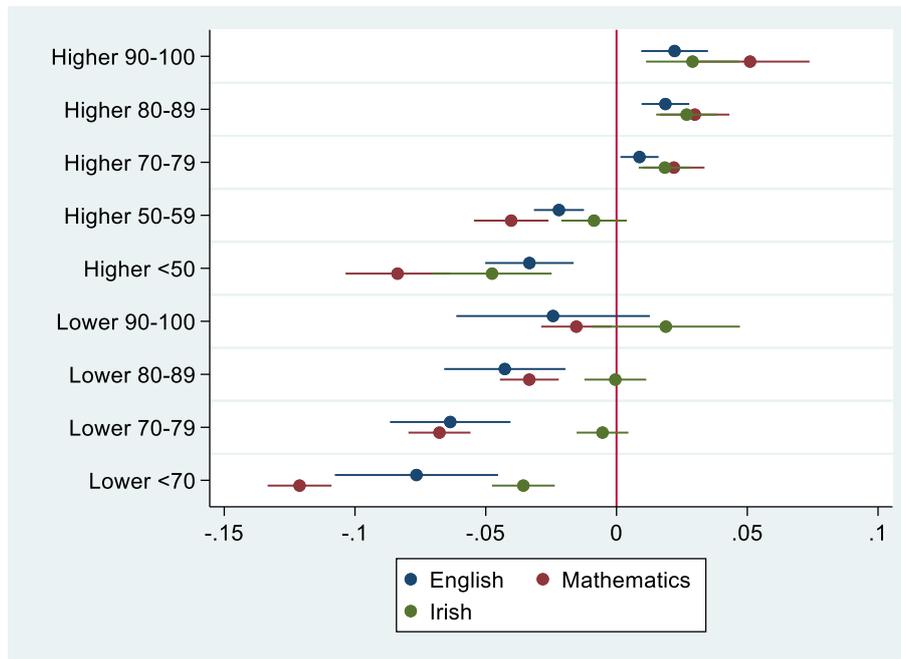


Figure 5: Relationship between Subject Grades and Probability of Obtaining a Good Degree (relative to scoring 60-69% at higher level)

