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International creative students: their significance for UK universities, regions and the creative industries

Wessel Vermeulen, Salvatore Di Novo, Giorgio Fazio

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About the authors

Dr Wessel Vermeulen is a Lecturer in Economics at Newcastle University Business School. He is an applied economist working on topics in international economics, in issues of international trade, migration and finance. Currently, his work applies international perspectives in the regional contexts in various settings.

Dr Salvatore Di Novo is a Research Associate at Newcastle University. His research has focused on industrial organisation, international trade and econometric methods. He has expertise in the analysis of firm and industry level data, and he has investigated the relationship between public procurement exposure and total factor productivity in the Italian context as well as working on econometric methods in settings characterised by network effects.

Professor Giorgio Fazio is an applied economist with expertise in open macroeconomics, trade and investment. Giorgio is Chair of Macroeconomics and, in the Creative Industries Policy Evidence Centre, leads the Workstrand on the International Competitiveness of the Creative Industries from Newcastle University.

Newcastle University Business School, 5 Barrack Rd, Newcastle upon Tyne NE1 4SE; Wessel.Vermeulen@newcastle.ac.uk; Salvatore.Dinovo@newcastle.ac.uk; Giorgio.Fazio@newcastle.ac.uk

1. Introduction

Over the recent past, assessing the value of higher education has become a divisive issue with much controversy surrounding, in particular, the use of graduate earnings as a measure of "value for money". Creative arts-based subjects systematically end up towards the bottom of rankings based on this measure (see Britton et al., 2020, for a recent account) and in the Augar review, questions have been raised about the level of funding for these degrees for UK Higher Education Institutions (HEIs, henceforth). As discussed by Bloom (2020), however, earnings are a misleading dimension when used alone in assessing the value of education, and the implications of disrupting creative education may have broader and potentially serious ramifications for the creative industries (CIs), one of the UK's highest growth sectors.

In this paper, we take a different tack and focus, instead, on higher education as an exporting sector. We concentrate on the overlooked issue of the international attractiveness of creative degrees. In particular, we investigate the enrolment of international students in different creative disciplines and their distribution across the UK regions. There are several reasons for doing this.

International students, in creative or non-creative degrees, provide an increasing contribution on a national and a local scale in several ways. In general, the higher education sector is a growing sector of the UK economy with an increasing impact on the balance of payments. From 2010 to 2016, revenues from education-related exports, both direct and transnational activities, have increased by 26%, with 67% of

such increase due to HEIs.[1] This growth reflects the international attractiveness of the UK HE sector in the increasingly competitive world of education. International students have also become an integral part of the funding base of UK universities (Naidoo 2007; Universities UK 2014). It is not surprising, then, that HEIs are anxious about possible disruptions to the international demand for UK education.

It is important to note that these effects are not just financial. Indeed, beyond their direct financial contribution to the education sector, the balance of payments, and direct local spending, international students also provide non-financial benefits that are challenging to measure. For example, during their studies, they enrich the experience of domestic students by providing cultural exchange opportunities in the classroom. Outside the classroom, they make local communities more vibrant and diverse.

While in the debate on workers' migration, some see lower barriers to migrants as in tension with the upskilling of local workers, the debate on students' migration in part avoids this tension: to the extent that international students improve the financial position of their HEIs and make their offer of specific degrees sustainable, they also partly subsidise the upskilling of local workers. Evidence also suggests that international students are well-seen by domestic students and the local communities where they reside.[2]

[1] UK Department for Education (2019) "UK revenue from education related exports and transnational education activity in 2016", 24 January 2019, available at : https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/773167/SFR_Education_Exports_2016.pdf

[2] Migration Advisory Committee (2018) "The impact of international students in the UK" available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/739089/Impact_intl_students_report_published_v1.1.pdf

As graduates, these students can also contribute to the economy by supplying advanced skills where there are shortages. For the CIs, an exponentially growing part of the UK economy, several reports have emphasised how skill gaps may hamper the future growth of the sector (Giles et al., 2020). In addition, the literature shows that migrant students (not specifically in creative subjects) are more likely to become entrepreneurs, inventors or writers (Hunt, 2011; Breznitz and Zhang, 2019). Finally, international students provide international links for an increasingly international industry (Di Novo et al., 2020). The UK Government's recent determination to allow international students to stay after their studies and work in the UK for an additional two years recognises their contribution to society and the economy. Upon leaving the UK, they further maintain a legacy with their alma mater as alumni and maintain international links with their host city contributing to the UK's "soft power". Though difficult to quantify, these spillovers may be significant. Looking at the distribution of international students in creative subjects across regions can help understand their contribution in the above ways.

Many of the effects mentioned above are local (urban or regional) and, therefore, depend on how aligned are local labour market needs for creative talent and the spatial distribution of international students. London, as a single region, and London-based institutions host the largest number of international students more generally (Oxford Economics 2007; Walker 2014). However, HEIs are, for historical reasons, geographically spread, and produce a significant impact on the regional economy in which they are based (Valero and Van Reenen, 2018). The presence of international students can, in relative terms, be even more critical outside London.

