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Academic Performance: Evidence from Administrative Data**

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Study Abroad Programme Participation and Subsequent Academic Performance: Evidence from Administrative Data

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ABSTRACT

There is increasing policy attention on international student mobility programmes in higher education. However, there is little evidence on how participation might impact students' subsequent academic performance. This paper uses administrative data from Ireland to examine the relationship between spending a semester studying abroad and academic outcomes on return. The results suggest that while study abroad is not related to improved academic performance on average, there are differences across student groups. In particular, male students from poorer backgrounds do worse after studying abroad than their peers, higher-achieving students do better, while language students perform better on return in language subjects.

KEY WORDS

Study abroad; Erasmus programme; Academic performance; Higher education; Ireland.

1. INTRODUCTION

In recent years, there has been a growing trend towards third level students studying abroad for a semester or more as part of their degree programme. In Europe, for example, approximately 2 million higher education students participated in the EU's Erasmus programme between 2014 and 2020, with a doubling of this number targeted for the 2021-2027 period¹. A variety of benefits are often attributed to a period spent studying abroad, ranging from improved language skills, increased intercultural awareness, greater labour market mobility, and enhanced confidence and communication skills – see Roy *et al.* (2019) for a useful summary. It is also suggested that increases in a student's human capital or academic knowledge is an important motivating factor in the decision to participate in study abroad programmes (Beine *et al.*, 2014; Lesjak *et al.*, 2015; Harmon and Erskine, 2017; Jacob *et al.*, 2019). Indeed, university representative organisations, such as the Irish Universities Association (IUA) and Universities UK, claim there is a positive correlation between outgoing exchange mobility and improved academic performance and labour market outcomes (IUA, 2017; Universities UK International, 2018). However, robust empirical evidence for many of the benefits ascribed to student exchange programmes is scarce. In this context, we examine the relationship between spending a semester studying abroad and subsequent academic performance for a cohort of Irish students.

Drawing on human capital theory, spending time studying abroad could be considered an educational investment if it provides students with a range of experiences and skills that help enhance their productivity. This may then manifest in better subsequent academic performance or labour market outcomes (Oosterbeek and Webbink, 2011; Schmidt and Pardo, 2017;

¹ It remains to be seen what the implications of the Covid-19 pandemic will be for these projections and for study abroad more generally.

Liwinski, 2019)². However, research on the relationship between study abroad and academic performance is rare, with only a few studies having examined this issue using student-level data. One example is Cardwell (2019), which assesses the impact of studying abroad on the final degree grades of students at Sheffield Law School in the UK and finds a beneficial impact on overall academic achievement. However, the analysis is based mainly on correlations between the results of students that go on exchange and those that do not, without controlling for other factors and characteristics that may impact academic performance. A more robust analysis of the causal relationship between studying abroad and academic performance that controls for observed and unobserved heterogeneity is provided by Joosten (2018), who examines the impact of student exchange placements³ on academic performance for students at KU Leuven in Belgium. The author finds that, with the exception of one faculty, students who participate in exchange significantly underperform in terms of grades relative to their non-mobile peers after they return. Finally, Sorrenti (2017) uses Italian data to find that spending a semester abroad while in university is beneficial in developing foreign language proficiency, although the effect is heterogeneous across different languages.

Consistent with the idea that studying abroad may enhance human capital, there are a number of empirical studies that examine the labour market outcomes of students that go on exchange⁴. While such outcomes are not the focus of our study, this literature is relevant as it points to the potential for productivity gains from participation. For example, Messer and Wolter (2007) use a sample of Swiss graduates to find a positive wage effect from participating in the Erasmus student exchange programme, though their results are not robust to their instrumental variables

² It is noteworthy that Roy *et al.* (2019) highlights an absence of a substantive theoretical framework in the literature relating to study abroad programmes and student outcomes but suggests that theories from outside economics, such as social learning theory, experiential learning theory, and trait activation theory, may be relevant.

³ While there are many forms of short-term international student mobility programmes, the focus of this paper is on academic exchange placements where students spend a semester or a year studying abroad only. Throughout the paper we use the terms study abroad and student exchange interchangeably when referring to such placements.

⁴ Di Pietro (2020) provides a useful summary of this and other study abroad related literature.

(IV) specification. Di Pietro (2015) investigates the impact of studying abroad on the subsequent likelihood of employment for a large sample of graduates. Using a fixed effects and IV approach, the results suggest that studying abroad has a significant impact on the probability of being employed three years after graduation, with a particularly strong effect found for graduates from disadvantaged backgrounds. Also in the Italian context, the aforementioned Sorrenti (2017) shows evidence that, besides the impact on language proficiency, spending a semester abroad positively impacts the wages of graduates. Finally, Van Mol *et al.* (2020) use a representative survey of higher education graduates in the Netherlands, conducted 1.5 years after graduation, to examine the impact of international student mobility on labour market outcomes. They find no difference in labour markets outcomes, such as monthly wages or duration in education to work transitions, between graduates that were mobile and those that were not.

With regard to the more general extant literature on the labour market return to better academic performance, Khoo and Ost (2018), Feng and Graetz (2017) and Freier *et al.* (2015), using data on students from the USA, the UK, and Germany respectively, all find that obtaining a better degree classification results in a significant earnings premium for graduates. Given this, a number of studies have considered the determinants of academic performance in higher education. For example, in the Irish context, Delaney and Devereux (2020) focus on the factors that influence the probability of obtaining a first class honours or second class honours upper division degree and find that, after controlling for upper secondary exam performance, students from Irish-language schools and certain private fee paying schools do worse on average. Outside of Ireland, several UK-based studies, such as Smith and Naylor (2001) and Crawford (2014), have examined the relationship between upper secondary performance, socioeconomic status (SES), and third level degree outcomes.

However, despite this previous research, there is a significant gap in the literature on the relationship between study abroad participation and subsequent academic performance and we address this using administrative data on business studies students in an Irish university that have the opportunity to study abroad during their four-year degree programme. In doing so, we explore, for the first time, potential differences in this relationship across a range of dimensions, including both socio-demographic and education-related factors. We also explore the potential language skills benefit of studying abroad for students taking their business degree with a foreign language. Our analysis, which is unique in the Irish context and rare in the international literature, has implications for policy and is especially relevant in a time of increased policy focus on, and student demand for, student exchange and study abroad programmes.

