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Unequal uptake of higher education mobility in the UK

The importance of social segregation in universities and subject areas

Schnepf, Sylke V.

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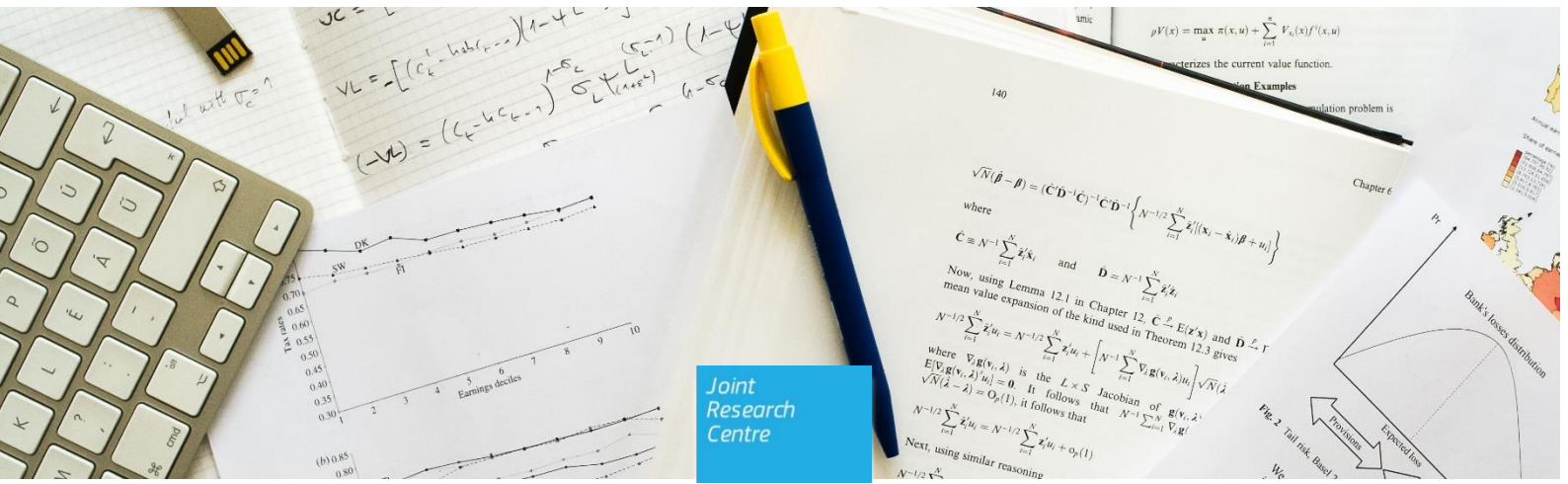

Contact information
Name: Schnepf, Sylke V.
Email: sylke.schnepf@ec.europa.eu

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UNEQUAL UPTAKE OF HIGHER EDUCATION MOBILITY IN THE UK
THE IMPORTANCE OF SOCIAL SEGREGATION IN UNIVERSITIES AND SUBJECT AREAS

Sylke V. Schnepf

European Commission, Joint Research Centre, Ispra, Italy

June 2018

Abstract

Student mobility is the most recognised element of Erasmus+, a major EU policy which celebrated its 30th anniversary in 2017. It is clearly popular with an increase in student uptake from 3.2 to 272.5 thousands from 1987 to 2014. Recent studies show that studying abroad provides benefits like improved employment chances and language competences. These benefits are not equally distributed among graduates, since recent literature shows that disadvantaged students are less likely to study abroad than better off students. This is explained by differing social capital of individuals from diverse socio-economic backgrounds which impacts on different choices. However, not much is known about the role of social segregation in universities and subjects studied.

Using multilevel logistic regressions this paper examines two main research questions. First, how important is social segregation in universities and subjects for unequal mobility uptake? Second, how much of existing differences in mobility by socio-economic background can be explained by ability of students? Throughout, results for Erasmus mobility will be compared with those of other mobility schemes organised by higher education institutes. The study exploits population data of more than 500,000 UK graduates of the 2010/11, 2012/13 and 2014/15 cohorts deriving from the Higher Education Statistics Agency data (HESA).

Results show that a considerable part of unequal mobility uptake is explained by social segregation in universities and subjects even if graduates' upper secondary school grades are taken into account. Policy makers aiming to increase mobility uptake of disadvantaged students could allocate resources for mobility more equally across universities.

JEL Codes: I23, I24, I28

Keywords: Erasmus, mobility uptake, credit mobility, study abroad, social segregation, UK

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1 Introduction

Student mobility which refers to students spending some time abroad during their degree programme at a home institute is the most recognised element of Erasmus+, a major EU policy which celebrated its 30th anniversary in 2017. It is clearly popular with an increase in student uptake from 3.2 to 284.1 thousands from 1987/88 to 2014/2015 (European Commission (EC) 2009, EC 2017a). This trend is unlikely to reverse but will probably increase in the future given an about 50% increase in the budget of Erasmus+ for the Multiannual Financial Framework for 2021-2027 (EC 2018). A communication adopted by the European Commission in 2017 on 'Strengthening European Identity through Education and Culture' sets the vision of building a European Education Area by 2025, which among other purposes aims to make mobility a reality for all (EC 2017b).

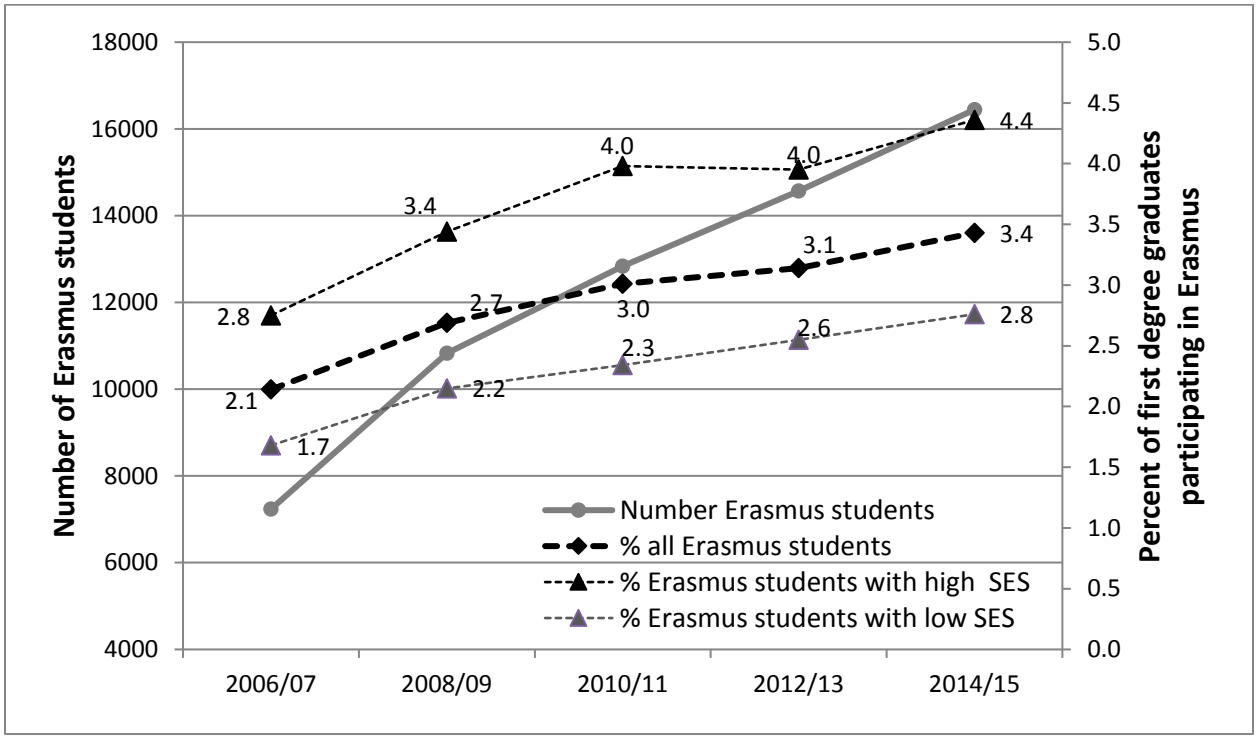
Figure 1 shows Erasmus uptake for the UK. Erasmus student numbers have more than doubled between the graduation cohorts 2006/07 to 2014/15. In 2014/15, around 16,500 students studied abroad. However, while the UK is the country with the sixth highest mobility rate of Erasmus students in Europe, given its population size it can be characterised as a country with low mobility compared to i.e. Germany with 41,000, France with 40,000, Italy with 34,000, Spain with 27,000 and Poland 17,000 students participating in Erasmus in 2014/15 (EC 2017a, Annex 1, Table7; Go International 2015).

In most EU countries the majority of students who study temporarily abroad are enrolled in EU programmes (Hauschildt et al. 2015). However, there exist also other mobility programmes organised by higher education institutes that foster students studying abroad during their degree programme.

Students participating in mobility programmes show generally high satisfaction with their experience abroad (Engel 2010). More importantly however, experience at host universities abroad during tertiary education can serve as a vital part for the acquisition of skills needed in labour markets that have to reply to cross border activities and globalisation. Indeed, the number of studies showing that studying abroad has a positive impact on students' future professional career are augmenting. For example, student mobility increases individuals' employment probability (Di Pietro 2015), their chances of working abroad (Parey and Waldinger 2007), their language competences (Sorrenti 2015) and European values (Souto-Otero et al. 2013). Rodrigues (2013) comparing several countries does not find a significant effect of mobility abroad on time to find the first job and hourly earnings for the UK (but for other countries in Europe).