While many of the above effects are pertinent to all types of students, they are

even more critical when we consider creative education. Indeed, starting from the seminal contributions of Florida (2002, 2004), extensive critical literature discusses the importance of the "creative class" in fostering local economic growth. This literature explicitly links creative graduates, sometimes referred to as "Bohemian graduates", to national and local economic development (Comunian, Faggian, and Li 2010; Comunian, Faggian, and Jewell 2011; Faggian et al. 2013, Florida, 2014). Attracting such graduates, depends, among other things, on the cosmopolitan culture and tolerance of the destination (Florida, 2004; Tornquist, 2004). Serafinelli and Tabellini (2020) discuss this issue in a European historical perspective and argue that democracy and open local institutions have fostered the spatial concentration of inventors and creatives. At the same time, inventors and creatives reinforce growth mechanisms.

Generally speaking, the provision and enrolment of creative degrees are less geographically concentrated than CIs firms and jobs, which are mostly concentrated in London and the South East areas (Comunian, Faggian, and Jewell 2011; Faggian et al. 2013; Tether 2019). It is, however, not obvious that international students follow the same geographical distribution as domestic students in all subjects and, in particular, in subjects related to the CIs. Various dynamics may come into play to determine the distribution of international students. For example, London is, at the same time, an attractive global creative hub and a very expensive city to live in. Other factors, such as international transport links or existing migrant diasporas, can also come into play. We refer the interested reader to the literature on the topic.[3] Finally, HEIs are not

[3] Understanding why students choose to UK to study a specific degree is a topic worthy of study. The relevant empirical literature on student mobility has aimed to estimate the factors that drive international student numbers (for early attempts see Soo and Elliott 2010; Rosenzweig 2010; Kritz 2016 for a large international study; and Beine, Delogu, and Ragot 2017 for the UK). Unfortunately, the effort of estimating precisely the role of specific push or pull factors of the student migration is hampered by

spatially evenly distributed. Differences across CIs' sub-sectors, in terms of characteristics and performance over time, may also imply some variability in regional specialisation in higher education over and above the factors mentioned above. Such regional specialisation could, in turn, lead to a concentration of revenues from international students.

In this paper, we are mainly interested in the spatial distribution of international students and the regional education specialisation in specific creative disciplines. This analysis can be informative in terms of understanding the nature of the sectoral and local skill shortages and the spatial distribution of education revenues and spillovers from international students.

A better understanding of the spatial and disciplinary distribution of international students is essential in terms of sectoral and regional growth and is, therefore, of interest for the UK's Industrial Strategy and the Government's levelling-up agenda. Also, it can be informative on the effects of shocks on the sector. At the time of writing, most HEIs are facing unprecedented uncertainty to recruitment in light of the COVID-19 pandemic (Drayton and Waltmann, 2020). Different HEIs and different creative degrees can fare differently depending on their location, characteristics of education provision, reliance on international students and the ability to successfully move teaching material and education experiences online. Also, changes to tuition fees, to the mutual recognition of qualifications, access to student loans and visa requirements are some of the factors that can affect the attractiveness of the UK education sectors for EU nationals. Institutions, regions and subjects that rely more

statistical issues. In particular, various unobserved factors may act as confounders with other factors that affect tuition fees or affect overall foreign student numbers. Moreover, such studies are often taking a more general view and do differentiate between subjects.

heavily on EU students are more vulnerable to the effects of these changes.

With the above considerations in mind, the remainder of the paper is organised as follows. Section 2 briefly presents the data used in this study. Section 3 looks at the aggregate trends in international recruitment. Section 4 investigates the geographical and sub-discipline distribution of student enrolment and its composition in term of student nationality (UK, Other EU, non-EU). Here, given their importance, as discussed above, we explicitly concentrate on creative students. Throughout the analysis, we compare enrolment in creative degrees with that in non-creative degrees. This exercise allows us to see how international students contribute to the provision of creative degrees across sub-sectoral and regional dimensions. Section 5 discusses the exposure of creative degrees and regions to the current COVID-19 pandemic and possible changes in fee status for EU students. We provide some simple back-of-the-envelope calculations to illustrate how creative degrees and the UK regions where they are offered could be affected by changes to the higher education sector. Section 6 draws some conclusions and policy recommendations, discusses some caveats and suggests avenues for further research.

2. Data

The analysis presented in this paper is based on students enrolment in UK HE

institutions over the academic years from 2007-2008 to 2017-2018.[4] Enrolment data is obtained from the Higher Education Statistics Agency (HESA). Student numbers are aggregated by *principal subject* (rather than programmes), by nationality (UK, Other EU, Non-EU), academic year and level of studies (UG and PG).[5] The principal subjects of creative degrees are those related to Crafts, Performing and Visual Arts, Design, but also Publishing, Advertising and Marketing, Architecture and a portion of Computer Technology related to Games. The subject codes used to map degrees to the CIs are in Appendix A.1.[6]