2. INSTITUTIONAL CONTEXT

The University of Limerick (UL), the local setting for our study, is one of eight universities in Ireland, with the higher education sector also comprising technological universities, institutes of technology (ITs), and colleges of education, as well as a small number of other public and private colleges. A competitive entry system based mainly on grades achieved in the Leaving Certificate examinations at the end of secondary school largely determines admission to all higher education institutions (HEIs)⁵. These grades are converted into a points score generally referred to as Central Applications Office (CAO) points, with the number of points an individual receives helping to determine the type of course they can pursue. In 2017/18, 55% of those in full-time undergraduate higher education in Ireland were in the university sector, 40% were in ITs, with the remaining 5% in other colleges (HEA, 2019). In recent years, the university sector has experienced rapid growth in student enrolments, with total full-time

⁵ A full list of HEIs in Ireland is available at www.educationireland.ie/.

undergraduate student numbers increasing by one-third from 65,880 in 2008/09 to 87,955 in 2017/18 (HEA, 2019). Students pursuing a business-related degree constituted approximately 14% of all full-time university undergraduate students in 2017/18. This figure is slightly higher in UL, with business students comprising around 17% of the total undergraduate population in the same academic year.

The total number of students studying abroad through the EU's Erasmus programme across all Irish HEIs has grown from 1,514 in 2007/08 to 2,545 in 2017/18. UL has the largest Erasmus programme of any Irish HEI, accounting for approximately 20% of all outgoing Erasmus students from Ireland in 2017/18⁶. Over the time period of our analysis, there has been a considerable increase in the number of business studies students in UL choosing to spend a semester studying abroad. At the same time, the number and range of Erasmus and non-EU exchange partners available to business students also increased significantly, from 42 in 2008/09 to 84 in 2018/19.

In Ireland, universities award degrees on a scale of first class honours, second class honours (upper division), second class honours (lower division), and third class honours/pass, with each HEI having the ability to set the standard required to achieve such awards. UL is one of the few Irish universities that utilises a grade point average (GPA) system to determine degree classification. Specifically, this entails that the quality and standard of a student's academic performance is expressed as an average numerical value that is based on the grades they receive. This numerical value is known as a Quality Credit Average (QCA) in UL and is calculated on a semester and cumulative basis for each programme, or for each part of a programme. An average QCA is calculated based on a student's grades, which are assigned a

⁶ It should be noted that students also have the opportunity to study outside of the EU for a semester or more as part of a bilateral exchange agreement with a partner in a non-EU country. National level statistics on the number of outgoing and incoming non-EU exchange students are not as detailed as those available for Erasmus. However, data from 2014/15 shows that 73% of all outgoing exchange students in Ireland were Erasmus students, with the remainder made up of students participating in bilateral non-EU exchange agreements (HEA, 2018).

numerical value on a scale from 4.0 (A1) to 0 (F), and weighted by the credits associated with each module. This QCA then determines a student's degree award at the end of their four years of study⁷.

It is noteworthy that for our relevant sample, a student's grades in their second, third and fourth year of study count towards their degree award, with their results in first year not included in the final QCA calculation. The Bachelor of Business Studies (BBS) degree in UL, from which the sample for this analysis is drawn, is a four-year degree split over eight semesters with formal end of term assessments in both the Autumn and Spring semesters in each year. BBS students all take the same core modules in the first three semesters of their study, and then choose a major option in which to focus in the latter part of their degree. Specifically, they choose from Accounting & Finance, Economics, Human Resource Management, Marketing, or Risk Management & Insurance major options at the end of their third semester. As part of the programme, these students have the opportunity to apply for an academic exchange placement abroad, in either semester 4 or 5 of their studies, while all students spend semester 6 on a mandatory work placement⁸. Hence, the influence of studying abroad on subsequent academic performance may arguably manifest itself (or not) in semesters 7 and 8 of a student's studies, their final year of study. The BBS degree also has an optional language component whereby students take a language (French, German or Japanese) module in each semester in place of a business module.

Finally, given the role that socioeconomic factors may play in academic outcomes, it is also important to note that the Irish State provides financial aid and assistance to help alleviate potential inequalities in accessing higher education related to income or geographic factors.

⁷ A table of how the UL QCAs relate to degree award is presented in Appendix A.

⁸ For the majority of our sample period, a QCA threshold of 2.40 (C2 average) was in place for students who wished to apply for an exchange placement. Given the timing of applications, a student's eligibility to apply is based on their average QCA from their first year of study.

Students who meet certain criteria based on parental income levels and geographic distance from their chosen HEI may receive a student maintenance grant throughout their time in higher education. The student contribution fee paid by a student may also be subsidised, either fully or partially, again dependent on parental income. The geographic component of these grants is that students who satisfy an income-related means test receive a full or partial maintenance grant, depending on whether they live more or less than 45kms from the HEI that they wish to attend. In 2013, 46% of new entrants to higher education in Ireland received some form of financial assistance (HEA, 2015). There is also a Delivery of Equality of Opportunity in Schools (DEIS) system where certain second-level schools that are deemed to be disadvantaged may access additional resources, such as extra learning support for teachers and a home-to-community liaison programme (Authors, 2017).

3. DATA AND METHODS

3.1 Data

The data used is from the UL administrative database of student records. Specifically, we analyse data for 1,973 BBS students in UL who graduated between the academic years 2010/11 and 2017/18 and Table 1 provides definitions of the variables we consider. For each student we have information on their semester-by-semester QCA (including the specific grades for language modules, where relevant), and we use this to calculate *Final Year QCA*, which represents the average QCA for the final two semesters of study in UL, and *Early College QCA*, which is the average QCA for the first three semesters of study. Given that students that go on exchange do so in either semester 4 or 5, the early college variable provides a measure of academic performance prior to any exchange taking place, while the final year variable provides a performance measure post-exchange. We also created similar variables specifically

for language modules for students who undertook a business and language degree. In addition, we have information on whether and where the student went on exchange (i.e. studied abroad for a semester) during his/her studies, their sex, whether they undertook the business degree with a language, subject specialisation (i.e. major), and whether the student received financial aid in the form of a government grant. We also know whether, prior to entering UL, the student attended a DEIS school or a private fee paying school, as well as their CAO points.