Nevertheless, it is of considerable concern that the opportunities of international mobility are unequally distributed across social groups. Student mobility could therefore perpetuate social inequalities. Social selectivity could transfer inequalities in uptake of mobility to inequalities in the labour market if employers tend to prefer graduates with international experience.

Figure 1: Number of total Erasmus students (all tertiary programmes) and % Erasmus students and other mobile students among all first graduate students in the UK by year



Source: Number of Erasmus students refers to mobilities in all tertiary programmes and derive from European Commission (2009, Annex 1) for 2006/07, from European Commission (2013, Annex 1, Part 2) for 2008/09 and 2010/11, from European Commission (2014, Annex 1) for 2012/13 and European Commission (2017a, Annex 1) for 2014/15. Percent of first degree graduate students who participate in Erasmus is calculated by the author using HESA data which covers first degree graduates only. Only for this graph, 'high SES' denotes graduates who have at least one parent with a professional occupation.

Existing literature agrees on unequal uptake of mobility: using the cross-national Eurostudent survey, Hauschildt et al. (2015) show that in almost all European countries examined, students whose parents are better educated have higher chances of studying abroad than their counterparts with lower parental education. This is confirmed also by country specific studies, i.e. for Norway (Wiers-Jenssen 2011), Denmark and Sweden (Munk 2009), Germany (Netz and Finger 2016) and the UK (Carbonell 2014, Go international 2015).

Figure 1 shows the problem at stake for the UK using population data on first degree graduates, which will be described in greater detail in Section 3. Between the graduation cohort of 2006/07 and 2014/15, the percent of undergraduate students studying temporarily abroad rose from 2.1 to 3.4%. In comparison and not shown, other temporary mobility abroad is taken up by 3.9% of students in 2014/15 and thereby slightly higher than Erasmus mobility in the UK. There is also a considerable difference between countries in the UK. In the most recent cohort, Erasmus uptake is highest in Northern Ireland with 5.5%, followed by Scotland with 4.4% and lowest in England and Wales with 3.3% (results not shown).

However, the uptake of studying abroad is unequal. 4.4% of individuals whose parents have a professional occupation take part in Erasmus mobility compared to just 2.8% of students whose parents have lower skilled positions. In addition, social selectivity of Erasmus grew slightly wider, given that the percentage point difference between the social groups increased from 1.1 (2.8% minus 1.7%) in 2006/07 to 1.6 percentage points in 2014/15 (this difference across time is significant at the 1 percent level). In Germany, a widening of the gap measured in a similar way has been found between 1991 and 2003 with no changes thereafter (Netz and Finger 2016).

Policy makers are aware of the unequal uptake of student mobility and as a consequence the need of higher education policies to aim at different groups of students having similar chances of participating in mobility abroad. The European Commission stresses equal access in a variety of documents. For example, the legal framework of Erasmus+ (EC 2017c) of which higher education student mobility is a part states: 'There is a need to widen access for members of disadvantaged and vulnerable groups ... in the implementation of the Programme'. The current framework for European cooperation in the field of youth aims at providing equal opportunities for young people in education thereby calling for greater attention to the inclusion of youth at risk. The European Commission's (2017b) Communication on 'A renewed EU agenda for higher education' stresses the need for inclusive higher education allowing students from different backgrounds to succeed and the support for international mobility. This is also subject of a tweet by Tibor Navracsics, European Commissioner for Education, Culture, Youth and Sport, from 24 July 2017: 'How can we make #ErasmusPlus even more open to people from all backgrounds?' (Navracsics 2017).

How student mobility can be made more equal depends on the mechanism that created student mobility to be unequal. (It is important to note, that student mobility is not only

unequal in terms of parental background, but also other characteristics which seem less alarming but are associated with parental background like personality type in terms of adaptability, initiative, assertiveness (Bracht 2006), ability (Loerz et al. 2016, Wiers-Jennsen 2011) and age and social constraints (Orr et al. 2011).)

So what is the mechanism that could explain the lower uptake of student mobility by the disadvantaged?

Some literature (Loerz et al. 2016, Netz 2015, Hauschildt et al. 2015, Salisbury et al. 2008) differentiates student motives at different decision points. For example, first students need to make a free decision against or do not consider mobility at all based on their specific mobility traits and information access. Second, those who would like to participate might refrain due to not being able to do so given i.e. financial problems, low language skills and low self-esteem.

Theoretical explanations are currently linked to the theory of cultural reproduction (i.e. Bourdieu and Passeron 1990) and rational choice (i.e. Breen and Goldthorpe 1997) as well as the consequences of students' choices given higher education expansion (Reimer and Pollak 2010). While rational choice theory would predict that for students with high socio-economic background benefits of studying abroad outweigh cost of doing so (since they have funds, experiences and networks available), the costs should outweigh the benefits of studying abroad for their counterparts with lower background. Cultural reproduction in the framework of educational expansion states that higher socio-economic background students protect their advantageous position by searching actively for prestigious educational qualifications. Educational expansion jeopardises the reproduction of prestigious education among the privileged since vertical differentiation (having achieved a tertiary degree in contrast to just an upper secondary degree) is not any more possible. As a consequence, students from higher backgrounds seek to distinguish themselves by looking for more prestigious educational channels horizontally and hence i.e. at the tertiary level. One of these channels could be higher education mobility (Netz and Finger, 2016).

Current literature examines specific parts of the mechanisms discussed in this theoretical framework. Underprivileged students evaluate studying abroad as less beneficial and fewer enrol in the programme compared to more privileged counterparts (Loerz et al. 2016, Salisbury 2008), which fits very well the theoretical framework discussed above. Hauschildt et al. (2015) show that in most European countries especially students with higher education background receive financial support. Finances and 'social context' (separation from family) are perceived as the most significant barriers by non-mobile students and

especially those with low socio-economic background (Orr et al. 2011). Low language skills play a further role (Loerz et al. 2016). In addition, some studies show that mobile students have a higher share of parents who hold prior experience of living abroad (Wiers-Jenssen 2011).

The current results of theoretical discussions and literature would therefore suggest that policy makers need to counteract the contrasting opportunity structures and social capital impacting on diverse choices of different social groups. This could be done by increasing the information on mobility abroad ensuring that it can be accessed by all and by improving the opportunities and support for and decreasing the costs of studying abroad for the socially disadvantaged (as concluded by Hauschildt et al. 2015, Loerz et al. 2016 and Souto-Otero et al. 2013).

These conclusions are very valid and important to pursue. Nevertheless, as highlighted by Bilecen and Van Mol (2017), 'international academic mobility are structured by disparities in the way labour markets, nation-state regulations, discourses, higher education systems, and institutions are organised as well as by individual characteristics such as gender, age, class, career stage, and cultural background. In order to understand these processes to the fullest further research should concentrate on the mechanisms through which social inequalities are being produced and reproduced by taking into account a variety of actors, nation-states, and higher education institutions.' Existing literature clearly has focused on individual characteristics and cultural background. However, inequalities of student mobility are very likely to be also generated within countries' education systems and higher education institutes. Students choose their field of study and their university depending on their own job preferences and abilities and other factors they regard as important, which initially are unlikely to reflect primarily on their intentions to study abroad. As such, the decision and chance to study abroad is entirely up to the opportunities available for students within their field of subject and higher education institute.

For example, we could imagine a very simplistic scenario: all high socio-economic background students study languages while low socio-economic background students enroll in other subjects. Imagine further that Erasmus mobility takes mainly place in language courses. In this case, mobility uptake would be very much unequal by socio-economic background due to individuals' choices or constraints on subject area studied and unequal distribution of Erasmus opportunities across subject areas. It is doubtable that policy recommendations on individual support foster reaching a more equal study abroad

population for this naive scenario. Nevertheless, it is exactly these institutional and choice constraints that might explain a considerable part of unequal uptake of mobility schemes.

Current research does not investigate the importance of university and subject choice in detail. For many studies, data might just not allow doing so since information on students clustered in universities might not be available. The literature that uses suitable data generally treats these variables as fixed effects in models without examining them as important factors in the first place.

This paper examines students' mobility abroad in the UK, a country that stands out in Europe for an extremely stratified higher education system (Brennen et al. 2009). After a first discussion on who participates in mobility programmes, the main focus of this study is to investigate the importance of social segregation in universities and subjects for explaining unequal uptake of Erasmus mobility. Two different methods will be used. First, inequality in uptake will be estimated by assuming equal access to Erasmus opportunities but taking the current UK Erasmus grant distribution and social segregation of students across subjects and universities into account. Second, a multilevel model will be run to estimate the importance of higher educational institutes on unequal Erasmus uptake.

Given that UK higher education institutions differ widely in their prestigious status and also the students they attract, ability of students, only sometimes taken into account in existing literature, could be an important factor for explaining university choice and its association with unequal mobility. As a consequence, it is examined how much student ability mitigates the association of university and subject segregation with unequal uptake of mobility abroad.

Throughout the analysis, Erasmus mobility is compared with other mobility schemes which adds a further value added to existing research that often does not compare mobility abroad schemes.