3. Students' Enrolment

Enrolment across disciplines

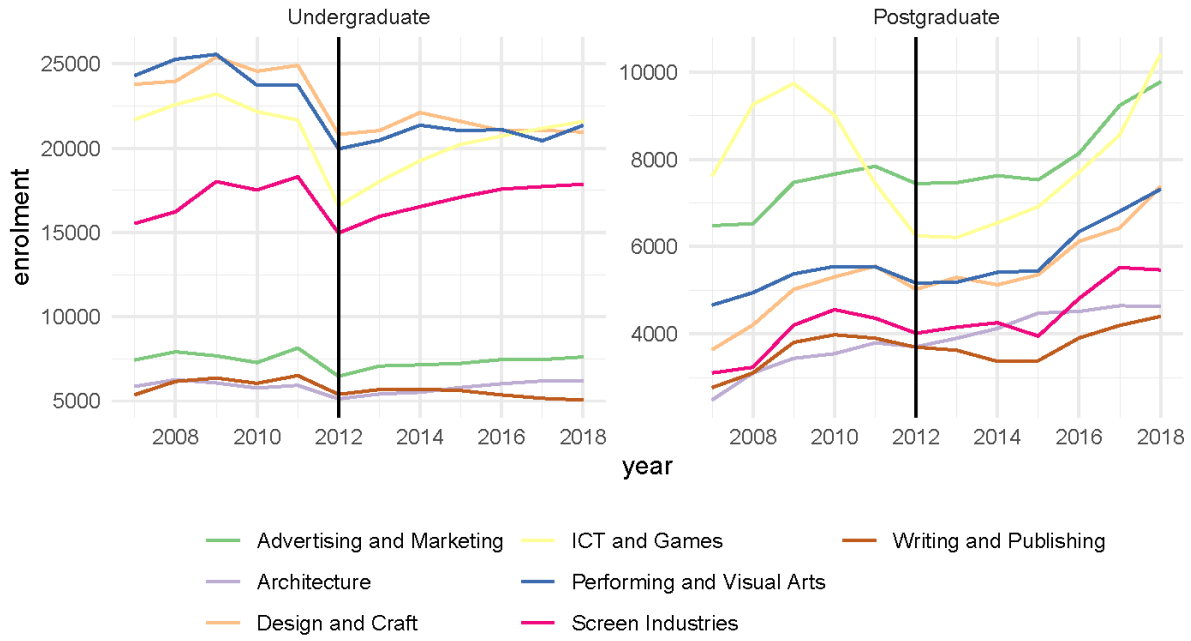
Figure 1 presents the enrolment trends by discipline and level of study for first-year students. While enrolment in undergraduate (UG) degrees is more substantial than in postgraduate (PG) degrees, it is also either flat or declining over time. The figure shows how a negative shock hits undergraduate enrolment in the academic year 2012/13, likely the result of the increase in tuition fees allowed from September 2012. However, the negative shock is not the same across disciplines: it appears more persistent in "Design and Craft" and "Performing and Visual Arts" and less persistent in the "Screen Industries".

[4] We take year one students as representative for full programmes. Undoubtedly, students drop out of programmes over time, but that's shared across all subjects and programmes. In this sense, our numbers can reflect potentially more the extent to which CI are able to attract students. An alternative analysis could be done on the number of degrees awarded.
[5] After Brexit, Other EU should simply be referred to as EU. However, we have preferred to keep here the denomination used by HESA that refers to non-UK European Union students as "Other EU".
[6] An early caveat on the data is required. "ICT and Games" is a relatively new subject area that in older data would be incorporated in more general software engineering. In our data, we have adopted the older (pre-2011) subjects to ensure consistency of subjects over time. However, the older subjects definitions are less transparent on the IT subjects that one could best attribute to the CIs.

For PG, instead, most disciplines show rising trends. A notable exception is "ICT and Games" degrees, displaying trends similar to UG enrolment. This evidence contrasts with the growth of this sub-sector in the same period and its reliance on foreign-educated talent, as noted by Di Novo et al. (2020, Table 4).

Table 1 compares the distribution of students across creative degrees by education level, including the aggregate of all other Non-creative subjects (labelled here as "Non-CI"), for the academic years 2007/08 and 2017/18. Creative degrees enrolled around 15% of all first-year UG students at the beginning and 16.8% at the end. They enrolled around 10% of PG students at the beginning and 12.1% at the end. Nationally, the most prominent creative subjects are "Design and Craft", and "Performing and Visual Arts" for UG, while "Advertising and Marketing" degrees are the largest among PG courses. Notably, "Advertising and Marketing" is also a discipline where we observe the smallest drop from UG to PG enrolment in 2007/08 and where PG enrolment is higher than UG level in 2017/18. The data suggests that students in design and arts-related subjects are less oriented to pursue postgraduate degrees. The difference in retention rate across disciplines from UG to PG could reflect differences in the type of students and careers that value PG degrees, but it could also reflect differences in the international attractiveness across programmes.

