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Levelling the Playing Field? SES Differences in Graduate Degree Choices*

by

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Abstract

In many countries, subsidies towards higher education and financial aid to students from poorer backgrounds have reduced socio-economic status (SES) gaps in undergraduate study. The increasing importance of graduate studies that are typically more expensive may, however, provide a new avenue for outcome differences by SES. We use administrative data from Ireland that allows us to take account of the exact undergraduate programme of study as well as a rich set of covariates. We find differences by SES in the probability of undertaking graduate study and larger differences in the type of programme entered. Low SES students are less likely to enter business/economic fields and more likely to enter education -- the lowest SES group enter fields with expected earnings that are, on average, about 3% lower compared to the highest SES group. We find that, at age 33, students in the lowest SES group who studied a graduate degree earn about 10% less compared to the highest SES group -- even for this high achieving group of graduates, those from the poorest backgrounds still earn significantly less than those from the most privileged backgrounds. Interestingly, we find choice of graduate programme can explain about 40% of this gap.

* This paper uses Educational Longitudinal Database (ELD) data provided by the Irish Central Statistics Office (CSO). Results are based on analysis of strictly controlled Research Microdata Files. The CSO's role was limited to providing the data and the CSO does not take any responsibility for the views expressed or the outputs generated from this research. We are grateful to Brian Stanley and Kieran Culhane for helpful discussions in relation to the ELD data.

1. Introduction

Much recent research has shown socio-economic status (SES) differences in undergraduate major choices even after taking account of pre-college skills. Lower SES students are less likely to enter undergraduate colleges and programmes that have high achieving students and high expected earnings (see, for example, Campbell et al. (2022) for the UK, Dillon and Smith (2017) and Leighton and Speer (2023) for the US, and Delaney and Devereux (2020a) for Ireland). However, despite the increasing importance of graduate degrees such as taught masters, particularly in Europe, there has been little research on how SES relates to the choices made at this point in the education trajectory. Low SES students may be less likely to enrol due to lower confidence in their academic abilities or liquidity constraints arising from higher debt levels or limited financial support from family.¹ Also, these or other factors may lead them to enrol in graduate programmes that have lower payoffs in the labour market. Therefore, differences by SES in graduate study choices may have important implications for earnings inequality and social mobility. In this paper, we use Irish administrative data that contain rich information about college graduates to examine SES differences in their graduate degree choices. Further, we use information on post-college earnings to evaluate the extent to which these decisions influence SES gaps in earnings for college graduates.

While there is a large literature on SES and undergraduate study choices, little work has focused on SES differences at the graduate level. The few papers that have studied this topic find mixed evidence. Using the UK Labour Force Survey, Wakeling and Laurison (2017) find that, in recent cohorts, persons from working class origins are about 28 percent less likely to attain a graduate degree compared to those from a privileged background. Similarly, Lindley

¹ Researchers have speculated that, as increasingly higher proportions pursue undergraduate degrees, graduate study has become more important as a signal that may be used by higher SES students to distinguish themselves from the rest of the population. This might imply increasing SES differences in graduate study enrolment (Raftery and Hout, 1993).

and Machin (2013), using both UK cohort studies and the NLSY, find large differences in graduate attainment by family income. In contrast, more recent work by Britton et al. (2020) and Britton and van der Evre (2020) using UK administrative data and controlling for a rich array of test scores find that, if anything, students from lower SES backgrounds are slightly *more* likely to attend graduate study.²

We build on this previous work by using rich Irish administrative data and looking not just at SES differences in whether students enrol in graduate (henceforth, PG) study but also at SES differences in the choice of field of study at the PG level; we also examine the extent to which PG choices can explain later earnings differences by SES. Ireland is a particularly interesting case to study as, while there is a quite limited amount of government financial aid for PG study (including partial/full fee waivers, maintenance grants, but not loans), what does exist is strongly targeted at students from low-income families.³ Therefore, if we see SES differences in this context, we might expect to find larger differences in other systems where funding for graduate study is typically little or non-existent and which may lead to particular issues for students from low income backgrounds.⁴

A core issue with studying differences by SES in graduate study is that it is important to compare across people who are in different SES groups but are similar in terms of undergraduate degree and general academic interests and achievements. Our administrative data allow us to completely account for undergraduate degree by using undergraduate

² Some older work also finds little effect of SES on undertaking graduate study. Stolzenberg (1994) shows that parental background has little explanatory power for the decision to do an MBA; Mare (1980) also shows that the link between SES and education vanishes once a student completes an undergraduate degree.

³ We discuss financial support for graduate study in Section 2.

⁴ Given the increase in graduate degree attainment, there has been an increase in the support available to cover tuition in other countries. In the US in 2006 the government introduced the Graduate PLUS loan programme which raised the borrowing limits for graduate programmes. However, Black et al. (2023) found that the policy change had little effect on the proportion of underrepresented groups attending graduate school. In the UK, loans for postgraduate study were introduced from the 2016/2017 academic year. This was motivated by the fear that widening participation at undergraduate level may not increase student mobility if higher SES students were more likely to do PG study.

programme fixed effects.⁵ We further control for general academic interests and achievements using detailed information on the subject choices made in high school and the grades received in these subjects.⁶ We also know the exact programme studied for PG so can evaluate the extent that accounting for the PG programme affects SES gaps in labour market earnings.

We find that students from the lowest quintile of the SES distribution representing the most deprived group are about 6 percentage points less likely to study for a PG degree within 3 years than the most affluent group. However, this differential is mostly explained by academic experience and achievement by the time of UG graduation; once UG programme and prior academic achievement are controlled for, the gap falls to 1 percentage point. Of those students who enrol in PG study, the lowest SES group enter fields of study with expected earnings that are, on average, about 5% lower compared to the highest SES group; even with the full set of control variables this gap remains at 3%. Lower SES groups are also much less likely to enter business/economic fields and more likely to enter teacher-training programmes. When we study heterogeneous effects, we find relatively small differences in SES gaps by gender. However, we find differences by undergraduate academic performance: With the full set of controls, there are little if any SES gaps in PG choices or outcomes for the group of students who achieved the highest degree class in their UG studies.

When we study labour market outcomes, we find that differences in SES choices have substantial implications for the gaps in earnings across SES groups. This is not apparent at the extensive margin of PG attendance; the SES gaps in earnings are little changed by taking account of whether students did a PG. However, amongst those who do a PG, the differences

⁵ A programme is both institution- and field-specific; for example, economics in University College Dublin.