[Insert Table 1 about here]

Table 2 presents sample descriptive statistics for our variables for the full sample and by exchange participation status. Overall, 7.8% of our sample (153 students) studied abroad for a semester and it is notable that students who did so had higher QCAs in both early college and final year. This is true for the full sample and for the subset of language modules and these differences in early college scores suggest that exchange students tend to be better performing students, on average. This is confirmed by Figures 1 and 2, which present kernel density functions of final year QCAs and final year QCAs in language modules respectively for students who spent a semester abroad on exchange and those who did not⁹. Both figures show that grades for those who went on exchange are more heavily concentrated towards the upper end of the performance distribution relative to those that did not.

[Insert Table 2 and Figures 1 and 2 about here]

3.2 Methods

In order to model the relationship between final year academic performance and exchange (study abroad) participation, we estimate a standard linear regression model, such that:

⁹ Figure 1 includes the full sample of BBS students, while Figure 2 includes only BBS students who studied a language as part of their degree programme.

$$Final\ Year\ QCA_i = \alpha + \beta Exchange_i + \gamma \mathbf{X}_i + \delta \mathbf{T}_i + \varepsilon_i \quad [1]$$

where *Final Year QCA_i* represents the QCA of student *i* in their fourth (final) year of study and *Exchange_i*, our main independent variable of interest, is a dummy variable indicating whether individual *i* spent a semester studying abroad in either semester 4 or 5 of their studies. \mathbf{X}_i is a vector of variables relating to the student's sex, if they were a language student, major option studied, if they received financial aid, and if their secondary school was a DEIS or fee paying school. It also includes two measures of student academic ability: CAO points and academic performance in college prior to any semester abroad i.e. early college QCA. \mathbf{T}_i represents a set of cohort fixed effects relating to the year of graduation, while β , γ , and δ are the parameters to be estimated and ε_i represents the error term. Estimated standard errors are clustered by major option studied, which allows for intragroup correlation at the major cohort level.

In considering the relationship between academic performance and study abroad participation, selection bias is likely to be a key issue. For example, if it is the case that wealthier or higher ability students have a greater likelihood of selecting to spend a semester abroad, this could give rise to a spurious relationship between the two variables of interest. Thus, our model controls for a range of observable factors likely to be correlated with academic performance and study abroad participation. Nonetheless, it is important to acknowledge that there are also likely to be other unobserved individual-level characteristics that may impact academic performance, such as motivation, and these factors could lead to omitted variable bias if they are also correlated with study abroad participation. In an attempt to address this, we therefore include two measures of previous academic performance in our model and one of these, CAO points, is based on performance in the 'high stakes' Leaving Certificate examinations.

Nonetheless we acknowledge that endogeneity concerns may still persist and, as a result, interpret our results as independent associations, rather than causal effects¹⁰.

In addition to our main model, we also estimate models containing interactions between our exchange dummy and a number of independent variables. This is to capture potential heterogeneity in the relationship between academic performance and study abroad participation across groups. These models specifically examine differences in the relationship by sex, language student, major, and by whether the student received financial aid while in higher education.

As well as considering differences across these individual-level characteristics, we also examine potential differences that might relate to features of the study abroad experience. In particular, we examine if the relationship between academic performance and study abroad participation differs by where a student studied abroad or by whether a student was on exchange in an institution with someone from their BBS class or not. These interactions aim to explore, in relatively broad terms, how differences in a student's experience while studying abroad may result in different academic outcomes. In relation to the former, we use a dummy variable proxy of the 'quality' of the institution abroad. This variable takes a value of one, indicating a higher quality HEI, if the HEI is ranked in the top 200 of the *Times Higher Education* or QS ranking tables, or if the business school is ranked in the Top European Business Schools ranking published annually by the *Financial Times*. For the latter, we use a dummy variable indicating whether the student went on exchange with another BBS student or not. Using information on the time and location that each student went on exchange, this variable takes a value of one if

¹⁰ Another potential complication concerns the fact that, in general, students in our sample were only eligible to apply for study abroad conditional on achieving a minimum QCA of 2.40 in 1st year. Therefore, we also estimated our models on a subset of students who achieved this grade or above. However, this did not change our key results or findings.

more than one student from the same cohort went on exchange to the same institution at the same time, and zero if they went without another BBS student.

Finally in relation to heterogeneity, we also consider how exchange might relate to subsequent academic performance depending on a student's academic ability by employing quantile regression techniques. While models such as Equation (1) consider the relationship between the mean of the dependent variable and a range of explanatory variables, quantile regression instead considers the relationship for a given quantile of the dependent variable e.g. upper and lower quartiles (Author *et al.*, 2019).

As well as these models, which focus on overall final year academic performance across all subjects, we also examine the relationship between exchange participation and performance in language modules for the subset of students studying BBS with a foreign language. This involves estimating the same model as presented in Equation (1) but instead considering *Final Year Language QCA* as the dependent variable.

4. EMPIRICAL RESULTS

4.1 Main Model Estimates

In Table 3 we present a set of linear regression models, including different sets of covariates, estimated using ordinary least squares (OLS). The dependent variable in each of the models is final year academic performance, as measured by final year QCA. Model (1) shows the raw unadjusted relationship between academic performance and spending a semester studying abroad, consistent with the sample descriptive statistics in Table 2. Specifically, it shows that those that go on exchange during their studies have a final year QCA that is 0.12 higher than those that do not¹¹, a difference that is statistically significant. Given that QCA is scaled from

¹¹ The apparent discrepancy with the difference in mean final year QCAs in Table 2 is a result of rounding.

0 to 4, this is equivalent to having a letter grade increase (e.g. move from a B2 to a B1) in approximately half of a student's modules in their final year. Therefore, it is also practically significant.

[Insert Table 3 about here]

In Model (2) we add a range of covariates relating to sex, language status, major choice, financial aid, school type, and graduation year. This model also shows a practically significant relationship between final year academic performance and exchange participation, even after controlling for such factors, though the estimated effect is smaller at 0.07 and is no longer statistically significant. Model (3) adds controls for prior academic performance in the form of a student's CAO points and early college QCA. Including these variables suggests that, conditional on prior academic performance, there is no significant independent relationship, either practical or statistical, between academic performance in final year and study abroad experience, on average.