Figure 1: Enrolment trends for year one creative students



Notes: Enrolment numbers for first-year students by creative subject. Source: Authors' elaborations based on HESA data

Table 1: Enrolment by principal subject

	2007/08		2017/08	
	% of Total Enrolment	Enrolment	% of Total Enrolment	Enrolment
Undergraduate				
Advertising and Marketing	1.07	7435	1.26	7455
Architecture	0.84	5865	1.05	6190
Design and Craft	3.41	23790	3.56	21055
ICT and Games	3.11	21695	3.58	21175
Performing and Visual Arts	3.49	24300	3.46	20440
Screen Industries	2.23	15530	3.00	17720
Writing and Publishing	0.77	5375	0.87	5160
Non-creative	85.07	592730	83.21	491670
Postgraduate				
Advertising and Marketing	2.16	6480	2.46	9235
Architecture	0.83	2485	1.24	4645
Design and Craft	1.21	3640	1.71	6425
ICT and Games	2.54	7615	2.28	8560
Performing and Visual Arts	1.55	4660	1.81	6810
Screen Industries	1.03	3105	1.47	5520
Writing and Publishing	0.92	2770	1.12	4195
Non-creative	89.76	269445	87.92	330370

Notes: Enrolment as % of total UK enrolment and absolute numbers, for academic years 2007/08 and 2017/08, by subject. Source: Authors' elaborations based on HESA data

Regional specialisation

Is the enrolment of creative CI subjects shared equally across the country or regionally concentrated? Firstly, we consider the twelve UK regions and aggregate enrolment over the HEIs within each region. Secondly, we calculate a "student location quotient", as a ratio that measures the national share of students in a CI sub-discipline, *d*, in the region, *r*, divided by the national share of all students in the same region, *r*.

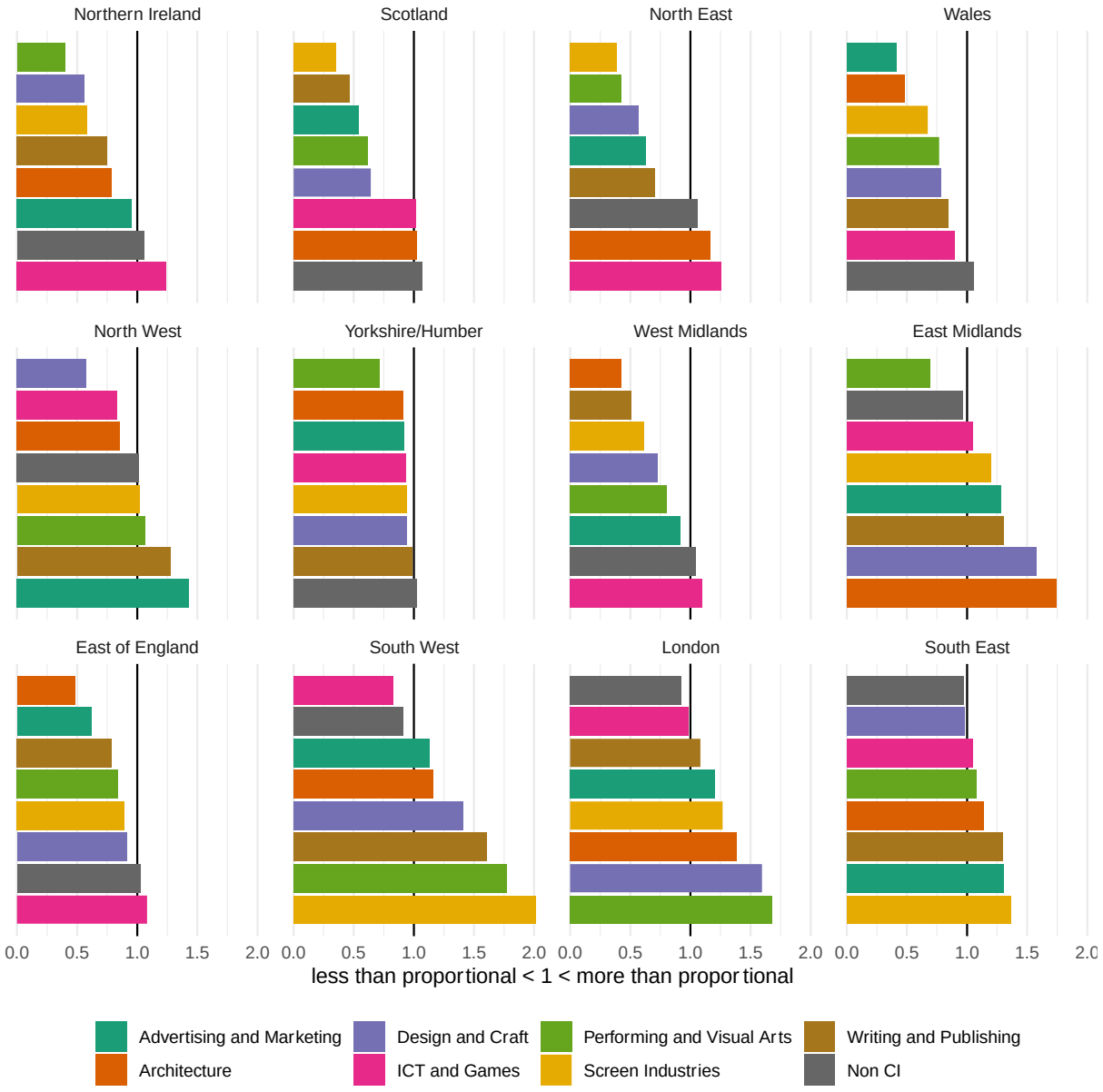
$$Student\ LQ = \frac{\%\ of\ students_{d,r}}{\%\ of\ students_{r}}$$