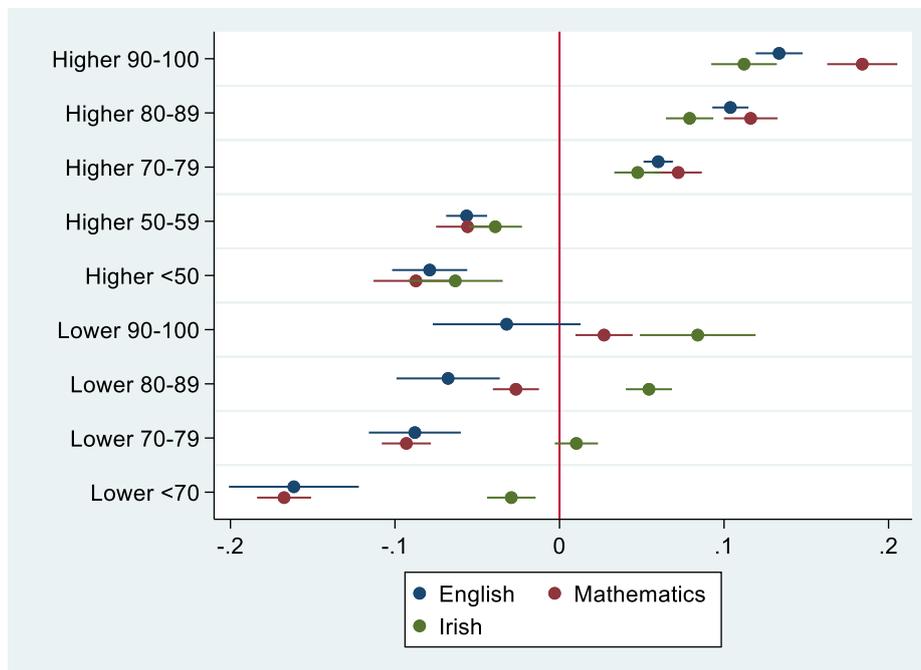
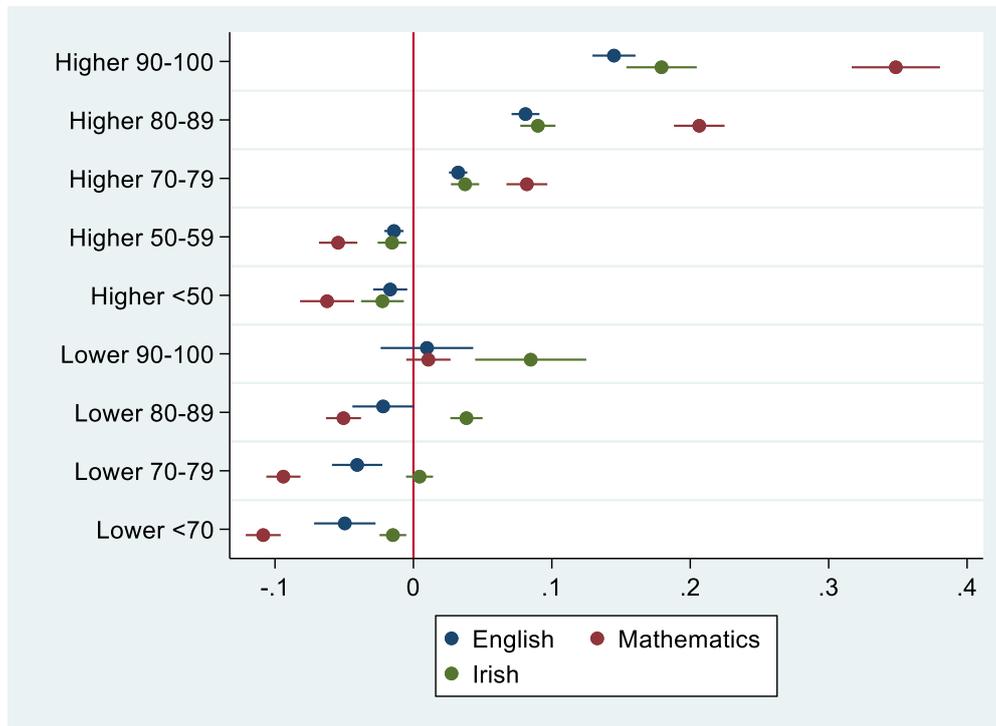


Figure 6: Relationship between Subject Grades and Probability of Obtaining a Great Degree (relative to scoring 60-69% at higher level)



- Mathematics grades are strongly predictive of performance at third level. A student who scored 90+ at higher level is about 20 percentage points more likely to get a 2.1 or better and 35 percentage points more likely to obtain 1st class honours than a student who scored 60-69 in higher level mathematics. Weak performers in mathematics are predicted to do poorly in college.
- English grades are similarly predictive to mathematics grades for college completion and for the probability of obtaining a 2.1 or better. However, they have less predictive power for obtaining 1st class honours.
- Irish grades have less predictive power than English and mathematics grades, particularly for the probability of obtaining a 1st class honours degree.
- Interestingly, for completion, effects at the bottom of the grade distribution are particularly predictive; for good degree, the effect sizes appear similar throughout the distribution; and for great degree, the top of the distribution is particularly informative (especially for mathematics grades).
- Overall, the estimates suggest that, while the differences are small for completion, mathematical skills are more important than English or Irish skills for degree outcomes, and particularly for the probability of getting a first-class honours degree.

- In 2012, Ireland introduced 25 bonus points in mathematics for persons scoring at least 40% on the higher-level paper (H6 grade or better). We find that persons who score 50-59% in higher-level mathematics do worse in college than persons with 90-100% at lower level and their performance is similar to persons who scored 80-89% at lower level. However, when bonus points are included, scoring 50-59% in higher level mathematics results in considerably higher points than the maximum achievable from lower level mathematics.

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