⁶ We have grades for each of the 7 or 8 subjects taken in the end of high school Leaving Certificate examinations. These high-stakes exams are centrally set and graded and so are comparable across all students and provide a detailed description of academic readiness at the end of secondary schooling. While mathematics, English, and Irish are compulsory subjects for Leaving Certificate, students tend to choose 4 or 5 optional subjects, providing valuable information about their interests and aptitudes.

in the programme chosen matter. At approximately age 33, students from the lowest SES group who studied a PG degree earn over 10 percent less compared to their highest SES counterparts. Interestingly, controlling for the PG programme chosen reduces this gap by 40%, suggesting that the choice of programme at PG level can have substantial effects on earnings.

Our work has important policy relevance as it suggests that focusing on the extensive margin of attending PG study may have little potential to reduce intergenerational persistence in earnings inequalities. However, more work is needed to understand why students from the poorest groups are choosing to enter graduate programmes that pay systematically less than those chosen by students from the most privileged backgrounds.

The remainder of the paper continues as follows: Section 2 describes the dataset and institutional background, and, in Section 3, we describe the empirical strategy. Section 4 presents the results. Section 5 explores heterogeneous effects while Section 6 assesses the extent to which PG choices can explain later earnings gaps in the labour market. Section 7 concludes.

2. Data and Institutional Background

We use the Educational Longitudinal Database (ELD) created by the Irish Central Statistics Office (CSO).⁷ This rich dataset includes students enrolled in Irish higher education institutions from academic years 2009/10 to 2021/22 and so includes college completions that occur between 2010 and 2021. Using the Protected Identifier Key of PPS numbers (equivalent to a US social security number), administrative data on high school outcomes, college characteristics, and subsequent labour market dynamics are linked. Information on colleges comes from the Higher Education Authority (HEA), characteristics of secondary schools from the Department of Education's Post-Primary Online Database (PPOD), and examination

⁷ Other work using this dataset includes Doris et al. (2022a) and Delaney and Devereux (2025).

records are reported by the State Examinations Commission (SEC). Additionally, data on need-based grants recipients are sourced from Student Universal Support Ireland (SUSI). Our earnings records are from the tax authorities (the Revenue Commissioners).

The dataset has several noteworthy advantages. Given the information comes from administrative sources rather than surveys or self-reports, we expect there to be little measurement error. Also, by using anonymised PPS numbers for administrative matching, the CSO ensure the accuracy of cross-dataset linkages. However, to adhere to CSO guidelines, we use a large representative random sample from the dataset rather than the full population data.

Because we focus on graduate (PG) study, our sample comprises individuals who have graduated from an undergraduate degree programme by age 25.⁸ Some students then enter multiple graduate programmes; we study the characteristics of the first one entered subsequent to completing undergraduate, except when the student does a subsequent programme at a higher NFQ level.⁹ Because we require information on secondary school characteristics and secondary school subjects and grades, we further restrict the sample to students who began their educational journey in Ireland prior to undertaking an Irish undergraduate degree.

Ireland has many types of graduate programmes ranging from non-degree avenues such as certificates and diplomas to more advanced programmes such as taught masters, research masters, and PhDs. We include all full-time post-graduate programmes. The programme duration varies across the type of graduate programme, with non-degree options typically

⁸ The criterion we use is that they have finished a National Framework of Qualifications (NFQ) Level 8 programme and earned an undergraduate honours degree. If they have graduated from two undergraduate programmes (a very rare situation), we take the second graduation. In Ireland, the educational landscape encompasses roughly 30 Higher Education Institutions (HEIs), each with its distinct focus and offerings. Among them, seven institutions have maintained university status consistently throughout our study period, widely regarded as the highest academic prestige. Additionally, specialized colleges cater to specific disciplines such as teaching and medicine. Notably, technological universities, formerly known as Institutes of Technology, prioritize STEM (Science, Technology, Engineering, and Mathematics) and business degrees, underscoring their commitment to fostering innovation and expertise in these areas.

⁹ In practice, it's uncommon for individuals to pursue multiple post-graduate (PG) programmes, and the specific rule we employ to select the pertinent programme for each individual has negligible impact on our research findings.

spanning up to one year, taught masters programmes generally lasting a year, research masters extending to two years, and PhDs typically requiring three to five years.¹⁰

In Ireland graduate degree fees range from around €3,000 up to €30,000 per year. The Irish government body SUSI offers financial assistance for graduate study for low-income students. There are two components of aid -- students may be eligible for a maintenance grant and a tuition fee contribution grant of up to €6,270. The maintenance grant is paid each month directly to the student for a period of 9 months per academic year. The level of the maintenance grant and the amount of tuition fee that is paid varies with the level of household income, the number of siblings, and the distance the student lives from the college.¹¹

There have been some changes in the grant scheme for graduate studies over the period we analyse. In 2010 and 2011, graduate students were eligible for means-tested fee reductions and maintenance grants. During these years, 36% of PG students in our sample received a grant of some sort (either a fee reduction or a fee reduction plus maintenance). In 2012, maintenance grants were abolished for incoming PG students and the means test was made stricter with lower income thresholds for fee reductions. The proportion of PG students in our sample receiving some type of grant fell to 21% in 2012 and continued to decline subsequently to 16% in 2016. Maintenance grants were re-introduced in 2017. Even then, they were only available to those from the poorest households (only 6% of persons starting a PG received a maintenance grant over the 2017-21 period). The income criteria for receipt of a fee reduction were loosened in 2021, resulting in an increase in the proportion receiving grant aid for graduate study (23%

¹⁰ Post-graduate (PG) certificates are typically highly specialized in nature. Diplomas, on the other hand, are often pursued by students seeking to explore a new field of study and can serve as a pathway for later advancing to a master's programme in the same subject area. These programmes typically do not include a thesis component and instead rely on coursework assessed through examinations. Prior to September 2014, individuals aspiring to become secondary school teachers were required to complete a higher diploma programme. However, starting from 2014, aspiring educators have two options: either pursue a specialized undergraduate degree spanning four years or enrol in a 2-year master's programme known as a Professional Master of Education. Consequently, our dataset for prospective teachers encompasses both diploma and master's degree programmes.