The index takes a value of zero when a region has no students in a specific discipline, *d*. A value of one indicates that the enrolment of students in a discipline, *d*, is the same as the overall share of students studying in region *r*. A value above one indicates a regional specialisation in discipline, *d*. The ratio accounts for the size of a region, e.g., London is the area with most students overall and is also expected to have more students in creative disciplines. However, if London were to attract mostly students in, say, business studies, its ratio for creative disciplines would fall below one. In contrast, relatively smaller regions in terms student numbers, e.g., Wales, would be considered as specialised if their national share of students in a creative discipline lies above that of its overall national share for all disciplines.

Figures 2 and 3 show these ratios for the academic year 2017/18, by region, for each creative discipline and UG and PG respectively (bars ordered by index size). Bars that fall to the left of the vertical black line, denoting one, indicate that the enrolment is below the regions' national shares. Bars to the right of one denote the regional specialisation in the relevant discipline.

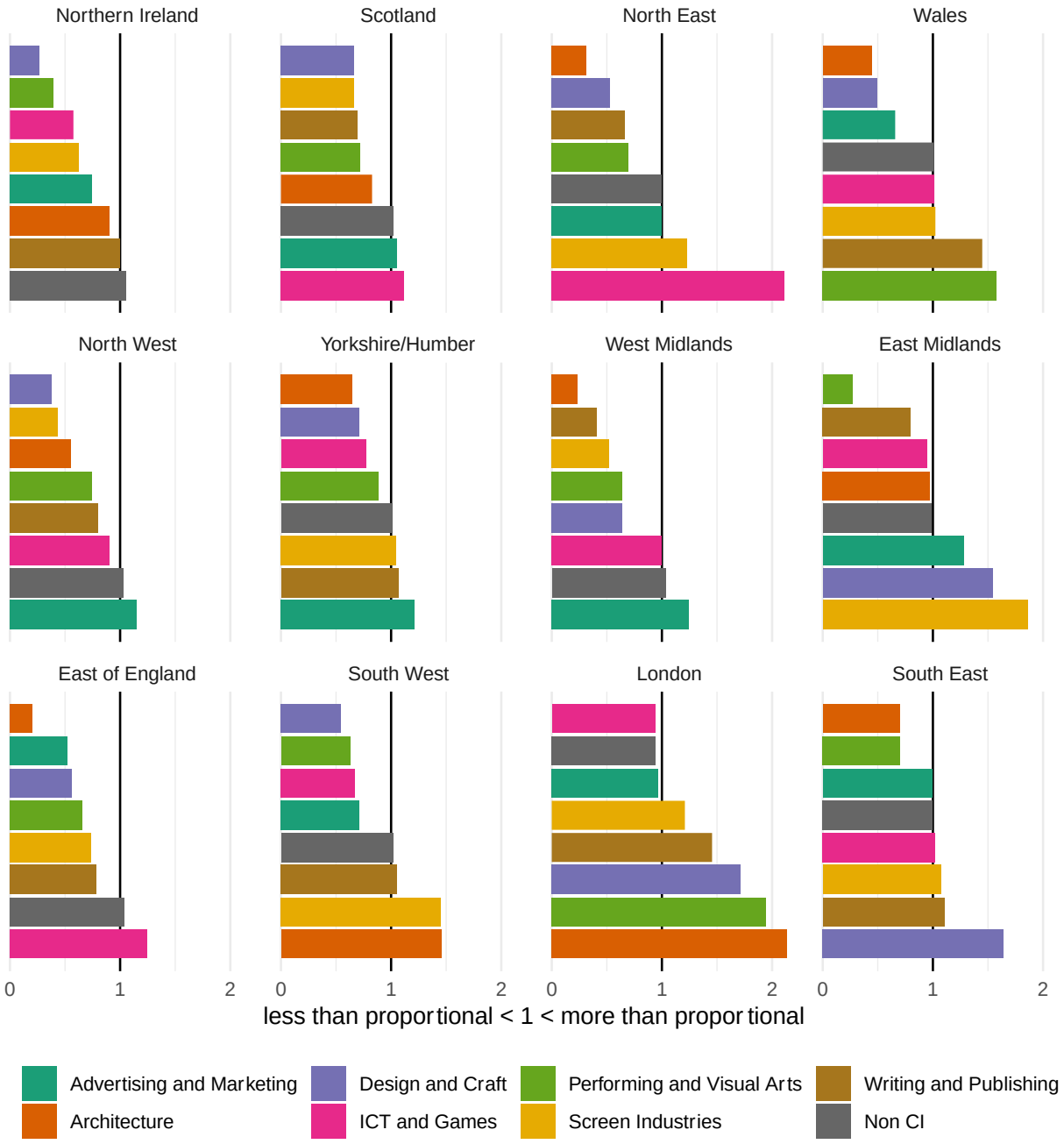
The variation is quite stark. For instance, for UG students, Northern Ireland is severely under-represented in "Performing and Visual Arts", but exceptionally strong in "ICT and Games". Interestingly, this pattern is not repeated for the PG programmes, where Northern Ireland under-performs and the North-East comes out as particularly strong. This evidence does not imply, of course, that students move from Northern Ireland to the North East if they decide to advance into PG education. Since the index is the ratio of two ratios (or shares), various dynamics within these could give rise to the observed pattern. However, if a sub-sector is particularly strong in a region and the HEIs of that region do not supply enough graduates, the attraction of talent from other regions or from abroad will be required to support local growth. An example can be the shortage of talent experienced by some industries in some locations, e.g., the "Screen Industries" in Wales. Strong specialisation in the sub-sector characterises, however, HEIs in the South West.