In terms of the other variables included in Model (3), it is notable that females perform better than males in their final year examinations, even after controlling for student background, subject choice, and prior academic achievement, a finding that is consistent with Delaney and Devereux (2019). There are also large differences across major options, with students pursuing HRM and marketing majors doing much better, while language students fare worse on average, all else equal. There is also evidence that, as expected, prior academic performance, both in the Leaving Certificate and in early college, are strong predictors of final year academic performance.

In interpreting these results it is important to acknowledge that since students self-select into the study abroad programme the relationship with final year QCA may suffer from endogeneity bias, even after including a wide array of controls. In an attempt to address this, we also

employed an IV approach similar to Sorrenti (2017) where we calculated the distance of each student's secondary school to UL as a proxy for their domicile 'home' distance to UL, and used this as an instrument for studying abroad. The motivation for this approach is that distance may influence the decision to study abroad by affecting a student's cost of study and/or it may provide a proxy for their cultural 'openness', but not affect a student's residual final year academic performance. Overall, we found no convincing evidence of an impact of studying abroad on subsequent academic performance from our IV models, though the results were not robust across different specifications of the model. Because of this, as well as possible concerns about the validity of such instruments, we do not include the results here, though they are available on request from the authors¹².

4.2 Heterogeneous Effects?

While the results above help us understand the relationship of interest on average, they do not address the fact that there may be heterogeneity in the impact of studying abroad across different groups of students or different study abroad experiences. To consider this, we also estimated additional models containing interactions between student exchange and variables such as sex, language student, major, financial aid, and where and with whom a student went on exchange. Overall, these models revealed little heterogeneity across groups or experience, with one notable exception. Specifically, we found evidence of large differences in academic performance after exchange for male students in receipt and not in receipt of financial aid. For example, Table 4 presents predicted final year QCAs and associated 95% confidence intervals (CIs) for male and female students, disaggregated by financial aid status and exchange participation¹³. The predicted final year QCA for male students who went on exchange and

¹² In addition to the IV models, we also attempted to estimate local average treatment effects of participation using a regression discontinuity (RD) design. However, this approach was not successful due to the relatively small numbers of students just below and just above the QCA threshold for participation.

¹³ These predictions are based on a model containing interactions between the variables *Exchange*, *Female*, and *Financial Aid* – see Appendix B.

were in receipt of financial aid while at university is 2.89 (95% CI: 2.74-3.04), considerably lower than the predicted QCA of 3.02 (95% CI: 2.88-3.16) for otherwise similar male students who studied abroad but were not in receipt of financial aid. It is also lower than for comparable male students in receipt of financial aid but who did not study abroad, where the predicted final year QCA is 2.97 (95% CI: 2.92-3.03). Interestingly, similar differences are not evident for female students.

[Insert Table 4 about here]

One caveat to this analysis concerns the relatively wide CIs around the point estimates for students who were on exchange, which is likely a function of the relatively small number and proportion of such students in our sample. This results in overlapping CIs across the four different groups analysed in Table 4. Nonetheless, the estimated difference in final year QCA for male students who studied abroad and were or were not in receipt of financial aid (-0.13) was found to be statistically significant – see Table B2 in Appendix B. The other differences were not statistically significant at conventional significance levels.

Finally, in relation to heterogeneous effects, we also estimated unconditional quantile regression models of the independent relationship between final year academic performance and study abroad participation at different quantiles of the final year QCA distribution¹⁴. Results are presented in Table 5 for the lower quartile, median, and upper quartile of final year QCA, and in Figure 3 across the full distribution of final year QCA. Overall, they provide some evidence that study abroad may be more beneficial in terms of subsequent academic performance for higher achieving students, though it is important to note the relatively wide CIs, which overlap both 0 and the OLS estimate in Model (3) in Table 3. Once again, this is likely related, in part, to the relatively small number of exchange students in our sample.

¹⁴ For more discussion on the unconditional quantile regression method, see Author *et al.* (2019)

[Insert Table 5 and Figure 3 about here]

4.3 Language Students

As noted previously, in our data we are able to distinguish students who take their business degree with a language and disaggregate their performance in language subjects from their business modules. This allows us to estimate Equation (1) for the language student sub-sample, but with the student's final year performance in their language modules as the dependent variable and their language grades in the first three semesters as a proxy for prior language performance. Table 6 presents results for this model and suggests a positive and significant relationship between spending a semester abroad and subsequent language proficiency. Specifically, we find that language students who studied abroad for a semester had a higher QCA on their language subjects of 0.16 than otherwise similar language students who did not study abroad. This result is consistent with Sorrenti (2017), which found evidence that studying abroad was related to the acquisition of improved foreign language skills. We also undertook a similar analysis for non-language business subjects for the sub-sample of language students, but did not find a similar effect. This implies that study abroad is particularly beneficial for academic performance in language subjects for language students, but not for other subjects.

[Insert Table 6 about here]

5. DISCUSSION AND CONCLUSION

With growing numbers of students choosing to spend time studying abroad while undertaking their undergraduate studies, a more complete understanding of the relationship between exchange participation and subsequent academic performance is warranted. However, previous research on the topic is rare, with the main focus of the limited extant literature being on the impact of studying abroad on post-graduation labour market outcomes or foreign language

skills. Furthermore, most studies that have examined the topic have not considered possible heterogeneous effects.

In this paper we present a linear regression model of academic performance in the final year of study for a sample of business students in Ireland to consider the potential benefits of spending a semester abroad earlier in their studies. We show that, on average, studying abroad is not independently associated with subsequent academic performance. However, we do find evidence that male students from poorer backgrounds do worse after studying abroad than their peers, that higher-achieving students tend to do better following exchange, while language students perform better on return in their language subjects.

Given the dearth of literature on the relationship between academic performance and studying abroad, it is difficult to fully explain all of our findings, particularly those relating to poorer male students. Additionally, given the nature of our administrative data, we do not have sufficient information on student characteristics to allow us to tease out what might be driving our results, nor does our empirical approach allow us to consider potential mechanisms. Nonetheless, the existing literature on study abroad does provide us with some suggestions in this regard. For example, students participating in short-term exchange programmes generally attend institutions in circumstances and cultures that are different from their own, while they often have to familiarise themselves with new education institutions, expectations, and behaviours. Moreover, they may also face additional financial costs. The process of adjusting to this new environment can be a significant source of stress for some students (Smith and Khawaja, 2011; Conroy and McCarthy, 2019) and it is possible that this stress may negate potential positive academic benefits from studying abroad (Hunley, 2010). It is also plausible that such issues are more pronounced for more socioeconomically disadvantaged students, who may also face more challenging financial circumstances on return as a result of exchange participation e.g. due to increased debt.