¹¹ Throughout our period families could claim tax relief on PG fees that exceed a certain level (€3,000 in 2024). However, this relief is subject to a maximum fee level of €7,000 so the maximum value is typically €800.

received a partial fee waiver in 2021 with 5% receiving a maintenance grant). Throughout our period, the maximum fee waiver was €6,270 for students from the poorest families with the waiver falling to €2,000 for students who qualify for a less strict means test.¹²

Measuring Socio Economic Status (SES)

We have several variables that can be used to measure SES and we use principal components to combine them into a single SES index. Firstly, we use whether the individual qualified for a fee waiver for the Leaving Certificate (in our sample period, the fee to sit the Leaving Certificate exams was about €100). This applies to any student who holds a medical card or is dependent on a parent/guardian who holds a medical card (20% of our sample). Medical cards are means-tested and, so, provide a useful marker for low family income. Secondly, we use whether the individual attended a fee-paying or DEIS secondary school (12% of our sample attend fee-paying schools, 10% attend DEIS). Schools with high concentrations of students from socioeconomically disadvantaged backgrounds have been designated as “DEIS” schools which stands for *Delivering Equality of Opportunity in Schools*, and these receive extra supports from the state, somewhat lower pupil-teacher ratios, and extra state funding for other purposes. On the other hand, fee-paying schools charge about €6,000-€9,000 per annum and are generally attended by students from richer backgrounds.¹³ Thirdly, we use whether the student received a means tested grant for their UG study. As described earlier, eligibility for these grants depends on parental income and the number of siblings so that only students from relatively low-income households can obtain financial aid. The criteria for undergraduate student grants have been quite stable throughout our sample period. Lastly, we

¹² In 2012, students were eligible for a €2,000 fee remission if there were fewer than four dependent children in the family and the assessable income was less than €31,500 (plus €4,980 for any other family member in third-level education). The limit was €34,615 for families with four to seven dependent children and €37,580 for larger families.

¹³ There is little evidence, however, that fee paying schools in Ireland create more value added than other schools (Doris et al., 2022b).

use the secondary school electoral district HP Deprivation index score in 2011.¹⁴ The HP relative index score is a measure of the relative affluence of an area and we use the index that is based on the electoral district in which the high school attended by the individual is located.¹⁵ We combine all these measures of SES in to one SES index using the first principal component.

For analysis, we divide the SES index into 5 quintiles. Table 1 shows descriptive statistics by SES quintile group. First, we can see how the principal components approach used the five underlying variables to allocate people into SES quintiles. While about 20% of students qualify for a Leaving Certificate fee waiver, the proportion varies from less than 1% in the two highest SES groups to 84% in the lowest SES group. Group 1 (the most affluent group) contains most of the people who attended fee-paying schools while Group 5 (the most disadvantaged group) contains students who have multiple measures of deprivation such as qualifying for a needs-based grant for undergraduate study, qualifying for a Leaving Certificate fee waiver, and attending a DEIS secondary school.

The SES groupings also correlate with Leaving Certificate achievement. At the end of the last year of secondary school, students sit the Leaving Certificate examinations, typically in 7 or 8 subjects, and grades in the student's 6 best subjects are combined to form their total Leaving Certificate points which range up to 625.¹⁶ We see that average points increase monotonically from Group 5 to Group 1. There is a similar gradient for the probability that a student obtains a first class honours undergraduate (henceforth, UG) degree and the probability

¹⁴ This index was developed by Haase et al. (2014) using 2011 Irish Census data and comprises three primary dimensions related to the relative affluence of an area: demographic profile, social class composition, and labour market situation. The index is comprised of the following indicators: the percentage change in population over the preceding five years, the proportion of individuals aged under 15 or over 64 years, the percentage of individuals with low educational attainment, the proportion of individuals with tertiary-level education, the mean number of persons per room, the percentage of households classified as high or low social class, the percentage of single-parent households with children under 15 years, and male and female unemployment rates (see Haase et al. (2014) for more information about this index).

¹⁵ There are approximately 3,500 electoral districts in the Republic of Ireland, with an average population of about 1,500 people.

¹⁶ We have deleted a small number of observations with Leaving Certificate points lower than 100 as these most likely result from some form of measurement error.

that the student enters a PG programme after completing their undergraduate degree. Earnings in 2022 are also increasing monotonically as we move from the most deprived to the most advantaged SES group. Interestingly, the proportion female (57% overall) tends to be higher in the less advantaged groups because gender gaps in university attainment tend to be greater for these groups (Goldin et al. 2006; Autor et al. 2019). We will control for gender in all our subsequent regression analysis so these gender disparities will have little effect on our estimates.¹⁷

Table 1 provides some initial information about how PG choices differ across SES groups. In terms of field choice, the largest differences are in business/economics (where the proportions vary from 41% for the most affluent to 24% for the most disadvantaged) to teaching (which is chosen by only 8% of the most affluent but is chosen by 19% of the least affluent). Business/economics is a relatively high-paying field and these differences translate into substantial differences in anticipated earnings associated with the field chosen, denoted as “Mean 2022 Earnings for PG Field” in the table (we describe how we calculate this variable in the next section). However, there are also substantial differences by SES group in field choices at UG level, as well as differences in UG performance (such as in the proportion achieving first class honours) and in other factors, so we cannot conclude that otherwise observationally equivalent students from different SES groups are making different PG choices. We will use regression analysis to analyse this in subsequent sections.

¹⁷ We have also addressed this directly by verifying that our estimates are robust to creating SES groups separately for each gender so that there is no gender imbalance across SES groups.