The remainder of this study is as follows. The next section describes student mobility and stratification of the higher education system in the UK. After that, the population data used and the methodological approach will be discussed. This is followed by a results and a concluding section.

2 Higher education institutions and student mobility

Selection of students into higher education institutes

Students generally apply to their preferred universities through the Universities and Colleges Admission Service (UCAS). Important components of the application process are students' likely school grades, an application letter and generally an interview by the university. Evaluating the application, universities make offers to students. Students then choose one offer. Final admission depends on students meeting the terms of the offer, generally achieving particular grades. Ability selection is therefore an important component of distributing students to universities. The more prestigious the university the higher is the requirements for the upper secondary school leaving results (generally called 'A-levels').

Uptake of Erasmus mobility

At the university level, a precondition for students to take part in Erasmus is that their own university has been awarded the Erasmus Higher Education Charter and has applied for funding regarding the so-called Erasmus+ Key Action 103 (student and staff mobility at higher education institutes) from the British Council, which is the National Agency responsible for Erasmus+ in the UK. The 2014/15 population graduate cohort exploited for the analysis below includes 153 accredited higher education institutes. 23 of these do not have Erasmus students of which 6 did not sign the Charter. Hence, most of all higher institutions in the UK have signed up to Erasmus mobility and applied for funding. (In the following, the term 'higher education institute' is used interchangeably with 'university'.)

UK institutions apply one year before mobility by submitting an estimate of mobility months of their students to the British Council. Applications need to be done separately for mobility projects within Programme countries (all EU countries and Macedonia, Liechtenstein, Iceland, Turkey and Norway) and Partner Countries (Western Balkan, Eastern Countries, South-Mediterranean, Russian Federation and Switzerland). In our data, the predominate part of undergraduates' mobilities takes place in Programme countries. The British Council has a set budget for the activity and decides on the places to be allocated for each university. Via email exchange with the British Council, the author was told that in the last two calls (prior to 2018/19) the demand of number student month applied for could not be met by the budget.

If mobility regards Programme Countries, there is no qualitative assessment meaning that every eligible grant application can potentially receive funding. The maximum grant amount

awarded can be 100% but depends on the number of mobility months applied for, the past performance of the university and the national budget allocated for the mobility action (EC 2017d, p. 38). The exact mechanism of allocation is not documented, however based on the author's exchange with the British Council and different universities, previous uptake of universities and the fit of the mobility estimation with the actual mobility uptake are important criteria. This might explain as shown later that universities that first took part in Erasmus, like Russell Group Universities, receive more grants than newcomers. Partner Country mobilities are much more expensive, and here qualitative assessment takes place also aiming to meet a regional balance in grant distribution. (EC 2017d, p. 40)

During the year of mobility within Programme Countries, universities write interim reports, stating the number of actual mobilities and special needs students. As a consequence of these reports, funding is likely to be increased to meet the current demand not covered with previous funding awards. (EC 2017d, p. 258) Like for universities, also for subject areas there is no quota, so that it is entirely up to the university how students are allocated to subjects.

At the students' subject area level, it is important to note, that students cannot visit any programme country university. Instead, the choice of host institute depends on the existing inter-institutional agreements made at the Faculty or Division level with host institutes. For example, it is likely that European language schools of a University have signed more exchange agreements with institutes abroad than schools of economics or politics. In the UK, the language barrier is a problem, so that many Faculties would try to find host institutes that offer tuition in English. The home institute recognises the credits received from the host institute, which explains why the schemes is often also called 'credit mobility'.

At the individual level, the students' Faculty or Division selects students based on the institutions' specific selection criteria (like ability, motivation, previous mobility etc.).

Erasmus+ Grants

Erasmus mobility can be between three and 12 months. In the UK, it is usual to have one semester of mobility for undergraduates (the focus of our analysis). The monthly student grant for mobility within Programme Countries is between 280 and 330 Euro (British Council 2017) and there are no tuition fees at the host universities to cover. The grant aims to contribute to additional costs deriving from studying abroad and not to cover all costs.

Students from disadvantaged backgrounds, for the UK Eramus mobility defined as those living in households with annual household income below £25,000, receive 120 Euros more per month currently (2017/18). (British Council 2017)

Other mobilities

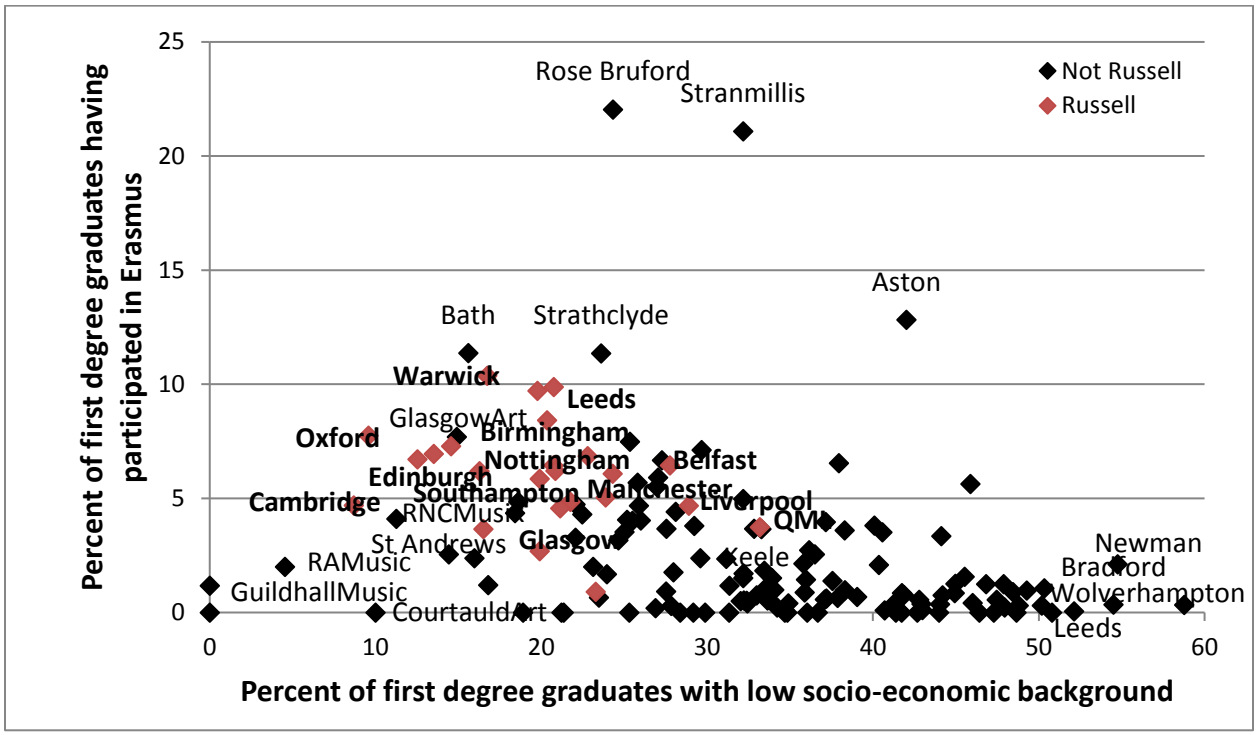
Besides Erasmus mobility, there are other possibilities for students to study abroad while being enrolled at their home institute. Some institutions and their Faculties have inter-institutional agreements with other universities allowing student exchange between the universities covered in the agreements. In addition, students can also organise their study abroad alone which involves more organisational effort compared to participating in international mobility within an institutional framework and might not allow for credit mobility. In this paper, these both mobility types are discussed as 'other mobilities'. The data does not provide more specific information of these other mobility types.

Social segregation and mobility abroad at the level of the higher education institute

Ability is associated with socio-economic background, so that segregation at the tertiary education level by ability leads to some degree to segregation by students' background. The inherent segregation in the tertiary education system could transfer into unequal uptake of Erasmus mobility, if higher prestigious universities offer more possibilities for mobility abroad.

Figure 2 presents the percent of graduates whose both parents neither have tertiary education nor have a professional occupation for our population sample of 153 accredited higher education institutions in the UK (23 of those have no Erasmus mobility) at the x-axis. On average across the UK, it is 31.7% of students falling into this so defined 'disadvantaged' category. Not surprisingly, Cambridge and Oxford and also prestigious art schools like Guildhall School of Music and Drama have less than 10% students from disadvantaged backgrounds. Russell Group universities (which are regarded to cover more prestigious higher education institutes) tend to have less disadvantaged students than other universities.

Figure 2: Percent of first degree graduates having participated in Erasmus and percent of graduates with low socio-economic background by university in 2014/15



Note: Russell Universities are plotted in red and their name is printed bold. Total number of accredited higher education institutes is 153 including 23 without Erasmus mobility. Graduates whose both parents neither have tertiary education nor have a professional occupation are defined to have a low socio-economic background (31.7% of the population). Across the population, the mean of Erasmus participation is 3.4%. The correlation coefficient between percent graduates enrolled with low background and percent of Erasmus graduates is -0.41.

The y-axis presents the percent of first degree graduates for the 2014/15 cohort having participated in Erasmus. It is important to keep in mind that the mean participation in Erasmus is 3.4% with a median of 2.4%. A university at the 25th percentile has 0.8% and at the 75th percentile 4.8% of students on Erasmus, reflecting a highly positive skew of the distribution.