Furthermore, it is important to note that our findings contrast somewhat to those of Di Pietro (2015) and Rodrigues (2013) who both showed that the labour market benefits of studying abroad were concentrated in students from disadvantaged backgrounds. However, as well as focusing on a different outcome, they both used parental education as a proxy for socioeconomic background, and so a direct comparison given our income-based measure should be made with caution. Finally, our results are comparable in certain respects to the findings of Lörz *et al.* (2015) who show that underprivileged students have comparatively lower benefit expectations leading to far fewer students from disadvantaged backgrounds opting to study abroad.

From a policy perspective, our analysis contributes in a number of ways. First, it supports previous findings on the positive effects of student mobility for those studying a language, a result that may be used to help encourage more students to undertake exchange opportunities, something envisaged in the forthcoming Erasmus Charter for Higher Education 2021-27 (European Parliament, 2019). The finding also highlights the potential loss in skills that language students may suffer as a result of the current Covid-19 pandemic. With a high degree of uncertainty surrounding the ability of students to participate in exchange programmes in the 2020/21 academic year, and possibly beyond, students studying a foreign language may be particularly disadvantaged.

Second, from a policy viewpoint, while we did not find a positive relationship between academic performance and student exchange on average in our study, the fact that there was no overall negative association is reassuring for exchange programmes, particularly in light of the wide range of other benefits that have been identified in the literature e.g. intercultural awareness, increased confidence, communication skills, etc. In other words, our results suggest that these benefits are not coming at an academic cost. Third, our findings suggest that consideration of the heterogeneous effects of exchange on academic outcomes, as well as the

reasons underpinning these, is important, particularly in terms of differences relating to socioeconomic background and academic ability. This could be used to enhance the experience of different groups that may not be realising the full benefits of exchange, another key aim of the Erasmus Charter for Higher Education 2021-27 (European Parliament, 2019).

Finally, in terms of our analysis, a number of caveats should be borne in mind. First, the data used is limited to a sample of business studies students in a single HEI in Ireland and, as a result, there are likely to be some concerns around the generalisability of our results. This is an issue in this area that has been highlighted by Roy *et al.* (2019) and, to address it, we suggest that future research on this topic examine a broader set of the student population to improve the external validity of key findings. We do however acknowledge the challenges around accessing such data. A second caveat is that our proxy for a student's socioeconomic background is limited to receipt of financial aid and attending a DEIS school. It would be informative to examine the robustness of our findings to different measures of socioeconomic disadvantage, including parental education and/or household income. Third, since students self-select into the study abroad programme, the relationship with final year QCA may suffer from endogeneity bias. As a result, and despite the fact that we control for prior academic performance, our estimates are independent associations as opposed to causal effects. While we did consider identification strategies including IV and RD, these did not yield convincing and robust estimates given our data. We suggest future studies on this topic adopt such approaches, where possible.

Nonetheless, despite these caveats, this paper makes a clear contribution to the literature and the issues raised in this study are not unique to one university in Ireland. Given the fact that a significant proportion of student exchange is made up of those in business or language related courses, as well the recent research interest in the role of socioeconomic factors in student

exchange participation and outcomes, our findings should prove useful to higher education policymakers, managers, and students internationally.

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Tables and Figures

Table 1: Variable Definitions

Variable	Definition
<i>Final Year QCA</i>	= QCA in final year of study (all students)
<i>Early College QCA</i>	= QCA in first three semesters of study (all students)
<i>Final Year Language QCA</i>	= QCA of language modules in final year of study (business and language students only)
<i>Early College Language QCA</i>	= QCA of language modules in first three semesters of study (business and language students only)
<i>Exchange (Study Abroad)</i>	= 1 if student spent a semester studying abroad; 0 else
<i>Female</i>	= 1 if student is female; 0 else
<i>Language Student</i>	= 1 if student is BBS & French/German/Japanese student; 0 else
<i>Major</i>	= 0 if major is Accounting & Finance = 1 if major is Economics = 2 if major is Human Resource Management = 3 if major is Marketing = 4 if major is Risk Management & Insurance
<i>Financial Aid</i>	= 1 if student received financial aid in university; 0 else
<i>DEIS School</i>	= 1 if student attended a DEIS secondary school; 0 else
<i>Fee Paying School</i>	= 1 if student attended a fee paying secondary school; 0 else
<i>CAO Points</i>	= Number of points achieved in the Leaving Certificate examination
<i>Year of Graduation</i>	= 0 if student graduated in 2010/11 = 1 if student graduated in 2011/12 = 2 if student graduated in 2012/13 = 3 if student graduated in 2013/14 = 4 if student graduated in 2014/15 = 5 if student graduated in 2015/16 = 6 if student graduated in 2016/17 = 7 if student graduated in 2017/18

Table 2: Sample Descriptive Statistics

Variable	Mean (SD) or %		
	Exchange Students	Non-Exchange Students	All Students
<i>Final Year QCA</i>	3.12 (0.37)	2.99 (0.37)	3.00 (0.37)
<i>Early College QCA</i>	2.80 (0.40)	2.66 (0.39)	2.67 (0.39)
<i>Final Year Language QCA</i>	2.96 (0.47)	2.72 (0.54)	2.84 (0.52)
<i>Early College Language QCA</i>	2.67 (0.56)	2.60 (0.50)	2.63 (0.53)
<i>Female</i>	52.29	43.85	44.50
<i>Language Student</i>	58.82	7.25	11.25
<i>Accounting & Finance Major</i>	25.49	37.80	36.85
<i>Economics Major</i>	29.41	19.34	20.12
<i>HRM Major</i>	15.69	11.43	11.76
<i>Marketing Major</i>	23.53	17.31	17.79
<i>Risk Major</i>	5.88	14.12	13.48
<i>Financial Aid</i>	33.99	38.85	38.47
<i>DEIS School</i>	3.27	6.48	6.23
<i>Fee Paying School</i>	7.19	7.58	7.55
<i>CAO Points</i>	457.08 (48.06)	435.56 (41.28)	437.22 (42.23)
<i>Year of Graduation 2010/11</i>	3.27	14.62	13.74
<i>Year of Graduation 2011/12</i>	4.58	14.51	13.74
<i>Year of Graduation 2012/13</i>	18.30	12.47	12.92
<i>Year of Graduation 2013/14</i>	14.38	13.41	13.48
<i>Year of Graduation 2014/15</i>	5.88	11.15	10.75
<i>Year of Graduation 2015/16</i>	11.76	10.44	10.54
<i>Year of Graduation 2016/17</i>	18.95	10.38	11.05
<i>Year of Graduation 2017/18</i>	22.88	13.02	13.79
Observations	153	1,820	1,973

Source: Analysis of UL administrative student record data.