Table 1: Mean Outcomes by Socio-Economic Group

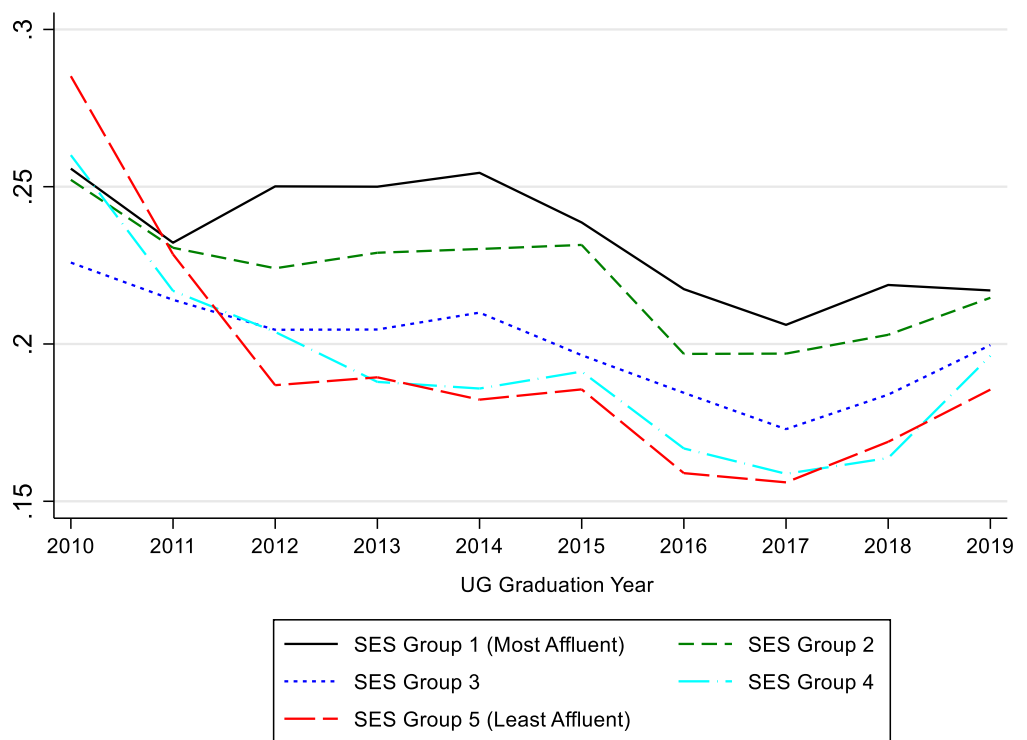
Variable	Full Sample	Group 1	Group 2	Group 3	Group 4	Group 5
Leaving Certificate Fee Waiver	0.199	0.003	0.007	0.017	0.133	0.837
Fee-Paying Secondary School	0.120	0.569	0.020	0.005	0.006	***
DEIS Secondary School	0.096	0.002	0.003	0.019	0.148	0.309
Grant for UG Degree	0.393	0.052	0.031	0.187	0.740	0.958
HP Relative Index Score	3.368	20.46	6.357	-3.019	-2.430	-4.583
Leaving Certificate Points	420.0	447.0	434.7	429.8	407.6	381.1
PG Programme	0.223	0.249	0.238	0.220	0.209	0.199
PG within 3 Years of Finishing UG	0.205	0.232	0.219	0.198	0.189	0.183
Age Finished UG Degree	22.50	22.67	22.51	22.48	22.44	22.42
Disability	0.041	0.047	0.038	0.037	0.041	0.040
Year Finished UG Degree	2016	2016	2016	2016	2016	2017
UG Degree At Least Upper 2 nd Class	0.649	0.696	0.658	0.652	0.626	0.616
UG Degree 1 st Class Honours	0.173	0.195	0.188	0.173	0.158	0.151
Female	0.565	0.522	0.503	0.616	0.590	0.592
UG in STEM	0.242	0.219	0.267	0.237	0.247	0.240
UG in Economics/Business	0.235	0.302	0.241	0.213	0.209	0.209
UG in University	0.624	0.731	0.673	0.643	0.566	0.506
Earnings in 2022	50,963	57,756	53,017	51,134	48,862	44,746
PG in STEM conditional on PG	0.218	0.213	0.241	0.209	0.214	0.210
PG in Economics/Business conditional on PG	0.304	0.408	0.312	0.281	0.258	0.240
PG in Teaching conditional on PG	0.152	0.084	0.138	0.180	0.182	0.190
PG in Health conditional on PG	0.126	0.108	0.126	0.134	0.135	0.128
PG in Other conditional on PG	0.045	0.047	0.044	0.043	0.044	0.046
Masters or PhD (conditional on PG)	0.879	0.899	0.890	0.872	0.856	0.871
PG in University (conditional on PG)	0.877	0.868	0.881	0.878	0.888	0.871
Year began PG (conditional on PG)	2016	2016	2016	2016	2016	2017
Grant for PG (conditional on PG)	0.189	0.041	0.045	0.099	0.297	0.533
Age began PG (conditional on PG)	23.05	23.19	23.08	23.05	23.02	22.87
Mean 2022 Earnings for PG Field	67,580	69,839	68,257	66,964	66,409	65,836
<i>Observations</i>	<i>147,807</i>	<i>29,606</i>	<i>29,635</i>	<i>29,468</i>	<i>29,538</i>	<i>29,560</i>

This table shows the average outcome for the main variables for each SES group. The groups represent quintiles of the SES index where Group 1 corresponds to the most advantaged / highest SES group and Group 5 corresponds to the least advantaged / lowest SES group. *** denotes fewer than 5 observations in this cell.

The SES groupings also differ in the proportions receiving state financial support for PG study; while only 19% receive some form of grant support, this rises to 53% in the most disadvantaged group. These differences suggest that the changes over time in the administration of grants might have affected differences across SES groups in the likelihood of pursuing a PG degree. As we saw earlier, the main changes were the elimination of

maintenance grants in 2012 and their return in 2017. Figure 1, below, plots the proportion of each SES group entering a PG within 3 years of finishing UG by the year of UG graduation. There is a large drop in the proportion of the least affluent group doing a PG amongst those who graduate from UG in 2011 and 2012. This may be due to the abolition of maintenance grants in 2012 but could also be related to the overall economic situation at that time. Beyond this, while there is a general decline over time that abates from 2017, there are no obvious changes by SES group that can confidently be ascribed to changes in the funding environment.

Figure 1: Proportion Doing a PG Degree within 3 Years of Completing UG Degree by UG Graduation Year



Note: This graph shows the proportion of students in each SES group who enter a PG degree within 3 years of finishing their UG degree from 2010 to 2019.

3. Empirical Strategy

We use regression analysis to show the relationship between quintiles of the SES index and various PG choices related to participation in PG study, field of study, the expected earnings of the field of study, and other characteristics of the PG programme. Our omitted

category in the analysis is the highest SES quintile so all estimates can be interpreted relative to that group. The main specification has the following form:

$$y = \beta_0 + \beta_1 SES2 + \beta_2 SES3 + \beta_3 SES4 + \beta_4 SES5 + \delta'X + u$$

where y denotes our outcome variable of interest, and each SES indicator denotes whether the student belongs to that SES group with $SES5$ representing the lowest SES (most deprived) group and the omitted category being students from the highest SES (most advantaged) group. We report regression estimates for two specifications: (1) with just basic controls, and (2) with a full set of controls. The basic set of controls include indicators for age finishing UG study, year finishing UG study, an indicator variable for female, and an indicator for having a disability. The full set of controls relate to UG choices, academic performance in UG, Leaving Certificate subject preferences and performance, as well as county of origin dummies. Importantly, UG programme indicators are included to precisely account for the exact undergraduate course completed by each student. Given that there are 3,163 undergraduate programmes in our sample, characterized by an average of 47 students per programme, they allow us to compare students according to narrowly defined courses. Additionally, we incorporate information on Leaving Certificate subjects and grades, reflecting interests and aptitudes discerned through high school choices and achievement.¹⁸ As a summary measure of Leaving Certificate achievement, we include a quadratic function of the total points obtained. Academic achievement at undergraduate level is likely to impact decisions on whether to attend graduate study and, if so, what PG programme to choose: Prior research on Ireland suggests that, once one controls for prior exam scores and other observables at college entry, lower SES students achieve better undergraduate grades. (Delaney and Devereux, 2020b). Therefore, in

¹⁸ Since some Leaving Certificate subjects are taken by small numbers of students, we include indicator variables for choosing 23 of the most popular subjects and for the grades obtained in each of those 23 subjects. These subjects are mathematics, Irish, English, history, geography, physics, chemistry, biology, agricultural science, applied mathematics, French, Spanish, German, economics, accounting, business, art, music, home economics, design and communication graphics, engineering, building construction, and technical graphics.

our full set of controls, we also include indicators for college performance, based on degree classifications (first class honours degree, second class honours upper division (2.1), other). Robust standard errors are reported for all regression models.