The correlation coefficient is -0.41 for all universities and -0.28 for Russell and non-Russell group universities respectively, showing a clear association between segregation and uptake. If disadvantaged status is differently defined by just focusing on those students whose both parents have no tertiary education, the correlation stays similar: -0.44 for all, -0.15 for Russell and -0.32 for non-Russell group universities.

If we focus on other mobilities (Figure A1 in the Appendix) the association between segregation in universities and uptake of mobilities is lower (-0.33 for the definition of

disadvantaged students having parents with neither higher education nor professional position and -0.35 defining disadvantage by parental lack of tertiary education). (In 27 out of the 153 universities, other mobilities do not take place.)

Nevertheless, for both mobilities there is a clear link showing that those universities that have an intake of socially advantaged students have also a higher share of mobilities abroad. This different opportunity structure by university status might add to the unequal uptake of mobility discussed in the literature. As a consequence, the following question is examined: How important is socio-economic segregation and varying mobility uptake in universities for explaining unequal uptake found?

3 Data and methods

Data

The analysis in this paper uses an extract of the UK Higher Education Statistics Agency's (HESA) Student Record Data (copyright Higher Education Statistics Agency Limited) which covers information on the entire population of students registered in UK higher education institutes each year. For the purpose of this paper, HESA extracted the population of all UK domiciled full-time first degree graduates studying a degree with expected length of study of at least 3 years, excluding those graduates who were not on the same course at the same higher education provider in the two years prior to the graduation year. For the graduation cohorts 2014/15, this extract covers 69% of the entire population of all graduates in the cohort. For other cohorts the percentage is slightly higher.

This specific selection of graduates rules out that domestic or subject changes or other international mobility enter as unobserved variables into the analysis. In addition, it restricts the focus on a more homogenous group of Erasmus and other mobility programmes: those offered to first degree students only and those who successfully completed their degree. While data is available for the 5 graduate cohorts 2006/07, 2008/9, 2010/11, 2012/13 and 2014/15, data quality increases considerable with time, since missing values on a number of individual characteristics are lowest in the last cohort. As a consequence, the data analysis is generally based on the most recent graduate cohort 2014/15. (Figure 1 however exploited all 5 cohorts (thereby being constrained to use a different socio-economic background measure than for the rest of the analysis).) Robustness of regression results for Erasmus mobility are checked by using both, 2014/15 data only (Table 3) and the pooled data of the three most recent cohorts (Table A1 in the Appendix). (For different years, the

'other mobility' variable was collected with different items, hampering comparison over time.)

The population size is high, with around 270,000 graduates in 153 accredited higher education institutes for the 2014/15 cohort. The data are unusually rich in the information provided. First, the data structure allows students to be attributed to their field of study and the university they graduate from. This makes it possible to take student choice and university selection into account for the examination of socio-economic background and Erasmus uptake. Second, quite unusual for graduate data, student data includes information on upper secondary school results which can be used as a proxy for ability. The variable is missing for 8% of graduates in 2014/15, 13% for 2012/13, 17% for 2010/12 and for the majority of individuals in the two previous cohorts. These students are included in the analysis by imputing average ability and controlling for imputation by using a dummy being equal to 1 if the value was imputed.

In addition, central for this paper two socio-economic background variables are available which students provided when they applied for university entry through UCAS: whether at least one of the graduates' parents has obtained a higher education qualification and occupational status. The latter variable refers to the parent if the student at university entry was below 21 years old, which is the case for 87% of students. It refers to the student if entry age is 21 or above.

Both socio-economic background variables are conditional on each other significant for explaining Erasmus participation, so that both are included in the analyses.

However, the variable on parental education is missing for the year 2006/07 and 2008/09. For 2010/11 information is not given for 33%, in 2012/13 for 23% and in 2014/15 for 21% of the graduates. As a robustness check, different imputation techniques were applied (i.e. imputing by occupational status and introducing a dummy for imputation), which altered the socio-economic background coefficients, but did not change the conclusions drawn given that direction and size remained similar. Consequently, for 2014/15 the 21% of cases with missing information on parental education were not taken into account for the analysis.

Non-response on parental occupation is small, with on average 2.6% across all five and 1.2% for the last cohort. Half of those missing are for individuals aged 21 or over who obviously struggle to determine their occupational status. These missings were not taken into account for the analysis. The data includes seven UCAS categories on occupation which are summarised into two categories: professional and non-professional occupations. Professional occupation refers to those students whose parents' or guardians' occupation fall

within the following two HESA categories: 'higher managerial and professional occupations' and 'lower managerial and professional occupations'. Non-professional occupations summarises the remaining categories: 'intermediate occupations', 'small employers and own account workers', 'lower supervisory and technical occupations', 'semi-routine occupations', 'routine occupations' and 'never worked/long-term unemployed'.

After cleaning, a robustness check was used introducing a dummy that was set to one if the student had an entry age of 21 or above. The dummy itself had a negative significant value indicating a lower Erasmus participation for those older students. The significance disappeared once it was controlled for students' ability and age at enrollment. While the coefficients for socio-economic background changed slightly once the dummy was introduced, these changes were throughout very small in size and mostly not significant.

No other variables have missings above 0.1%. The multivariate analysis excludes those universities with no Erasmus mobility abroad. After cleaning, the observation size for the multivariate analysis is 201,250 graduates in 126 universities for the 2014/15 cohort and 526,375 graduates in 135 universities for the last three cohorts.

Method

To investigate uptake of student mobility a multilevel modelling approach is employed, recognising the clustering of students within higher education institutes. Multilevel modelling is nowadays a well-established modelling approach and has become very popular in the education literature to analyse for example pupil and school effects on educational attainment (Leckie and Goldstein 2011).

For the application here, the multilevel approach has a number of advantages. First, estimates of standard errors account for the clustering of students within higher education institutes. Failure to account for the clustering by higher education institute leads to downward bias in standard errors. The problem is especially severe for coefficients of higher-level variables, (higher education institutes' characteristics in the present case) (Goldstein, 2011). Second, a multilevel approach allows what is central for this study's research question: the investigation of university effects on student mobility uptake provides insight into the importance of higher education institutes factors (like social segregation) and student level factors (like ability). Determining the relative importance of factors at different levels gives key insights to the level at which the action lies. The variance partition coefficient (VPC) is interpreted as the proportion of variation in the underlying student mobility propensity that is due to differences between higher education institutes. (Different definitions of the VPC can be used for binary response models, see

Goldstein, 2011, Ch. 4.9). Here, the underlying latent variable approach, sometimes referred to as the threshold model (Snijders and Bosker, 2012, p. 305), is used. Finally, the multilevel approach naturally allows for the exploration of contextual effects that could be potentially important for explaining student mobility uptake. For example, it can be tested whether the association between students' background and mobility uptake differs for different types of higher education institutes (i.e. Russell group universities or highly segregated institutes) using cross-level interactions. In addition, it can be investigated whether the impacts of student background varies across universities (using random coefficient models).

Let y_{ij} denote the student mobility i in university j coded:

$$y_{ij} = \begin{cases} 1 & \text{student is mobile} \\ 0 & \text{student is not mobile.} \end{cases}$$

Denoting the probability of student mobility by $p_{ij} = \Pr(y_{ij} = 1)$ a general two-level random coefficients logistic model for mobility participation can be written as

$$\text{logit}(p_{ij}) = \boldsymbol{b}^T \boldsymbol{x}_{ij} + \boldsymbol{u_j}^T \boldsymbol{w_{ij}}, \qquad (1)$$

where $\boldsymbol{x}_{ij}$ is a vector of student and university level covariates and their interactions and $\boldsymbol{w_{ij}}$ is a subset of student-level components of $\boldsymbol{x}_{ij}$ with random coefficients $\boldsymbol{u_j}$ at the university level. (More specifically, for a given element of $\boldsymbol{w_{ij}}$ the notation u_{0j} for the random intercept is used).

To test the significance of the random effects parameters and to allow comparison between nested models, the likelihood ratio test statistic is used (for variance components, since the null hypothesis is on the boundary of the parameter space, this is based on a 50:50 mixture of chi-squared distributions; see Rabe-Hesketh and Skrondal, 2012, p. 88-89).

King and Zeng (2001) outline that the maximum likelihood estimation of logistic regression models is susceptible to small sample bias which is likely to occur with rare event data. In our data, student mobility is considerably above the 1 percent threshold generally used for defining a rare event: in the 2014/15 cohort 3.4% graduates participated in Erasmus. In addition, even if the smallest subgroup in the data is considered – just the graduation cohort of 2014/15 with around 200,000 students– we still have around 6,800 students taking part in Erasmus. As such, a small sample bias is not problematic for this study.

The following systematic modelling strategy is applied. First, logistic regressions are estimated with and without university fixed effects. These provide comparisons of the importance of socio-economic background and mobility uptake if university clustering are and are not taken into account. Second, the association between socio-economic background and mobility uptake net of anything but university variation (measured with the random effect) is examined. Then, the focus is on how the association between socio-economic background and mobility changes by using nested models with the following variables : a) individual characteristics like upper secondary school result, gender, age and region, b) adding further either the proportion of students with low socio-economic background at subject level area or subject fixed effects, c) adding further university characteristics (whether the university is a member of the Russell group, average ability of its student population, its size and the proportion of students with low socio-economic background). In a final step, interactions between universities and individual factors as well as random slope models are run. Random slope and random intercept effects are allowed to co-vary. Furthermore, comprehensive sensitivity checks are carried out by changing the order of variables entered (not shown, conclusions remain the same).