Table 3: Linear Regression Models of Final Year Academic Performance

	Dependent Variable: <i>Final Year QCA</i>		
	(1)	(2)	(3)
<i>Exchange</i>	0.122** (0.037)	0.068 (0.032)	-0.010 (0.021)
<i>Female</i>		0.125*** (0.013)	0.101*** (0.010)
<i>Language Student</i>		-0.019 (0.024)	-0.062* (0.029)
<i>Economics Major</i>		-0.071*** (0.007)	-0.015 (0.011)
<i>HRM Major</i>		-0.045*** (0.006)	0.065*** (0.010)
<i>Marketing Major</i>		-0.021** (0.006)	0.123*** (0.019)
<i>Risk Major</i>		-0.131*** (0.003)	-0.005 (0.013)
<i>Financial Aid</i>		-0.005 (0.017)	0.003 (0.015)
<i>DEIS School</i>		-0.005 (0.029)	-0.013 (0.016)
<i>Fee Paying School</i>		-0.054 (0.031)	0.040 (0.037)
<i>Year of Graduation 2011/12</i>		0.074** (0.025)	0.040 (0.022)
<i>Year of Graduation 2012/13</i>		0.194*** (0.016)	0.179*** (0.015)
<i>Year of Graduation 2013/14</i>		0.209*** (0.019)	0.230*** (0.009)
<i>Year of Graduation 2014/15</i>		0.248** (0.058)	0.261*** (0.056)
<i>Year of Graduation 2015/16</i>		0.162** (0.045)	0.132** (0.035)
<i>Year of Graduation 2016/17</i>		0.323*** (0.065)	0.256*** (0.036)
<i>Year of Graduation 2017/18</i>		0.301*** (0.027)	0.280*** (0.032)
<i>CAO Points</i>			0.001*** (0.000)
<i>Early College QCA</i>			0.515*** (0.053)
Constant	2.994*** (0.026)	2.808*** (0.026)	0.930** (0.246)
Observations	1,973	1,973	1,973
R ²	0.008	0.126	0.464

Notes: The table presents estimated coefficients from linear regression models of *Final Year QCA* estimated using OLS. Standard errors clustered by major are in parentheses. *** denotes statistically significant at 1%, ** denotes statistically significant at 5%, and * denotes statistically significant at 10%.

Source: Analysis of UL administrative student record data.

Table 4: Predicted Final Year QCAs by Sex, Financial Aid Status, and Exchange Participation

<u>Male Students</u>		
<i>Exchange</i>	<i>Financial Aid</i>	
	No	Yes
No	2.95 (2.93, 2.97)	2.97 (2.92, 3.03)
Yes	3.02 (2.88, 3.16)	2.89 (2.74, 3.04)
<u>Female Students</u>		
<i>Exchange</i>	<i>Financial Aid</i>	
	No	Yes
No	3.06 (3.04, 3.09)	3.06 (3.03, 3.09)
Yes	3.04 (2.90, 3.19)	3.02 (2.87, 3.17)

Notes: The table presents predicted final year QCAs for male and female students, disaggregating by financial aid status and exchange participation. The predictions are based on a model containing interactions between the variables *Female*, *Exchange*, and *Financial Aid* – see Appendix B. 95% confidence intervals are in parentheses.

Source: Analysis of UL administrative student record data.

Table 5: Unconditional Quantile Regression Models of Final Year Academic Performance

	Dependent Variable: <i>Final Year QCA</i>		
	Lower Quartile	Median	Upper Quartile
<i>Exchange</i>	-0.014 (0.043)	-0.034 (0.037)	0.075* (0.040)
<i>Female</i>	0.105*** (0.021)	0.105*** (0.019)	0.114*** (0.021)
<i>Language Student</i>	-0.065* (0.037)	-0.047 (0.033)	-0.054 (0.035)
<i>Economics Major</i>	0.034 (0.032)	-0.039 (0.025)	-0.103*** (0.026)
<i>HRM Major</i>	0.171*** (0.033)	0.118*** (0.035)	-0.098*** (0.034)
<i>Marketing Major</i>	0.226*** (0.035)	0.143*** (0.033)	-0.023 (0.028)
<i>Risk Major</i>	0.052 (0.041)	-0.037 (0.029)	-0.076** (0.030)
<i>Financial Aid</i>	0.031 (0.021)	-0.048** (0.019)	-0.018 (0.020)
<i>DEIS School</i>	-0.059 (0.043)	0.013 (0.036)	0.020 (0.040)
<i>Fee Paying School</i>	0.042 (0.044)	0.017 (0.035)	0.063* (0.035)
<i>Year of Graduation 2011/12</i>	0.042 (0.043)	0.075** (0.034)	0.068** (0.029)
<i>Year of Graduation 2012/13</i>	0.178*** (0.046)	0.234*** (0.039)	0.191*** (0.031)
<i>Year of Graduation 2013/14</i>	0.193*** (0.046)	0.269*** (0.036)	0.242*** (0.033)
<i>Year of Graduation 2014/15</i>	0.247*** (0.049)	0.316*** (0.041)	0.313*** (0.037)
<i>Year of Graduation 2015/16</i>	0.118** (0.047)	0.142*** (0.038)	0.171*** (0.033)
<i>Year of Graduation 2016/17</i>	0.283*** (0.042)	0.306*** (0.041)	0.294*** (0.036)
<i>Year of Graduation 2017/18</i>	0.246*** (0.043)	0.333*** (0.039)	0.344*** (0.037)
<i>CAO Points</i>	0.000 (0.000)	0.001*** (0.000)	0.001*** (0.000)
<i>Early College QCA</i>	0.498*** (0.040)	0.557*** (0.036)	0.550*** (0.035)
Constant	0.978*** (0.141)	0.855*** (0.129)	0.992*** (0.146)
Observations	1,973	1,973	1,973
R ²	0.213	0.333	0.333

Notes: The table presents estimated coefficients from unconditional quantile regression models of *Final Year QCA* estimated at the lower quartile, median, and upper quartile. Bootstrapped standard errors with 500 replications are in parentheses. *** denotes statistically significant at 1%, ** denotes statistically significant at 5%, and * denotes statistically significant at 10%.