Dependent Variables

In terms of dependent variables, we employ a multifaceted approach to capture various dimensions of PG course choices. Firstly, we study whether the student enters a PG programme within 3 years of finishing their UG degree. This allows us to see whether there are differences in transitioning to PG programmes by SES group.

Secondly, conditional on entering a PG programme, we examine the field of study that is pursued. We analyse whether the chosen PG programme is in STEM, business/economics, teaching, health, or some other field.

Thirdly, we assess the anticipated labour market earnings associated with each field. To do this, we use earnings data from 2022 for individuals who completed PG programmes between 2010 and 2013. We estimate projected earnings for a PG field as the mean earnings by 1-digit field in 2022, leveraging data from individuals who completed PG programmes between 2010 and 2013. Notably, these variables are derived from the full population rather than the large random sample utilized in our analysis.

Lastly, we study the quality of the PG programme that is entered. In particular, we differentiate between whether it is a “higher level” programme which includes master’s and PhDs rather than a PG programme that awards certificates or diplomas. Similarly, we study whether the programme is in a more prestigious university or a less renowned institute of technology.

4. Main Results

In this section we show how PG decisions differ by SES. We find that, even after taking account of the exact undergraduate programme as well as numerous other controls, there are significant differences in PG choices by SES. The upper panel of Table 2 shows the estimates with just basic controls for age and year of finishing UG degree, gender, and disability status while the lower panel shows the estimates after adding the full set of control variables.¹⁹

We find that lower SES individuals are less likely to enter a PG programme within 3 years of completing their UG degree. This effect is increasing across the SES distribution with the lowest SES group being over 6 percentage points less likely to do a PG compared to the most advantaged group. However, this gap can be largely explained by individual characteristics including UG programme and high school subjects and grades. Once we add these controls the gap falls to 1.4 percentage points but remains statistically significant. Given that 21 percent of students attend PG study within 3 years this implies that the lower SES students are 7 percent less likely to attend PG study. This finding contrasts with recent work using UK administrative data (Britton et al. 2020) which found that, with a similar set of control variables (albeit without UG programme fixed effects), graduates in the lowest SES quintile were slightly more likely to undertake PG study. It is not clear what leads to differences between the UK and Irish findings as there are many differences between the two settings in terms of fee levels, financing options, and other institutional and societal characteristics.

We see substantial differences by SES group in terms of the field of study of the PG programme. Conditional on entering a PG programme, the lowest SES group are around 18 percentage points less likely to enter an economics/business PG programme compared to the

¹⁹ The estimates in Table 2 are for enrolling in a PG programme rather than completing it. We prefer to study enrolment rather than completion for a few reasons. First, enrolment may be a better measure of the desired PG choice than completion. Second, enrolment enables a larger and potentially more representative sample as we can observe it up until the 2021/22 academic year; we only observe completions that occur by 2021 so miss out on many PG spells. In any case, the estimates in Table 2 are similar if we only use PG programmes that are completed.

highest SES group. In addition, we find that the lowest SES group are 9 percentage points *more* likely to enter teaching PG programmes and approximately 3 percentage points more likely to enter a PG programme that is in STEM, health or other fields.

Looking at the lower panel of Table 2 we see that the addition of the full set of controls reduces the magnitudes of the SES differences somewhat so that there is little difference by SES group in the probability of doing a PG degree in STEM or in health. However, there still exist large SES differences in the proportion doing a PG programme in economics/business, teaching or other fields. The lowest SES group are 9 percentage points less likely to do a PG in the lucrative economics/business field while they are 3 percentage points more likely to do a PG in teaching and 4 percentage points more likely to enter some other field.²⁰ The economics/business effect size is particularly large; given that, conditional on doing a PG programme, 30% of students enter economics/business, the effect size implies that the least affluent students are 28% less likely to enter these fields than students from the most affluent group.

Perhaps unsurprisingly, given that lower SES students are less likely to enter the high paying business/economics field and more likely to enter the more modest paying teaching field, in column (7) of the lower panel of Table 2 we see that the lowest SES individuals enter fields with expected earnings that are 3 percent less compared to observationally equivalent individuals from the highest SES group. This result suggests that policies that seek to “widen participation” at the PG level may have limited impact as, even among persons who choose to do graduate study, there are substantial differences by SES in the levels of pay of the fields chosen. In contrast to our earlier findings, once we use the full set of controls, there is no

²⁰ These findings can be compared to the findings for Ireland at the UG level whereby Delaney and Devereux (2020a) found that students from the lowest SES group were 2 percentage points more likely to enter teaching and 2 percentage points less likely to enter business & law. Also, at the UG level the lowest SES group were found to be 8 percentage points more likely to enter STEM fields compared to students from the highest SES group.

evidence of systematic SES gaps in the probability of doing a “high level” PG or of attending a university for graduate study.