Figure 2: Undergraduate creative industries enrolment relative to the total, by region



Notes: Regional specialisation ratios as set out in the text. Based on 2017/18 enrolment only. Source: Authors' elaborations based on HESA data

Figure 3: Postgraduate creative industries enrolment relative to the total, by region



Notes: Regional specialisation ratios as set out in the text. Based on 2017/18 enrolment only. Source: Authors' elaborations based on HESA data

Further compelling evidence from these figures is the variation of specialisation between the regions. Although partly by construction, each region appears to have

its specialisation in a creative discipline. Moreover, while some specialisations are in both UG and PG (e.g., London for "Performing and Visual Arts"; South West for "Screen Industries"), there also exists some variation between UG and PG (e.g., Northern Ireland, Wales and East and West Midlands). London specialises (i.e., has an index above 1) in six creative disciplines for UG and five for PG, underlining its importance for the sector overall. However, the specialisation of the East Midlands and the South West for UG studies is also noteworthy.

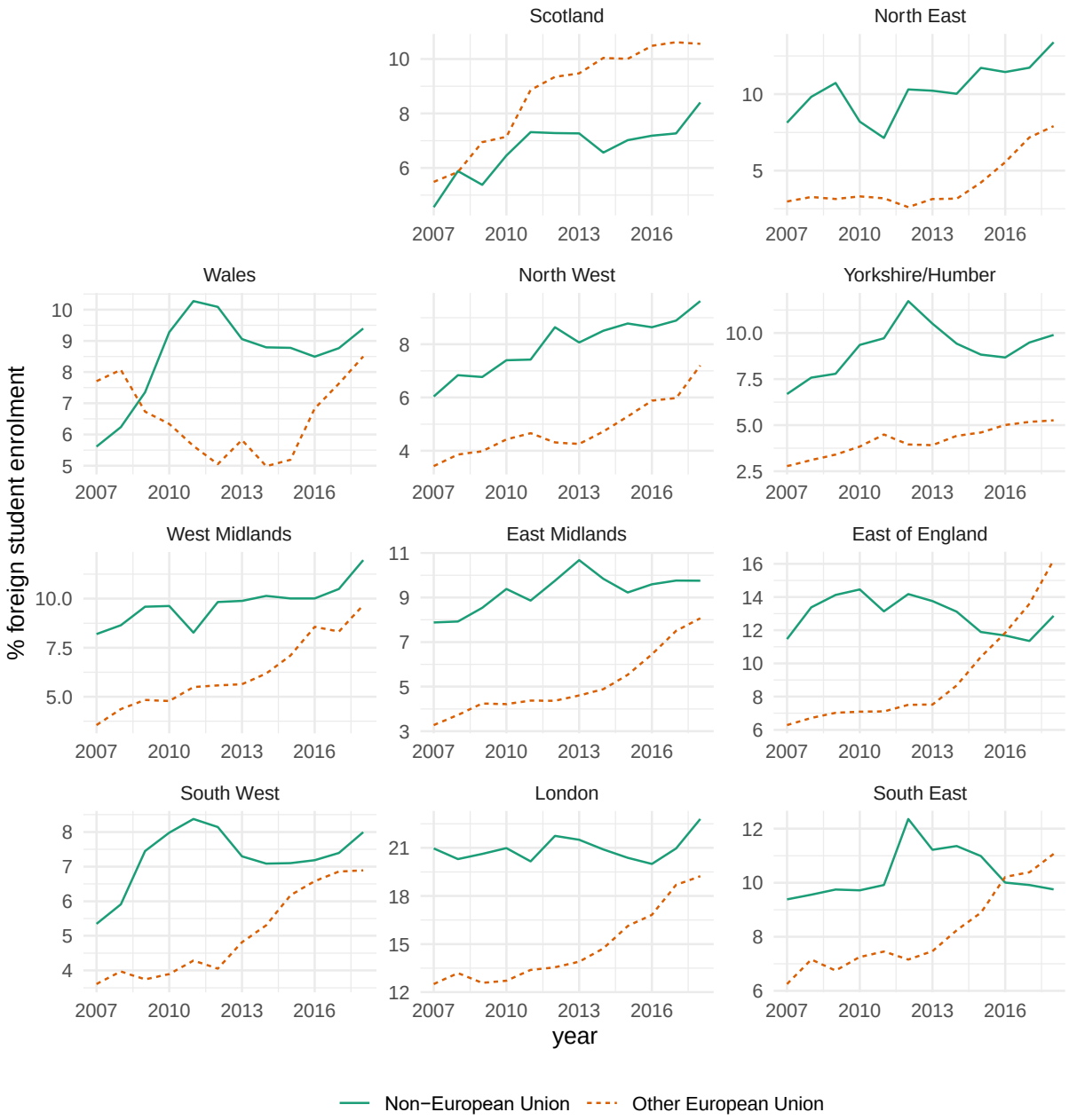
4. International students from the EU and the rest of the world