Source: Analysis of UL administrative student record data.

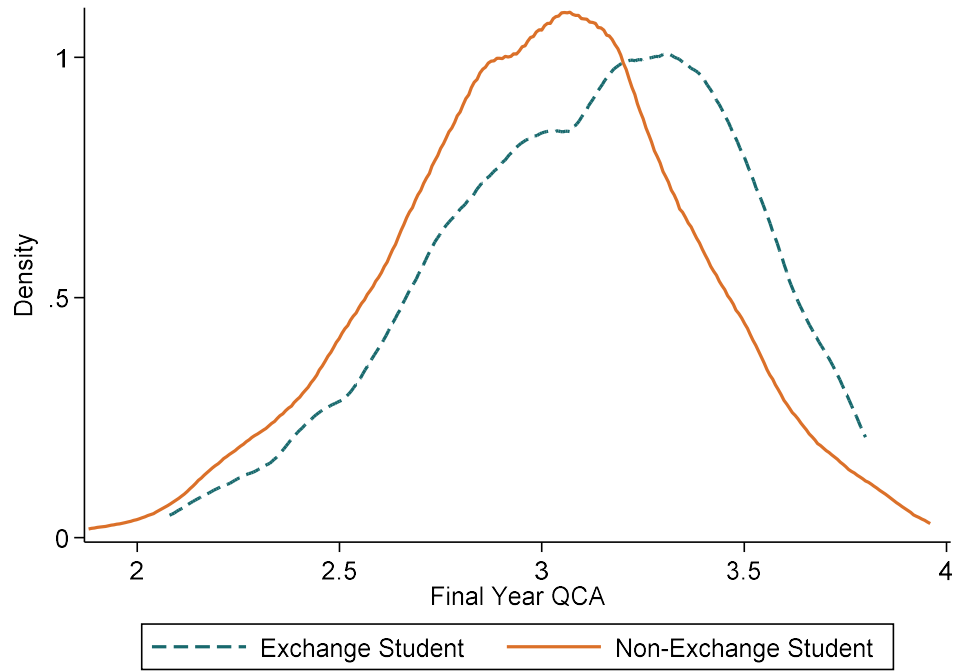
Table 6: Linear Regression Models of Final Year Academic Performance in Language Subjects for Business and Language Students

Dependent Variable: <i>Final Year Language QCA</i>	
<i>Exchange</i>	0.157* (0.057)
<i>Female</i>	-0.090 (0.057)
<i>Economics Major</i>	0.020 (0.031)
<i>HRM Major</i>	0.048 (0.036)
<i>Marketing Major</i>	-0.005 (0.011)
<i>Risk Major</i>	0.008 (0.034)
<i>Financial Aid</i>	-0.015 (0.072)
<i>DEIS School</i>	-0.096 (0.204)
<i>Fee Paying School</i>	0.288*** (0.047)
<i>Year of Graduation 2011/12</i>	0.033 (0.246)
<i>Year of Graduation 2012/13</i>	0.431** (0.149)
<i>Year of Graduation 2013/14</i>	0.440** (0.128)
<i>Year of Graduation 2014/15</i>	0.200 (0.209)
<i>Year of Graduation 2015/16</i>	0.406 (0.293)
<i>Year of Graduation 2016/17</i>	0.434** (0.149)
<i>Year of Graduation 2017/18</i>	0.297 (0.175)
<i>CAO Points</i>	-0.000 (0.001)
<i>Early College Language QCA</i>	0.741*** (0.029)
Constant	0.727 (0.349)
Observations	172
R ²	0.316

Notes: The table presents estimated coefficients from linear regression models of *Final Year Language QCA* for BBS and language students estimated using OLS. Standard errors clustered by major are in parentheses. *** denotes statistically significant at 0.1%, ** denotes statistically significant at 1%, and * denotes statistically significant at 5%.

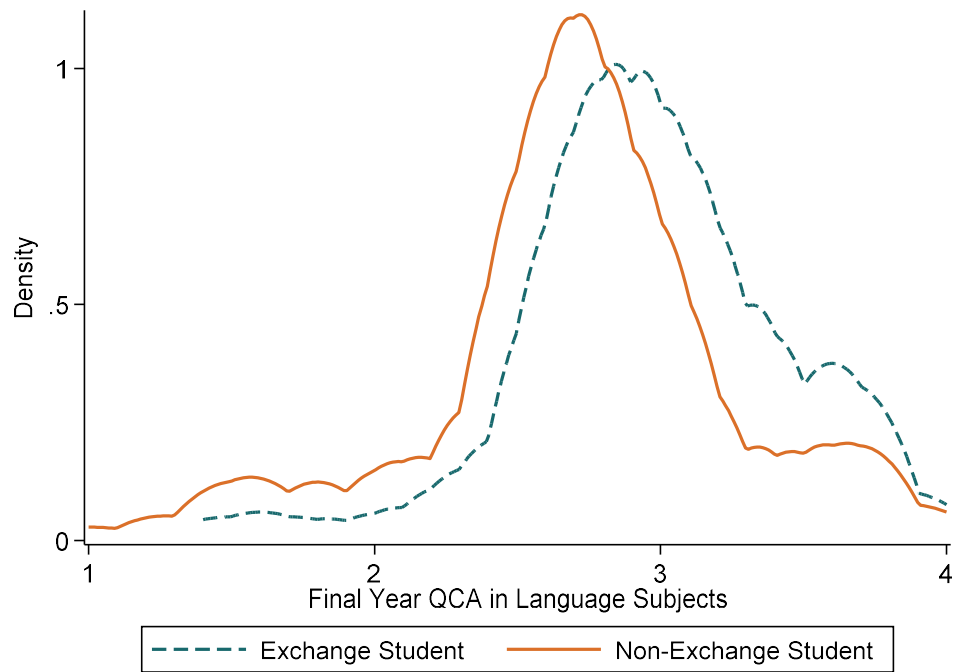
Source: Analysis of UL administrative student record data.