Table 2: Relationship between SES and PG Field

Specification	(1) Any PG within 3 years	(2) STEM	(3) Economics /Business	(4) Teaching	(5) Health	(6) Other Field	(7) Log (Mean Pay)	(8) Higher Level PG	(9) University PG Degree
Basic Controls									
Group 2	-0.025*** (0.004)	0.033*** (0.007)	-0.105*** (0.008)	0.052*** (0.005)	0.029*** (0.005)	-0.009 (0.006)	-0.023*** (0.003)	-0.009* (0.005)	0.010* (0.006)
Group 3	-0.045*** (0.004)	0.024*** (0.007)	-0.126*** (0.008)	0.081*** (0.006)	0.025*** (0.005)	-0.004 (0.007)	-0.034*** (0.003)	-0.021*** (0.005)	0.010* (0.006)
Group 4	-0.057*** (0.004)	0.029*** (0.007)	-0.153*** (0.008)	0.083*** (0.006)	0.031*** (0.006)	0.010 (0.007)	-0.043*** (0.003)	-0.034*** (0.006)	0.018*** (0.006)
Group 5	-0.063*** (0.004)	0.028*** (0.007)	-0.176*** (0.008)	0.087*** (0.006)	0.027*** (0.006)	0.034*** (0.007)	-0.053*** (0.003)	-0.037*** (0.006)	0.000 (0.006)
R-Squared	0.026	0.051	0.037	0.040	0.052	0.012	0.054	0.051	0.006
Full Controls									
Group 2	-0.015*** (0.004)	0.008 (0.006)	-0.049*** (0.007)	0.016*** (0.005)	0.009** (0.004)	0.016** (0.006)	-0.014*** (0.002)	0.006 (0.005)	-0.002 (0.005)
Group 3	-0.020*** (0.004)	0.012** (0.006)	-0.051*** (0.007)	0.019*** (0.006)	0.006 (0.005)	0.013* (0.007)	-0.014*** (0.003)	0.004 (0.006)	0.006 (0.006)
Group 4	-0.019*** (0.004)	0.019*** (0.006)	-0.069*** (0.007)	0.022*** (0.006)	0.006 (0.005)	0.022*** (0.007)	-0.020*** (0.003)	-0.001 (0.006)	0.014** (0.006)
Group 5	-0.014*** (0.004)	0.011* (0.007)	-0.086*** (0.008)	0.030*** (0.006)	0.008 (0.005)	0.037*** (0.007)	-0.029*** (0.003)	-0.001 (0.006)	0.005 (0.006)
R-Squared	0.189	0.509	0.478	0.341	0.566	0.319	0.452	0.225	0.306
Observations	116,844	32,972	32,972	32,972	32,972	32,972	32,972	32,972	32,972
Mean Y	0.205	0.218	0.304	0.152	0.126	0.045	11.11	0.879	0.877

Note: Robust standard errors in parentheses. *** p<0.01 ** p<0.05 * p<0.10. Basic controls include indicators for age and year when finishing the UG degree and gender and disability indicators. Full controls include fixed effects for the specific UG programme studied, fixed effects for UG performance as measured by degree class, fixed effects for subjects taken for the terminal high school examination (the Leaving Certificate exam), a linear function of points achieved in each individual subject, a quadratic function of total points achieved in the Leaving Certificate exam, and a set of county of origin indicators. The sample in columns (2) to (9) is restricted to students who enter a PG programme.

5. Heterogeneous Effects

The previous section has shown that there exist large differences in PG decisions across SES groups. There has been much work showing that SES gaps in education outcomes are larger for males than females with disadvantaged males being much less likely to do well in

high school or enter college (Goldin et al. 2006; Autor et al. 2019). In addition, there is evidence that SES gaps in UG mismatch and UG participation are largest for high ability students (Hoxby et al. 2013; Delaney and Devereux 2020a). In this section, we analyse how SES differences in PG choices vary by gender and by ability. For parsimony, we report estimates only for the specification with the full set of controls so that we are comparing across students who have very similar academic aptitudes and preferences.

The estimates that split the sample by gender are in Table 3. The tendency for low SES groups to be more likely to do STEM and to do health is less apparent for males than females as are the (much larger) SES gaps in the proportion doing economics/business. On the other hand, the SES gaps in teaching are a little larger for males than females. When we look at the mean earnings in the field, the SES differences are similar in magnitude across males and females. Overall, we conclude that differences in the size of SES effects by gender are not large.²¹

²¹ For further research on gender differences in earnings in Ireland see Doorley et al. (2021) and Barrett et al. (2022).

Table 3: Relationship between SES and PG Field (Full Controls)

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Any PG within 3 years	STEM	Economics /Business	Teaching	Health	Other Field	Log (Mean Pay)	Higher Level PG	University PG Degree
Females									
Group 2	-0.014** (0.006)	0.002 (0.008)	-0.065*** (0.010)	0.016* (0.009)	0.020*** (0.007)	0.027*** (0.010)	-0.020*** (0.004)	0.010 (0.008)	-0.002 (0.008)
Group 3	-0.018*** (0.005)	0.015* (0.008)	-0.066*** (0.009)	0.017* (0.009)	0.012* (0.007)	0.023** (0.010)	-0.018*** (0.004)	0.001 (0.008)	0.002 (0.008)
Group 4	-0.022*** (0.006)	0.016** (0.008)	-0.083*** (0.010)	0.021** (0.009)	0.017** (0.007)	0.029*** (0.010)	-0.024*** (0.004)	-0.009 (0.009)	0.013 (0.008)
Group 5	-0.017*** (0.006)	0.018** (0.008)	-0.100*** (0.010)	0.024** (0.010)	0.016** (0.008)	0.040*** (0.011)	-0.030*** (0.004)	-0.008 (0.009)	0.009 (0.008)
Observations	65,820	18,381	18,381	18,381	18,381	18,381	18,381	18,381	18,381
R-Squared	0.197	0.483	0.487	0.375	0.592	0.320	0.453	0.294	0.337
Males									
Group 2	-0.018*** (0.006)	0.014 (0.010)	-0.039*** (0.010)	0.017*** (0.007)	0.000 (0.005)	0.008 (0.009)	-0.010*** (0.004)	0.004 (0.008)	-0.003 (0.008)
Group 3	-0.025*** (0.006)	0.003 (0.011)	-0.039*** (0.011)	0.025*** (0.008)	0.003 (0.006)	0.008 (0.010)	-0.014*** (0.004)	0.009 (0.009)	0.016* (0.008)
Group 4	-0.014** (0.006)	0.020* (0.011)	-0.057*** (0.012)	0.023*** (0.008)	-0.002 (0.005)	0.016 (0.010)	-0.018*** (0.004)	0.013 (0.009)	0.019** (0.009)
Group 5	-0.010 (0.007)	-0.005 (0.011)	-0.075*** (0.012)	0.039*** (0.009)	0.005 (0.006)	0.035*** (0.011)	-0.030*** (0.004)	0.003 (0.009)	0.007 (0.009)
Observations	50,411	14,591	14,591	14,591	14,591	14,591	14,591	14,591	14,591
R-Squared	0.204	0.524	0.489	0.284	0.493	0.352	0.444	0.158	0.319

Note: Robust standard errors in parentheses. *** p<0.01 ** p<0.05 * p<0.10. Full controls include indicators for age and year when finishing the UG degree, county of origin, fixed effects for the specific UG programme studied, fixed effects for UG performance as measured by degree class, fixed effects for subjects taken for the terminal high school examination (the Leaving Certificate exam), a linear function of points achieved in each individual subject, a quadratic function of total points achieved in the Leaving Certificate exam, and controls for disability status. The sample in columns (2) to (9) is restricted to students who enter a PG programme.