To aid interpretation of coefficients in the logistic model for Erasmus uptake, the marginal effect of a one-unit change in a university-level characteristic z_k on the probability of response p is estimated as

$$\frac{dp}{dz_k} = p(1 - p)a_k \qquad (2)$$

where a_k is the coefficient of explanatory variable z_k and p is set by the researcher, most commonly at the average response probability estimated by the model (Gelman and Hill, 2006). The maximum marginal effect occurs where p is equal to 0.5.

4 Results

Table 1 provides descriptives by subject studied for the 2014/15 graduate cohort. Subjects are ordered by percent uptake of Erasmus. 75% of European language students take part in Erasmus and they constitute as many as 41% of all Erasmus students, which is a result very specific to the UK. For other mobilities, the highest uptake is 59% among non-European language students, who constitute 7% of all other mobility students. While less than one percent of students studying medical subjects go abroad with Erasmus, 24% do so with other mobility schemes.

It is interesting that the higher the mobility uptake for a subject, the lower the average ability of students defined as percent of students who did not achieve an A for the A-level results. Based on figures presented in Table 1, low ability is correlated with Erasmus uptake with -0.32 and other mobilities with -0.45 at the subject level. In addition and related, uptake is correlated with disadvantaged background for Erasmus with -0.40 and for other mobilities with -0.54.

In sum, the association of social segregation and uptake for subjects is similar in its magnitude to that found for universities before. Hence, it is social segregation into HEI and subject areas paired with different mobility uptake which seem to be important factors for explaining the unequal uptake found in the UK.

A theoretical thought experiment

Table 2 shows a practical and simple thought experiment and can deliver first results on the association of socio-economic background segregation by subject and university and unequal Erasmus uptake by comparing the socio-economic background of different populations of students.

Up to now, the study focused on those with low socio-economic status (none of the parents has neither tertiary nor a professional job) versus other individuals (Table 1). For the following analysis, the other individuals are divided into the following three additional groups: a) those with parents having both, tertiary education and a professional job, b) those who have no parent with tertiary education, but at least one with a professional job and c) those who have no parent with a professional job, but at least one parent with tertiary education. The rows of Table 2 show the proportion of students allocated to the four socio-economic background groups.

Each of the Table's five columns describes the percentage of students being in a specific socio-economic group for different populations. The first column (i) shows the socio-

economic background of the population of first degree students graduating in 2014/15. As discussed before 31.7% of students in the population have a disadvantaged socio-economic background with parents neither having a professional occupation nor tertiary education.

Table 1: Total number, percent students enrolled, percent Erasmus uptake, percent other mobility uptake, percent with low socio-economic background and percent with low upper-secondary school degree by subject area, 2014/15 first degree graduation cohort

	Total graduate students	% of all graduates enrolled	% uptake Erasmus	% of all Erasmus	% uptake other mobility	% of all other mobility	Percent with low SES	Percent without A mark
European language	5,100	1.9	75.2	41.0	16.5	8.0	18.6	38.8
Combined	580	0.2	15.3	1.0	8.8	0.5	19.5	27.8
Old language	12,385	4.6	5.9	7.8	3.9	4.7	28.3	49.5
Law	11,000	4.0	4.8	5.6	2.4	2.5	34.2	58.7
Non-Euro languages	1,195	0.4	4.2	0.5	58.5	6.7	20.8	46.2
Business Stud.	28,890	10.6	3.6	11.2	3.8	10.4	33.7	76.0
History	13,345	4.9	2.7	3.9	3.8	4.8	24.9	48.3
Social Studies	26,945	9.9	2.3	6.7	3.3	8.5	33.3	62.1
Art	29,900	11.0	2.0	6.4	1.8	5.2	30.4	75.9
Engineering	12,665	4.7	1.9	2.5	3.4	4.1	25.0	58.9
Physical	14,025	5.2	1.9	2.8	5.3	7.1	25.2	52.5
Architecture	4,550	1.7	1.7	0.8	5.0	2.2	27.5	72.7
Mineral	1,425	0.5	1.5	0.2	1.8	0.2	25.4	78.2
Mathematics	13,130	4.8	1.1	1.5	1.3	1.7	41.8	85.8
Education	5,970	2.2	1.1	0.7	1.8	1.0	28.2	35.4
Communication	7,875	2.9	1.0	0.8	2.4	1.8	35.4	82.4
Computer	10,380	3.8	1.0	1.1	0.9	0.9	39.5	82.7
Biology	31,145	11.4	0.8	2.7	2.0	6.0	33.1	68.2
Sub-medicine	30,660	11.3	0.7	2.2	1.2	3.4	39.3	70.9
Medicine	8,605	3.2	0.5	0.5	23.9	19.6	16.4	18.7
Veterinary / agriculture	2,695	1.0	0.3	0.1	3.3	0.8	28.7	58.9
Total	272,465	100.0	3.4	100	3.9	100	31.7	64.8

Note: Results of the first six columns exploit the entire population data of 272,465 graduates in 153 universities. Column seven is based on 212,285 and column eight on 246,605 graduates. Graduates in universities without Erasmus mobility are included. The subject 'Combined' refers to several subjects studied at the same time. Number of graduates is rounded to the nearest 5.

Table 2: Change of socio-economic background from the population of all graduate students to the final group of Erasmus /other mobility graduates taking different scenarios into account, 2014/15

	Parents' occupation and education	(i) Population of all graduate students	(ii) Population in universities with mobility uptake	(iii) University segregation and Erasmus grant distribution	(iv) University and subject segregation and Erasmus grant distribution	(v) Population of mobile students
Erasmus	Low occupation & no tertiary	31.7	31.4	25.3	22.8	20.4
	Low occupation & tertiary	22.1	22.0	22.2	21.7	22.2
	High occupation & no tertiary	11.7	11.7	10.9	11.5	10.6
	High occupation & tertiary	34.6	34.9	41.6	44.4	46.7
	All	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Other mobility	Low occupation & no tertiary	31.7	31.2	26.0	23.7	19.5
	Low occupation & tertiary	22.1	21.9	22.2	22.0	22.9
	High occupation & no tertiary	11.7	11.7	11.0	10.9	10.3
	High occupation & tertiary	34.6	35.2	40.9	43.5	47.4
	All	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: (i) includes the entire population of first degree graduates. (ii) includes only students in higher education institutes in which mobility takes place. (iii) is the same group as (ii) taking different distribution of four socio-economic background groups and of grants within universities into account assuming that for each group the university average Erasmus (or other mobility) uptake takes place. (iv) is the same group as (ii) taking different distribution of four socio-economic background groups and of grants within universities and subject areas into account assuming that for each group the university subject average Erasmus (or other mobility) uptake takes place. (v) is the population of Erasmus / other mobile students only. For the calculation, universities with Erasmus (or other) mobilities are included.

Column (v) shows the socio-economic background composition of Erasmus (first row) and other mobility students (second row). It shows that compared to the population (first column), disadvantaged students are underrepresented by around 11 percentage points (31.7%-20.4%) among Erasmus students. Advantaged students defined as at least one parent having achieved a professional occupation and tertiary education are

overrepresented by about 12 percentage points. However, the middle two groups, those individuals who have either a parent with a professional occupation or with tertiary education are equally represented among the mobile. This pattern found for Erasmus mobility is very similar for other mobility students as well.

As discussed above, only students can be mobile who have enrolled in a higher education institute which has signed the Erasmus charter. Column (ii) includes therefore only the population of students in universities that have Erasmus or other mobilities. There are only marginal differences in the composition between the population of all students and those enrolled in universities with mobilities, so that unequal uptake does not derive from exclusion of universities from the Charter or institutional arrangements.

However, as discussed above those universities recruiting students with advantaged background tend to send more students abroad. How much can this association explain unequal uptake? Focusing only on the population of students in universities with mobilities (as done in column (ii)), results of column (iii) assume that within a university all students have equal chances to be mobile independent of their social status, but chances are determined entirely by the proportion of mobility in a university and the proportion of a specific social background attending universities. For example, for the most disadvantaged students, the proportion of 0.253 (given column (iii) for Erasmus students) is calculated by summing up the university's product of its proportion of students with low background and its proportion of students with mobility across universities:

$$p(\text{low}) = \sum_{k=0}^{n} p_k(\text{low}) \times p_k(\text{mobility}) \qquad (3)$$

P refers to the proportion, low refers to students with low background, k refers to universities, n to the total number of universities and mobility to mobility incidences. Hence, column (iii) shows how the socio-economic background of the population (ii) would look like if for each socio-economic group the proportion of uptake of mobility would be the same within the university, namely the average university uptake.

Obviously, the association between high mobility uptake in more socially segregated universities determines considerably the unequal uptake of Erasmus. Compared to column ii, the percent of advantaged students increases and disadvantaged shrinks by about 6 percentage points, which is as much as half of the total underrepresentation of disadvantage students found (comparing the population value of column (i) with the Erasmus student value of column (v)).

Column (iv) adds an additional layer, by taking social segregation into universities and subjects into account (hence the sums of the proportions are done not only by universities but also by subjects). This further increases underrepresentation of disadvantaged by about 3 percentage points, hence an additional quarter of the total unequal uptake.

The difference in composition between column (iv) and column (v) remains unexplained and therefore is probably due to factors like ability selection within university for mobility uptake.