Figure 1: Final Year Academic Performance Distribution by Exchange Participation



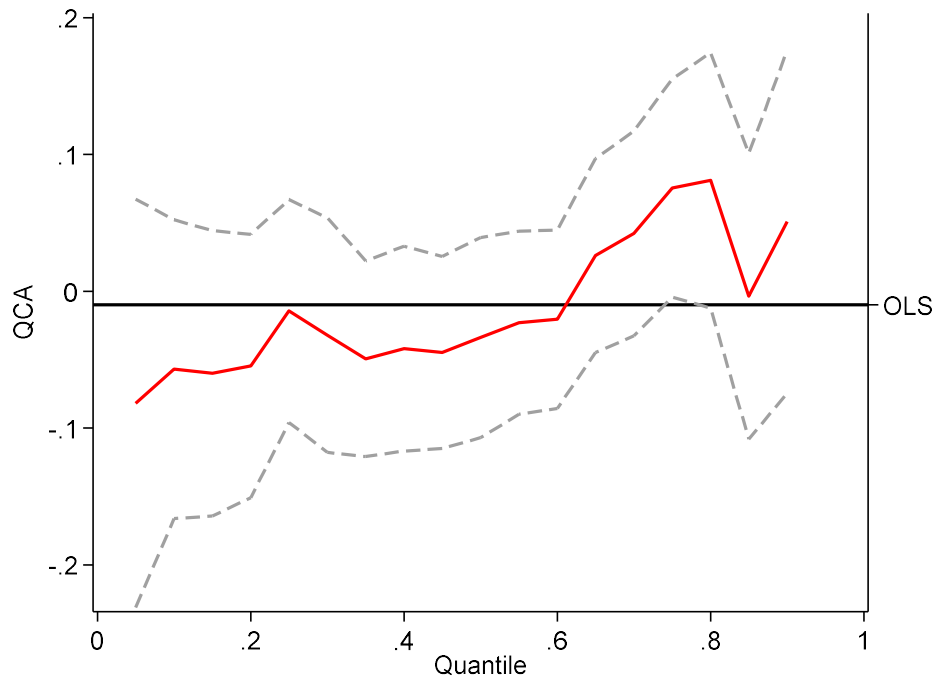
Source: Analysis of UL administrative student record data.

Figure 2: Final Year Academic Performance Distribution in Language Modules for Business and Language Students by Exchange Participation



Source: Analysis of UL administrative student record data.

Figure 3: Unconditional Quantile Regression Model Estimates of Effect of Exchange Participation on Final Year QCA



Notes: The chart presents estimated coefficients and associated 95% CIs (broken lines) from unconditional quantile regression models of *Final Year QCA* estimated across the distribution of *Final Year QCA*.

Source: Analysis of UL administrative student record data.

Appendix A

Table A1: University of Limerick Grading System and Degree Award Classification

Letter Grade	UL QPV
A1	4.00
A2	3.60
B1	3.20
B2	3.00
B3	2.80
C1	2.60
C2	2.40
C3	2.00
D1	1.60
D2	1.20
F	0.00
NG	0.00

Award Classification	Cumulative QCA
First class honours	≤ 4.00 & ≥ 3.40
Second class honours grade 1 (2.1)	< 3.40 & ≥ 3.00
Second class honours grade 2 (2.2)	< 3.40 & ≥ 3.00
Third class honours	< 2.50 & ≤ 2.00

Note: QPV = Quality Point Value; QCA = Quality Credit Average and is the weighted average of the QPV scores related to a student's results.

Appendix B

Table B1: Linear Regression Model of Final Year Academic Performance with Interactions between *Exchange*, *Female*, and *Financial Aid*

Dependent Variable: <i>Final Year QCA</i>	
<i>Exchange</i>	0.066 (0.045)
<i>Financial Aid</i>	0.019 (0.025)
<i>Exchange*Financial Aid</i>	-0.144** (0.037)
<i>Female</i>	0.112*** (0.009)
<i>Exchange*Female</i>	-0.086 (0.097)
<i>Financial Aid*Female</i>	-0.023 (0.021)
<i>Exchange* Financial Aid*Female</i>	0.124 (0.084)
<i>Language Student</i>	-0.062 (0.034)
<i>Economics Major</i>	-0.015 (0.011)
<i>HRM Major</i>	0.066*** (0.010)
<i>Marketing Major</i>	0.120*** (0.019)
<i>Risk Major</i>	-0.005 (0.013)
<i>DEIS School</i>	-0.012 (0.016)
<i>Fee Paying School</i>	0.040 (0.037)
<i>Year of Graduation 2011/12</i>	0.040 (0.021)
<i>Year of Graduation 2012/13</i>	0.175*** (0.015)
<i>Year of Graduation 2013/14</i>	0.228*** (0.010)
<i>Year of Graduation 2014/15</i>	0.261*** (0.056)
<i>Year of Graduation 2015/16</i>	0.131** (0.037)
<i>Year of Graduation 2016/17</i>	0.256*** (0.035)
<i>Year of Graduation 2017/18</i>	0.280*** (0.032)
<i>CAO Points</i>	0.001*** (0.000)
<i>Early College QCA</i>	0.514*** (0.054)
Constant	0.922** (0.246)
Observations	1,973
R ²	0.465

Notes: The table presents estimated coefficients from linear regression models of *Final Year QCA* estimated using OLS. Standard errors clustered by major are in parentheses. *** denotes statistically significant at 0.1%, ** denotes statistically significant at 1%, and * denotes statistically significant at 5%.

Source: Analysis of UL administrative student record data.

Table B2: Estimated Differences in Final Year QCA for Subgroups of Male Students

	Estimated Difference
Exchange and Financial Aid <i>versus</i> Exchange and No Financial Aid	-0.125** (0.051)
Exchange and Financial Aid <i>versus</i> No Exchange and Financial Aid	-0.078 (0.059)
Exchange and No Financial Aid <i>versus</i> No Exchange and No Financial Aid	0.066 (0.045)

Notes: The table presents estimated differences in final year QCAs for different subgroups of male students and are derived from the model presented in Table B1. Standard errors clustered by major are in parentheses. *** denotes statistically significant at 0.1%, ** denotes statistically significant at 1%, and * denotes statistically significant at 5%.

Source: Analysis of UL administrative student record data.