Aggregate trends

International students are a substantial part of the overall student UK student body. In the academic year 2017/18, about 9.9% and 11.8% are Other EU students in UG and PG programmes respectively. About 11.1% and 33.9% are Non-EU students (i.e., from the rest of the world) in UG and PG programmes respectively.

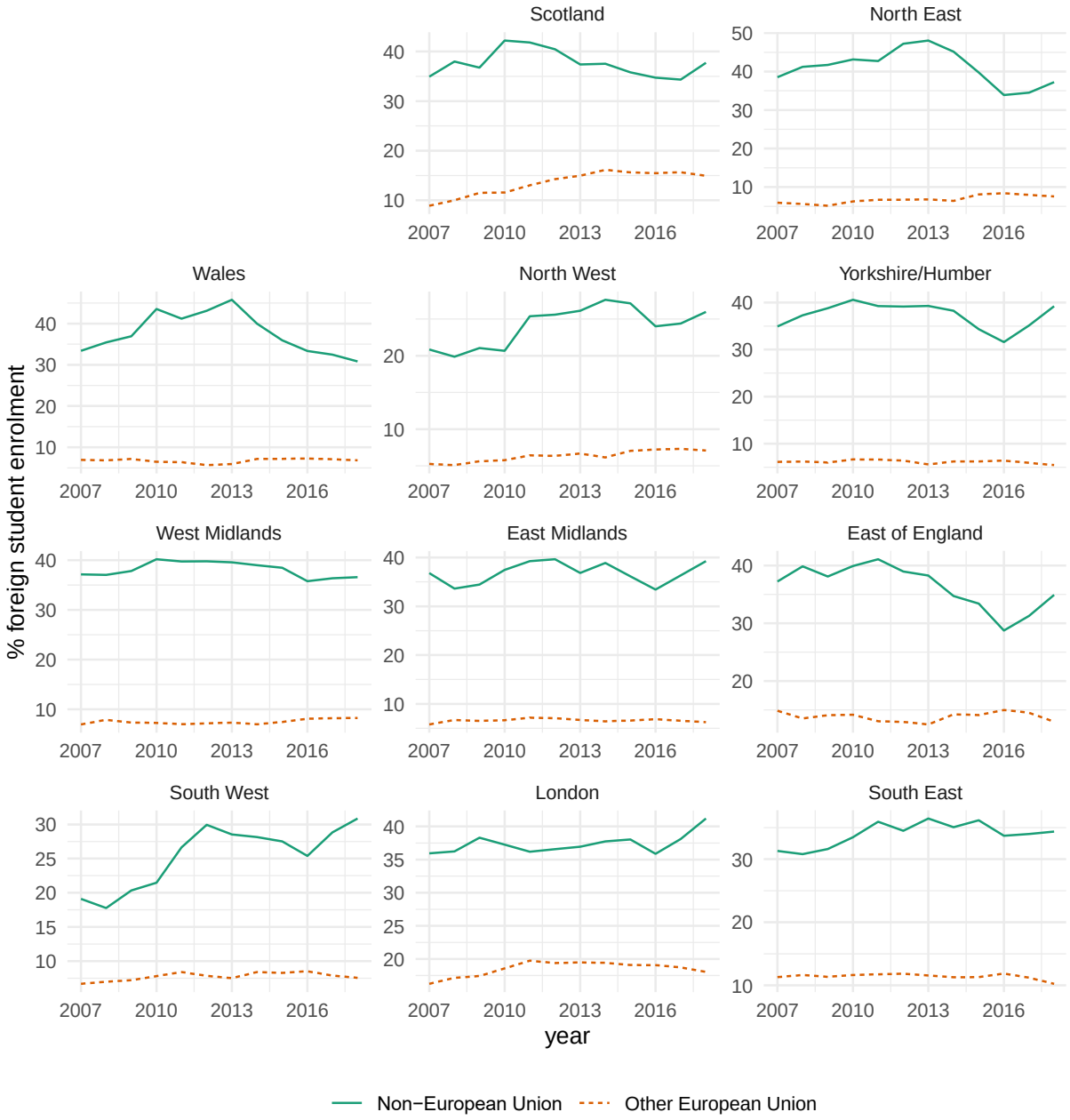
Figures 4 (for UG) and 5 (for PG) present the aggregate trends of international students enrolled in the creative subjects as a percentage of the total enrolment in each region. For UG degrees, we see strong growth across most regions for Other EU and Non-EU students. Generally, Non-EU students had a much larger share in 2007/2008, but Other EU students have caught-up and occasionally surpassed the share of Non-EU students. Notably, there is a higher share of Other EU students enrolled in UG degrees in Scotland where EU students have so fat paid no fees in line with local students. However, the share of Other EU students has surpassed that of Non-EU students also in the East and South East of England. For PG studies, instead, there are much higher percentages for Non-EU students relative to Other EU students with only minimal evidence of a positive trend for either group.