In Table 4, we split the sample to consider how the estimates for the 17% of students who received a first class honours undergraduate degree differ from the rest of the students. If we focus on the top panel and so those students who did not achieve the highest degree class in their undergraduate degree, we see that students from the lowest SES group are about 2 percentage points less likely to do a PG degree, are 10 percentage points less likely to enter economics/business fields and around 4 percentage points more likely to enter teacher-training

programmes. These estimates are very similar to the full sample which is not surprising given that this group of students represents 83% of the full sample.

Interestingly, if we focus on the group of students who did achieve a first class honours UG degree (the lower panel), we see a very different pattern emerge. Now, there is very little difference across SES groups. For this sample of high achieving students, those from the lowest SES groups are still about 4 percentage points less likely to enter business/economics degrees but there is little difference for other fields of study. Unlike for the sample of students who achieved lower than first class honours, there is no difference in the expected pay of the chosen fields. These results suggest that for this sample of high achieving students, SES gaps are largely eliminated and do not lead to substantial differences in expected labour market earnings. This has important policy implications as it suggests that policy should be aimed at those students who failed to achieve a first class honours degree as this is where the SES gaps in PG choices and outcomes are most pronounced.

Table 4: Relationship between SES and PG Field (Full Controls)

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Any PG within 3 years	STEM	Economics /Business	Teaching	Health	Other Field	Log (Mean Pay)	Higher Level PG	University PG Degree
Not First Class Honours									
Group 2	-0.018*** (0.004)	0.009 (0.007)	-0.054*** (0.008)	0.015** (0.006)	0.010** (0.005)	0.021*** (0.007)	-0.015*** (0.003)	0.005 (0.006)	0.001 (0.006)
Group 3	-0.021*** (0.004)	0.011 (0.007)	-0.058*** (0.008)	0.020*** (0.007)	0.010** (0.005)	0.016** (0.008)	-0.016*** (0.003)	0.003 (0.007)	0.013** (0.007)
Group 4	-0.019*** (0.004)	0.019*** (0.007)	-0.077*** (0.008)	0.025*** (0.007)	0.007 (0.005)	0.026*** (0.008)	-0.022*** (0.003)	-0.003 (0.007)	0.021*** (0.007)
Group 5	-0.018*** (0.005)	0.010 (0.007)	-0.099*** (0.009)	0.035*** (0.007)	0.006 (0.005)	0.047*** (0.009)	-0.034*** (0.003)	-0.004 (0.007)	0.012* (0.007)
Observations	98,884	26,419	26,419	26,419	26,419	26,419	26,419	26,419	26,419
R-Squared	0.189	0.473	0.450	0.346	0.568	0.289	0.433	0.226	0.286
First Class Honours Undergraduate Degree									
Group 2	0.001 (0.011)	0.009 (0.014)	-0.021* (0.013)	0.013 (0.010)	0.002 (0.011)	-0.002 (0.013)	-0.003 (0.005)	0.008 (0.010)	-0.015 (0.010)
Group 3	-0.002 (0.011)	0.011 (0.014)	-0.014 (0.013)	0.015 (0.012)	-0.018 (0.012)	0.007 (0.014)	-0.004 (0.005)	0.008 (0.011)	-0.024** (0.011)
Group 4	-0.009 (0.012)	0.011 (0.015)	-0.024 (0.015)	0.004 (0.013)	0.008 (0.013)	0.001 (0.016)	-0.007 (0.006)	0.006 (0.012)	-0.019 (0.012)
Group 5	0.016 (0.012)	0.012 (0.016)	-0.038*** (0.014)	0.008 (0.013)	0.014 (0.013)	0.003 (0.016)	-0.009 (0.006)	0.010 (0.012)	-0.013 (0.012)
Observations	17,303	6,553	6,553	6,553	6,553	6,553	6,553	6,553	6,553
R-Squared	0.256	0.658	0.679	0.385	0.623	0.545	0.625	0.318	0.507

Note: Robust standard errors in parentheses. *** p<0.01 ** p<0.05 * p<0.10. Full controls include indicators for age and year when finishing the UG degree, county of origin, fixed effects for the specific UG programme studied, fixed effects for UG performance as measured by degree class, fixed effects for subjects taken for the terminal high school examination (the Leaving Certificate exam), a linear function of points achieved in each individual subject, a quadratic function of total points achieved in the Leaving Certificate exam, and a set of individual characteristics including controls for gender and disability status. The sample in columns (2) to (9) is restricted to students who enter a PG programme.

6. Implications of the Findings for Earnings Gaps

We have seen that there are SES gaps in the probability of engaging in PG study and, conditional on doing a PG, in the field and other characteristics of the chosen PG programme.

We now directly assess whether these choices affect SES earnings gaps, conditional on prior decisions and outcomes such as undergraduate programme, Leaving Certificate subject choices, and Leaving Certificate grades. In all analyses, we use the last available year of

earnings data (2022). To compare people with strong labour market attachment who are engaged in full year work, we restrict the sample to persons who earned at least €5,000 in 2022, worked at least 45 weeks in 2022, and were not enrolled in education during the 2021-22 academic year.

Effect of SES Gap in Proportion Doing a PG on SES Earnings Gap for all UG Graduates

We begin by asking whether SES differences in the decision to do a PG affects the earnings gaps for all UG graduates. To do so, we contrast estimates with the full set of controls to those with the addition of a control for whether the student did a PG degree or not. To allow for a reasonable period to have passed after UG completion, we include all UG completers up to 2013 and use individual-level log income in 2022 as our dependent variable.

Table 5 shows how PG study effects the pay gap across SES groups for the sample of all UG graduates. We find that the conditional earnings gap between the highest and lowest SES group is about 10% and that the addition of an indicator variable for doing PG study has no effect on this gap. Clearly the extensive margin (differences across SES in whether people enter PG programmes) is not important in determining early career earnings differences by SES. This implies that for policy development, it is crucial to go beyond simply examining postgraduate attendance rates and instead focus on analysing the types of programmes being chosen.

Table 5: Relationship between SES and Log 2022 Earnings (All UG Graduates)

	(1) Without PG Indicator	(2) With PG Indicator	(3) Difference
Group 2	-0.028*** (0.010)	-0.027*** (0.010)	0.001 (0.001)
Group 3	-0.031*** (0.010)	-0.030*** (0.010)	0.001 (0.001)
Group 4	-0.053*** (0.010)	-0.053*** (0.010)	0.001 (0.001)
Group 5	-0.094*** (0.011)	-0.094*** (0.011)	0.000 (0.001)
Observations	24,856	24,856	24,856
PG Indicator	No	Yes	

Note: Robust standard errors in parentheses. *** $p < 0.01$. Full controls include fixed effects for age and year when finishing UG degree, county of origin, fixed effects for the specific UG programme studied, fixed effects for UG performance as measured by degree class, fixed effects for subjects taken for the terminal high school examination (the Leaving Certificate exam), a linear function of points achieved in each individual subject, a quadratic function of total points achieved in the Leaving Certificate exam, and a set of individual characteristics including controls for gender and disability status. The estimates of the standard errors of the differences come from bootstrapping using 1,000 replications.