In sum, the biggest part of unequal uptake of Erasmus+ (and the same regards other mobilities shown in row 2) is due to universities attended by more advantaged students having also higher mobility uptakes. The pattern is very similar for Erasmus and other mobilities.

Modelling student mobility

Results from the logistic regression modelling are presented in Table 3 and are based on data for the graduate cohorts 2014/15 presented above. (The same models were run using data from three pooled graduate cohorts 2010/11, 2012/13 and 2014/15. Results were very similar in terms of size, direction and significance of coefficients, see Table A1 in the Appendix.) Models 1 to 8 provide estimates from multilevel modeling. While they represent the preferred modelling approach by taking clustering of students in universities into account, it is still of interest to explore the association of socio-economic background with mobility using (single-level) logistic models the results of which are shown in columns (a) without and (b) with university fixed effects.

The socio-economic background measure covers the same four socio-economic groups used in Table 2. The control group is individuals who have parents with both, a professional occupation and higher education.

Column (a) shows that socio-economic background is significantly associated with mobility. Students with the most disadvantaged background whose parents neither hold a professional occupation nor tertiary education have an about 2 percentage points lower probability of being mobile (evaluating at the mean probability of Erasmus uptake) compared to the most advantaged group holding other factors constant. This is close to unconditional results discussed in Figure 1 (which due to lack of data on parental education over time focuses on professional background of parents only). Once university fixed (column b) or random effects (column 2) are introduced, the coefficients of socio-economic

background halve showing that a considerable part of the unequal uptake is determined by universities.

This is in line with results from Table 2 and is further confirmed by the multilevel logistic models. Across most multilevel models the between university variance is significant, indicating a clear university effect on student mobility. Multilevel model results include information on the percent of variation in students' underlying mobility propensities due to differences between universities. The Variance Partition Coefficient (VPC) based on the threshold model shows that this is high with as much as 30% (Models 1 and 2). The 'effect' decreases with different models but is still substantial with 14% even conditional on university (and individual) characteristics (Model 6).

Clearly, universities do matter a lot for explaining unequal uptake of Erasmus mobility. One reasons for this could be that more able students go to better universities and have greater chances of taking up an Erasmus grant. Hence, the 'effect' for universities we find could be mediated by ability of students. This is examined in model 3, which measures students' ability by the number of A-level results marked with an A. In the population, around 7% of students achieve three A levels marked with an A. They build the control group, while the model includes dummies for individuals who have no (62%), one (19%) or two A-levels marked with an A (12% in the population). The model also covers region of the university, gender (41.8% in the population are male) and centered age at enrollment (mean age is 19.6 years at time of enrolment). Results indicate that indeed individuals with lower A-level results have a significantly lower probability to take part in Erasmus mobility. For example an individual with no A-level marked with an A has an about 0.7 percentage point lower probability of studying abroad (evaluating at the mean probability of Erasmus mobility and holding other factors constant) than a student having achieved three As. In addition, men are less likely to be mobile than women and older graduates than younger graduates.

Surprisingly, however, is that ability clearly cannot explain the association found between socio-economic background and mobility. All three coefficients on socio-economic background decline slightly once ability is conditioned on. The changes are not significant. The VPC decreases from 0.29 to 0.26, indicating that student ability contributes to a small degree to the considerable explanatory power of universities for Erasmus uptake.

If ability cannot really explain the unequal uptake of Erasmus+, perhaps subject choice by students can do so. As discussed above (Table 1), socio-economic background is clearly related to subject choice. Disadvantaged students are underrepresented among those studying European and non-European languages, combined subjects and history. These are

subjects with highest Erasmus uptake (for other mobilities, it is especially medicine where mobility is high and intake of disadvantaged students low). Given this, subject choice is likely to matter.

This is examined in two different ways with Models 4 and 5. Model 4 uses subject fixed effects. Model 5 instead measures the coefficient for the proportion of disadvantaged students by subject studied (due to collinearity, both approaches cannot be tested in one single model). Subject fixed effects (Model 4) do not lead to a decrease of the socio-economic background variables but improve the model estimation measured with log likelihood considerably. As descriptive analysis showed before, a European language student is much more likely to go abroad than a nurse. However, once social segregation into subject areas is taken into account (Model 5), a clear association appears: the more a subject is studied by less privileged, the lower is the Erasmus uptake. The size of the effect is huge with -15.94. This shows that conditional on ability and other individual characteristics, switching from one subject to another with a 10% higher share of the disadvantaged decreases Erasmus uptake by as much as 4.6 percentage points (evaluating at the mean probability of Erasmus uptake and holding other factors constant.). As expected, the coefficients for the disadvantaged decreases at the same time significantly, showing that students' unequal socio-economic distribution to subjects explains a part of the unequal uptake of Erasmus mobility. (Oddly, the coefficient direction for ability changes, indicating that lower ability conditional on subject segregation increases Erasmus uptake. The contrast is less stark once the 3 year pooled data are used, where the association of ability with Erasmus uptake is marginal once conditioned on social segregation in subjects, Table A1 in the Appendix.)

A last attempt to disentangle the association of socio-economic background with Erasmus uptake is considered in Model 6, which adds university characteristics, like the number of undergraduates in university divided by 1000, average achievement in the university (proportion of students who achieved at least one A in their A-level results), whether a student attends a Russell university, the proportion of disadvantaged students in the university, and a cross-level interaction between Russell university and students' disadvantaged background. University size does matter (the association is less clear with three year data): the bigger the university the more likely is the student to study abroad. In addition, average ability intake of universities is of considerable importance. The better the students on average in a university, the better are their chances of Erasmus uptake.

However, conditional on individual and average ability in university, how important is social segregation in universities for explaining unequal uptake of Erasmus mobility? Those universities with more disadvantaged students have a considerably lower probability of mobility. The coefficient (-1.97) is only significant at the 10% level. (The coefficient is -2.90 and significant at the 1% level if all three data cohorts are used, Table A1, model 6b). Based on the smaller estimate in Model 6, enrolling in a university that has 10% more disadvantaged students (which would be similar to a move from Southampton to Liverpool University, see Figure 2) decreases the probability of Erasmus uptake by around 0.5 percentage points. This result is among others conditional on students' upper secondary school degrees and average school results at university. Given that there is a great variation in the proportion of low socio-economic background students across universities (less than 10% for Oxford and Cambridge and almost 60% for Wolverhampton University, see Figure 2), the size of the coefficient is considerable.

Do the prestigious Russell group universities do better? No, conditional on individual and other university characteristics, being in a Russell university decreases the probability of Erasmus uptake, whereby the disadvantage appears slightly greater for graduates from lower socio-economic background (as the cross-level interaction term shows; however with pooled data the result can only be replicated with one of the two models used).

Given that Model 6 controls for university characteristics, the VPC decreases to 15.8 (from 20.2 in Model 5), showing that less than a quarter of the variation of Erasmus uptake explained by universities can be captured by the university factors included in Model 6.

A number of other cross-level interactions with individual socio-economic background and university size, average ability and social intake did not yield significant coefficients. Random slope models, relaxing the assumption that socio-economic background 'impacts' similarly across all universities, did also not provide additional insights.

In sum, regression results confirm that social segregation in subjects determines unequal uptake of Erasmus. The same is true for higher education segregation: the bigger the share of disadvantaged students in a university or subject, the smaller the probability of Erasmus mobility. Therefore, the unequal distribution of students across subjects and universities are important explanatory variables for unequal uptake of mobility in the UK. These results are conditional on student ability and other individual and university characteristics including average ability.

Are social segregation of subject studied and universities equally important for other mobility abroad schemes? Models 7 and 8 are the same than Models 5 and 6 but with the

dependent variable of other mobilities. (Note that in order to keep the group of non-mobile students equal, the sample only excludes those universities with no Erasmus mobility. Hence, 13 universities which have no other mobility are included in the model.) Methodologically, in order to compare the models it is required to assume 'equal unobserved heterogeneity' (Scott Long 1997). This could be problematic since different variables could excerpt varying association with uptake of the two dissimilar mobility schemes.

Models 7 and 8 show that social stratification into subject studied is equally important for other mobilities. For subjects that are studied by the disadvantaged mobility uptake is lower. However, in contrast to Erasmus mobility the social background composition of the university is not of importance. Instead, it is the share of students with high upper secondary school results that determines uptake: the worse the average school results in a university the less likely it is to study abroad. While this association was also important for Erasmus mobility, it seems even more pointed with other mobilities. Also at the individual level selection into mobility by ability appears to play a greater role.

The association of socio-economic background with mobility uptake appears to be higher for other than for Erasmus mobilities comparing conditional models 6 and 8. Students in Russell universities are again less likely to study abroad conditional on other university and individual factors. Gender differences are much smaller than with Erasmus (which is likely to be due to more women studying European languages, a subject with high Erasmus mobility).

The greater VCP for other mobilities can be explained by the fact that Erasmus funding is well established and to some degree centralized by procedures set into practice by the British Council. Creation and funding of other mobility activities are completely in the responsibility of universities and therefore more dependent on them.

Table 3: Selection of coefficients from logistic (a, b) and multilevel regressions (1 to 8) for the 2014/15 cohort of graduates

		Single level logistic regression		Multilevel logistic regression							
				Erasmus mobility						Other mobility	
		(a)	(b)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Parental background	No manager occupation, no higher education	-0.776***	-0.407***		-0.413***	-0.346***	-0.342***	-0.248***	-0.187***	-0.382***	-0.392***
		(0.031)	(0.032)		(0.032)	(0.032)	(0.040)	(0.033)	(0.042)	(0.032)	(0.042)
	No manager occupation, higher education	-0.309***	-0.144***		-0.146***	-0.078*	-0.058	-0.061	-0.057	-0.080**	-0.080**
		(0.030)	(0.031)		(0.031)	(0.031)	(0.039)	(0.032)	(0.032)	(0.030)	(0.030)
	Manager occupation, no higher education	-0.414***	-0.180***		-0.184***	-0.162***	-0.251***	-0.095*	-0.088***	-0.162***	-0.161***
		(0.040)	(0.041)		(0.041)	(0.041)	(0.052)	(0.042)	(0.042)	(0.040)	(0.041)
Student characteristics	No A level marked with A					-0.242***	-0.423***	0.209***	0.222***	-0.362***	-0.356***
						(0.045)	(0.060)	(0.048)	(0.047)	(0.042)	(0.042)
	One A level with A					-0.077	-0.290***	0.384***	0.387***	-0.230***	-0.229***
						(0.044)	(0.058)	(0.047)	(0.046)	(0.042)	(0.042)
	Two A levels with A					-0.000	-0.224***	0.379***	-0.379***	-0.071	-0.072
						(0.045)	(0.060)	(0.048)	(0.048)	(0.042)	(0.042)
	Ability info missing					-0.071	0.264**	-0.382***	-0.384**	0.177**	0.174**
						(0.078)	(0.089)	(0.082)	(0.082)	(0.064)	(0.064)
	Men					-0.453***	-0.135***	-0.578***	-0.579***	-0.221***	-0.222***
						(0.025)	(0.032)	(0.026)	(0.026)	(0.024)	(0.024)
	Age at enrollment, centred					-0.093***	-0.070***	-0.079***	-0.079***	-0.040***	-0.039***
						(0.008)	(0.008)	(0.008)	(0.008)	(0.006)	(0.006)
	Northern Ireland					1.419**	1.818***	2.144***	2.041***	1.894**	1.618**
						(0.501)	(0.450)	(0.450)	(0.410)	(0.597)	(0.577)
	Scotland					0.523*	0.676**	0.537*	0.870**	0.889**	1.775***
						(0.257)	(0.235)	(0.233)	(0.309)	(0.315)	(0.440)
	Wales					0.112	0.060	0.161	0.187	-0.131	0.105
						(0.382)	(0.351)	(0.346)	(0.320)	(0.471)	(0.459)
Subjects	Proportion of students with low SES of subject							-15.940***	-15.871***	-12.341***	-12.320***
								(0.232)	(0.232)	(0.210)	(0.210)
	Subject fixed effects						X				

Table 3 continued

		Single level logistic regression		Multilevel logistic regression							
				Erasmus mobility						Other mobility	
		(a)	(b)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University characteristics	University fixed effects		X								
	Proportion achieving at least one A mark in uni								1.507**		2.765***
									(0.599)		(0.838)
	Russell group university								-0.708**		-1.096*
									(0.304)		(0.430)
	Uni size/1000								0.068**		0.106**
									(0.024)		(0.034)
	Proportion of students with low SES in uni								-1.974+		0.313
									(1.169)		(1.643)
	Russell Group uni * low SES								-0.135*		0.029
									(0.063)		(0.060)
	Constant	-2.873***	-3.910***	-3.771***	-3.596***	-3.466***	-2.826***	-4.162***	-3.921***	-3.832***	-3.458***
		(0.017)	(0.280)	(0.095)	(0.094)	(0.109)	(0.115)	(0.102)	(0.125)	(0.127)	(0.167)
	Sigma u			1.189*	1.159*	1.061	0.915	0.912	0.744+	1.332***	1.208*
				(0.062)	(0.060)	(0.075)	(0.067)	(0.0.066)	(0.057)	(0.102)	(0.091)
	VPC	.	.	0.300	0.290	0.255	0.203	0.202	0.158	0.350	0.307
	log likelihood	-31727	-29125	-29499	-29413	-29049	-19710	-26412	-26392	-28288	-28277

Note: The dependent variable for models a to 6 is participation in Erasmus (excluding other mobilities). Results are based on 192,710 graduates of the 2014/15 cohort in 126 universities. The dependent variable for models 7 and 8 is other mobilities (excluding Erasmus mobilities). Results are based on 193,635 graduates of the 2014/15 cohort in 126 universities. The sample of non-mobile students is the same for all models (185,095). The data includes 7,615 Erasmus and 8,540 other mobility students. Universities without Erasmus mobilities are excluded. University (Model b) and subject fixed effects (Model 4) are not displayed. Standard errors in parentheses, *** p<0.001, ** p<0.01, * p<0.05, +p<0.1

5 Conclusion

Student mobility is the most recognised element of Erasmus+, a major EU policy. While uptake has hugely increased during its 30 years of existence, it is well known that individuals from better socio-economic background are more likely to study abroad than those more disadvantaged. Policy makers are aware of this problem. I.e. the legal framework of Erasmus+ (EC 2017c) highlights the importance of equal access to mobility. How can this be achieved?

The current results of theoretical discussions and literature suggest that policy makers need to counteract the contrasting opportunity structures and social capital impacting on diverse choices of different social groups (as concluded by Hauschildt et al. 2015, Loerz et al. 2016 and Souto-Otero et al. 2013).

Nevertheless, existing literature has focused predominantly on examining the association between mobility and individual characteristics. However, inequalities of student mobility are very likely to be also generated within countries' education systems and higher education institutes. Students choose their field of study. Attendance of universities depends on their ability. These choices and decisions are unlikely to reflect primarily on students' intentions to study abroad. As such, the decision and chance to study abroad will be determined by the opportunities available for students within their field of subject and higher education institute.

The valued added of this study was to focus the attention on the embeddedness of individuals in specific subjects studied and university attended in the UK, a country that stands out in Europe for an extremely stratified higher education system (Brennen et al. 2009). The study examined the importance of university and subject choice for explaining unequal uptake of Erasmus mobility and the additional explanatory power of students' ability.

Two different methods were used. First, inequality in uptake was estimated by assuming equal access to Erasmus opportunities within universities and subject studied. For this scenario, the distribution of students into university and subject by socio-economic background and the distribution of Erasmus grants (and other mobilities) to universities and subjects was taken from the population data. Results show that unequal uptake cannot be explained by some universities not having any Erasmus mobilities (or not having signed the Charter). However, the population of students comprises 31.7% disadvantaged graduates

(defined as individuals whose parents hold neither tertiary education nor a professional job). They represent only 20.4% among Erasmus students, hence 11.3 percentage points less. Social segregation into university and subject paired with unequal distribution of Erasmus mobilities (mobilities are overrepresented in subjects and universities that have more advantaged students) can explain almost 80% of the gap (8.9 of the 11.3 percentage points). Results are very similar for other mobilities organised by higher education institutes.

Second, a multilevel model was run to estimate the importance of social segregation in higher educational institutes and subjects conditional on students' ability for Erasmus and other mobility uptake. Results on individual characteristics and their association with mobility are in line with existing literature. Regarding institutional factors, regression results showed that social segregation in subjects determines unequal uptake of Erasmus substantially. The same is true for higher education segregation: the bigger the share of disadvantaged students in a university or subject, the smaller the probability of Erasmus mobility. Enrolling in a university that has 10% more disadvantaged students (which would be similar to a move from Southampton to Liverpool University, see Figure 2) decreases the probability of Erasmus uptake by around 0.5 percentage points. Given that there is a great variation in the proportion of low socio-economic background of students across universities (less than 10% for Oxford and Cambridge and almost 60% for Wolverhampton University) the association is considerable. These results are conditional on many factors, like students' upper secondary school degrees and students' average ability in university. The latter are important for explaining Erasmus uptake, but do not greatly change the association of socio-economic background with uptake.

For other mobilities organised by higher education institutes, segregation into subject areas is equally important than for Erasmus. However, segregation into universities by socio-economic background does not play any role for explaining other mobility uptake. Instead, ability, whether individual or average individual ability at the university level, has a greater association with other mobility uptake than found for Erasmus.

Policy conclusions need to draw on possible reasons why universities with disadvantaged students experience less mobility uptake. First, at the individual level disadvantaged could not be interested in mobility leading to universities with a higher share of disadvantaged students requesting fewer grants. Existing literature suggests to increase the information on mobility abroad ensuring that it can be accessed by all and to improve the opportunities and support and to decrease the costs of studying abroad for the socially disadvantaged (as

concluded by Hauschildt et al. 2015, Loerz et al. 2016 and Souto-Otero et al. 2013). Nevertheless, if students study at a university, where many of their peers have Erasmus experience, they will still be more likely to try out themselves than those students in universities who do not know peers having gone abroad.

Second, at the institutional level university with more disadvantaged students might facilitate student mobility less than other universities. As discussed above, interinstitutional arrangements of UK universities with other universities abroad are key for sending students abroad. It might be that universities attended by students with lower socio-economic background either have more difficulties for or other priorities than negotiating these agreements. One part of these arrangements is credit mobility. Erasmus mobility could be lower at universities with more disadvantaged students since mobility is associated there with considerably longer time needed to complete the degree. Using HESA data, results show that this is not the case. Erasmus students need on average half a year more time to study, and this is the same for students in the upper quartile and the lower quartile of the socio-economic background distribution of universities.