Effect of SES Gap in PG Programme Chosen on SES Earnings Gaps for PG Entrants

Our analysis so far suggests that there are systematic differences in PG field choice by SES group that may translate into substantial SES differences in earnings for those who do a PG degree. We now directly assess whether PG programme choice affects SES earnings gaps, conditional on prior decisions and outcomes such as undergraduate programme, Leaving Certificate subject choices, and Leaving Certificate grades. We do this by contrasting the SES gaps in earnings in regressions with our full set of control variables to that measured when we additionally include PG programme fixed effects. To allow for a reasonable period to have passed after the PG degree, we restrict the sample to persons who start a PG degree in 2013 or before and use individual-level log income in 2022 as our dependent variable. In this restricted sample, the average age in 2022 is 33. Because some PG programmes are small, we need to drop observations (about 300) for which we only observe one student in the relevant time

period. Once again, we restrict the sample to persons who earned at least €5,000 in 2022, worked at least 45 weeks in 2022, and were not in education in 2021/22.

Table 6 shows earnings estimates for the log of individual earnings in 2022 for the sample of individuals who enter a PG programme. There is a sizeable SES gap in earnings at age 33 even accounting for UG programme and the other controls: The first column shows that the lowest SES group have earnings that are 10 percent lower compared to the highest SES group.²² In column (2) of Table 6, we add fixed effects for the PG programme entered and find that the gap between the highest and lowest SES group falls to 6 percent.

There are two main takeaways from these findings. First, it is striking that, for the sample who do a PG programme, even accounting for the exact undergraduate and graduate programme studied, on average individuals who are from the most deprived background earn around 6 percent less at age 33 than their most advantaged counterparts. In other words, even for this high achieving group of graduates, those from the poorest backgrounds still earn significantly less than those from the most privileged backgrounds. If earnings growth rates for PG graduates tend to rise with experience, then the gap could even increase later in the life cycle.

Second, even after accounting for UG programme and prior secondary school subjects and grades, the choice of PG programme makes a significant difference to the size of SES earnings gaps. The change in the difference between the highest and lowest SES group is from 10% to 6% which implies that PG choice goes about 40% of the way to explaining this SES earnings gap at age 33. This is a large effect and suggests that, abstracting from whether people do PGs, the exact PG chosen has important consequences for earnings inequality. While there

²² The conditional earnings gaps are similar to what we saw for the full sample of UG graduates (Table 5). We might have expected that doing PG study would level the playing field somewhat and lead to reduced pay disparities but this is not the case.

are several factors that may contribute to the SES earnings gap such as region of work, the firm or industry, hours of employment, etc., it is interesting that the exact PG programme chosen can account for much of this earnings gap. Therefore, one step policymakers could take to reduce inequality for this highly educated sample would be to understand why lower SES groups are less likely to enter the highest paying PG programmes. Our findings highlight that the extensive margin (differences across SES in whether people enter PG programmes) is less important for SES earnings differences than the intensive margin (what types of PG programmes they choose to study).

Table 6: Relationship between SES and Log 2022 Earnings (PG Entrants)

	(1) Without PG Programme FE	(2) With PG Programme FE	(3) Difference
Group 2	-0.019 (0.021)	-0.007 (0.022)	0.012 (0.014)
Group 3	-0.049** (0.022)	-0.042* (0.023)	0.007 (0.014)
Group 4	-0.051** (0.023)	-0.028 (0.023)	0.023 (0.015)
Group 5	-0.104*** (0.025)	-0.063*** (0.026)	0.041** (0.017)
Observations	4,908	4,908	4,908
PG Programme FE	No	Yes	

Note: Robust standard errors in parentheses. *** p<0.01 ** p<0.05 * p<0.10. Full controls include indicators for age and year when finishing the UG degree, county of origin, fixed effects for the specific UG programme studied, fixed effects for UG performance as measured by degree class, fixed effects for subjects taken for the terminal high school examination (the Leaving Certificate exam), a linear function of points achieved in each individual subject, a quadratic function of total points achieved in the Leaving Certificate exam, and a set of individual characteristics including controls for gender and disability status. We restrict the sample to persons who enter a PG programme. The estimates of the standard errors of the differences come from bootstrapping using 1,000 replications.

7. Conclusion

We find substantial differences in PG decisions by SES group. Overall, 22% of graduates subsequently enter a graduate programme. Students from the lowest quintile of the SES distribution representing the most deprived group are about 6 percentage points less likely

to study for a PG degree within 3 years of completing their UG degree compared to the most affluent group. However, this differential is mostly explained by academic experience and achievement by the time of UG graduation; once UG programme and prior academic achievement are controlled for, the gap falls to 1.4 percentage points. Of those students who enrol in PG study, the lowest SES group enter fields of study with expected earnings that are, on average, about 5% lower compared to the highest SES group; even with the full set of control variables this gap remains at 3%. Lower SES groups are also much less likely to enter business/economic fields and more likely to enter teacher-training programmes. When we study heterogeneous effects, we find relatively small differences in SES gaps by gender. However, we find differences by undergraduate academic performance: With the full set of controls, there are little if any SES gaps in PG choices or outcomes for the group of students who achieved the highest degree class in their UG studies. This has important policy implications as it suggests that policies aimed at widening participation at the PG level should be focused on those students who failed to achieve a first class honours degree as this is where the SES gaps in PG choices and outcomes are most pronounced.

When we study labour market outcomes, we find that differences in SES choices may have substantial implications for the gaps in earnings across SES groups. This is not apparent at the extensive margin of PG attendance; the SES gaps in earnings are little changed by taking account of whether students did a PG degree. However, amongst those who do a PG degree, differences in the programme chosen may matter. At approximately age 33, students from the lowest SES group who studied a PG degree earn over 10 percent less compared to their highest SES counterparts (after accounting for academic differences up to undergraduate completion). Interestingly, we find that the choice of PG programme can explain 40% of this gap highlighting that the choice of programme at the PG level can lead to substantial differences in earnings.

It is important to note that the SES differences we find are after controlling for the exact undergraduate programme attended as well as many other detailed controls. Therefore, they suggest that, even for this highly educated group, new inequalities arise as students contemplate graduate study. Clearly, differences in opportunities and choices at earlier stages in the educational trajectory are very important; our findings suggest that one should not stop there but should also pay attention to the decision to do graduate study and, most importantly, to the programme choices made at this stage.

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