Third, are funds just distributed unequally favouring those universities that comprise a more advantaged student body? If this scenario is true, policy makers can clearly impact on the distribution of university funding. If funds were distributed equally across universities independent of their socio-economic composition the opportunity structures of the disadvantaged would be more equal. As such, it would be important to make the decision processes on funding more transparent. This would include taking care that all universities can secure equal access to the funds. In addition, incentives could be provided for those universities with low Erasmus uptake. Clearly, this would not automatically imply that disadvantaged students make use of their equal opportunities, but creating them is of prior importance.

This study focused on the UK only which is characterised by a highly stratified tertiary education system in comparison to other European countries. Social stratification into subject areas however is likely to be found across the rest of Europe as well. Unfortunately, due to lack of data cross-European research comparing results on graduates and mobility is rare. The future 'Eurograduate Survey' which is currently commissioned by the Directorate-General for Education, Youth, Sport and Culture, could provide the possibility to examine inequality of students' uptake of mobilities and the importance of institutional characteristics and grant distribution in a cross-national framework.

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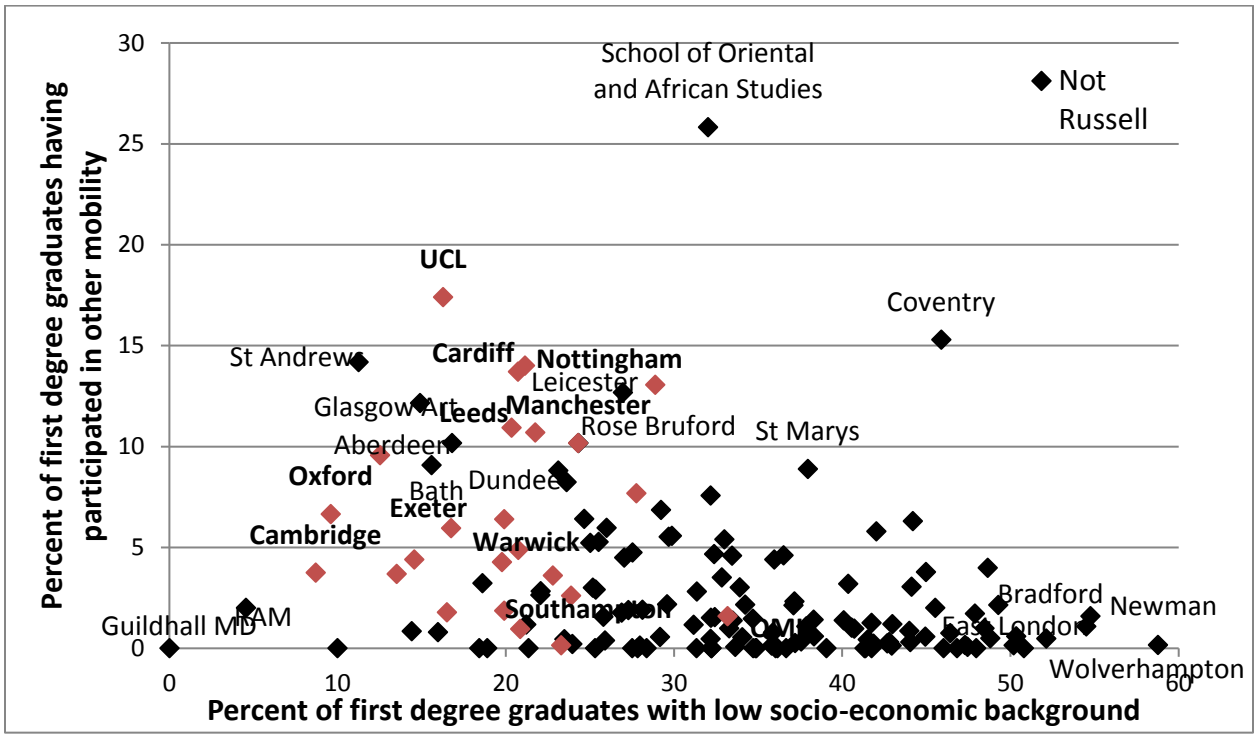
Appendix

Figure A1: Percent of first degree graduates having participated in other mobilities and percent of graduates with low socio-economic background by university in 2014/15



Note: Russell Universities are plotted in red and their name is printed bold. Total number of accredited higher education institutes is 153 including 27 without other mobility abroad. Graduates whose both parents neither have tertiary education nor have a professional occupation are defined to have a low socio-economic background (31.7% of the population). Across the population, the mean of other mobility participation is 3.9%. The correlation coefficient between percent students enrolled with low background and percent of other mobility students is -0.33 for all universities.

Table A1: Selection of coefficients from logistic (a, b) and multilevel regressions (1 to 6b) for graduates from the cohorts 2010/11, 2012/13 and 2014/15

		Erasmus mobility								
		Single level logistic regression		Multilevel logistic regression						
		(a)	(b)	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)
Parental background	No manager occupation, no higher education	-0.768***	-0.367***		-0.370***	-0.320***	-0.313***	-0.215***	-0.261***	-0.179***
		(0.020)	(0.021)		(0.021)	(0.021)	(0.026)	(0.021)	(0.032)	(0.028)
	No manager occupation, higher education	-0.304***	-0.129***		-0.130***	-0.078***	-0.038	-0.053**	-0.034	-0.051*
		(0.019)	(0.020)		(0.020)	(0.020)	(0.025)	(0.020)	(0.025)	(0.020)
	Manager occupation, no higher education	-0.399***	-0.155***		-0.157***	-0.135***	-0.165***	-0.058*	-0.153***	-0.050
		(0.025)	(0.026)		(0.026)	(0.026)	(0.032)	(0.026)	(0.032)	(0.026)
Student characteristics	No A level marked with A					-0.352***	-0.523***	-0.022	-0.505***	-0.012
						(0.026)	(0.034)	(0.027)	(0.034)	(0.027)
	One A level with A					-0.283***	-0.445***	0.082**	-0.434***	0.087**
						(0.026)	(0.034)	(0.027)	(0.034)	(0.027)
	Two A levels with A					-0.227***	-0.373***	0.063*	-0.364***	0.066*
						(0.026)	(0.035)	(0.027)	(0.035)	(0.027)
	Ability info missing					0.059	0.263**	-0.180***	0.268***	-0.178***
						(0.038)	(0.045)	(0.040)	(0.045)	(0.040)
	Men					-0.518***	-0.214***	-0.607***	-0.215***	-0.607***
						(0.016)	(0.021)	(0.017)	(0.021)	(0.017)
	Age at enrollment, centred					-0.077***	-0.065***	-0.075***	-0.064***	-0.075***
						(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
	Northern Ireland					1.560**	1.884***	2.196***	1.751***	2.072***
						(0.505)	(0.479)	(0.473)	(0.405)	(0.414)
	Scotland					0.662**	0.767**	0.641**	0.987***	0.939***
						(0.252)	(0.340)	(0.237)	(0.238)	(0.238)
	Wales					-0.110	-0.078	-0.072	-0.000	0.026
						(0.347)	(0.336)	(0.327)	(0.289)	(0.291)
Subjects	Proportion of students with low SES of subject							-15.266***		-15.231***
								(0.148)		(0.148)
	Subject fixed effects						X		X	

Table A1 continued

		Erasmus mobility								
		Single level logistic regression		Multilevel logistic regression						
		(a)	(b)	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)
	University fixed effects		X							
University characteristics	Proportion achieving at least one A mark in uni								1.751***	1.827***
									(0.431)	(0.429)
	Russell group university								-0.726*	-0.986**
									(0.298)	(0.301)
	Uni size/1000								0.027	0.049*
									(0.023)	(0.023)
	Proportion of students with low SES of uni								-3.416***	-2.895***
									(0.461)	(0.410)
	Russell Group uni * low SES								-0.100*	-0.061
									(0.049)	(0.040)
	Year 2010	-0.331***	-0.417***	-0.426***	-0.416***	-0.452***	-0.626***	-0.085***	-0.539***	-0.020
		(0.020)	(0.021)	(0.021)	(0.021)	(0.021)	(0.028)	(0.022)	(0.030)	(0.024)
	Year 2012	-0.122***	-0.127***	-0.128***	-0.128***	-0.146***	-0.214***	-0.100***	-0.205***	-0.095***
		(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.022)	(0.018)	(0.022)	(0.018)
	Constant	-2.877***	-4.275***	-3.785***	-3.627***	-3.326***	-2.775***	-3.917***	-2.581***	-3.621***
		(0.014)	(0.215)	(0.091)	(0.091)	(0.099)	(0.102)	(0.095)	(0.124)	(0.120)
	Sigma u			1.220**	1.194**	1.091	1.008	0.990	0.811**	0.832**
	VPC	.	.	0.311	0.302	0.266	0.236	0.230	0.167	0.174
	log likelihood	-78964	-72755	-73278	-73111	-72212	-47869	-66304	-47813	-66256

Note: The dependent variable is participation in Erasmus (excluding other mobilities). Results are based on 526,375 graduates of the pooled 2014/15, 2012/13 and 2010/11 graduate cohort covering 135 universities. Universities without Erasmus mobilities are excluded. University (Model b) and subject fixed effects (Models 4 and 6a) are not displayed. Standard errors in parentheses, *** p<0.001, ** p<0.01, * p<0.05.

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