Figure 4: Trends in foreign students' enrolment in undergraduate creative subjects, by region



Notes: Foreign student enrolment as a % of total enrolment in creative subjects in respective regions.
Source: Authors' elaborations on HESA data.

Figure 5: Trends in foreign students' enrolment in postgraduate creative subjects, by region



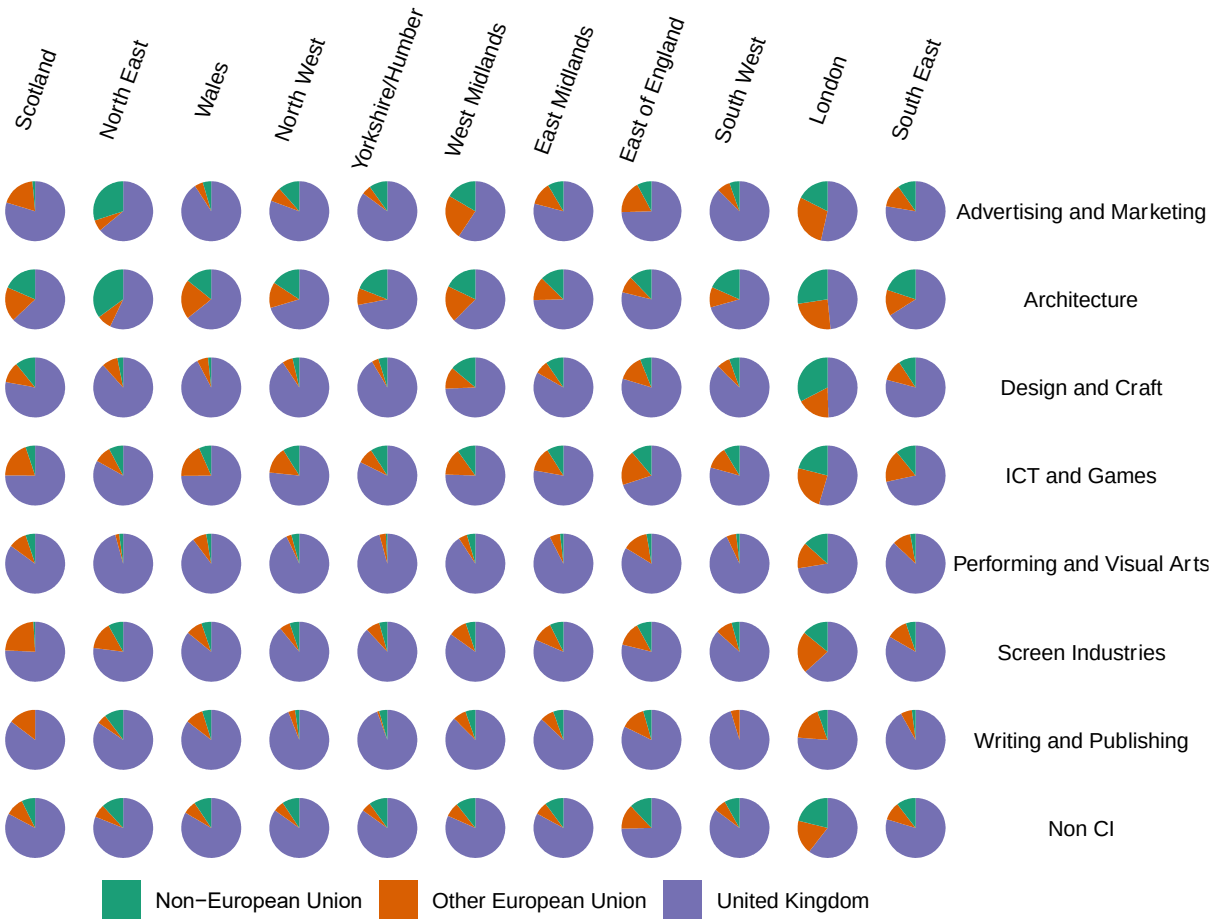
Notes: Foreign student enrolment as a % of total enrolment in creative subjects in respective regions.
Source: Authors' elaborations on HESA data.

The regional and disciplinary distribution of international students.

The next question is whether the distribution of international students is similar across creative disciplines and regions. Figures 6 and 7 present, for UG and PG respectively, pie charts to indicate the allocation over three groups of students, UK, Other EU and non-EU, for the last academic year available. Overall, a rich picture emerges with international students spread across disciplines and regions.

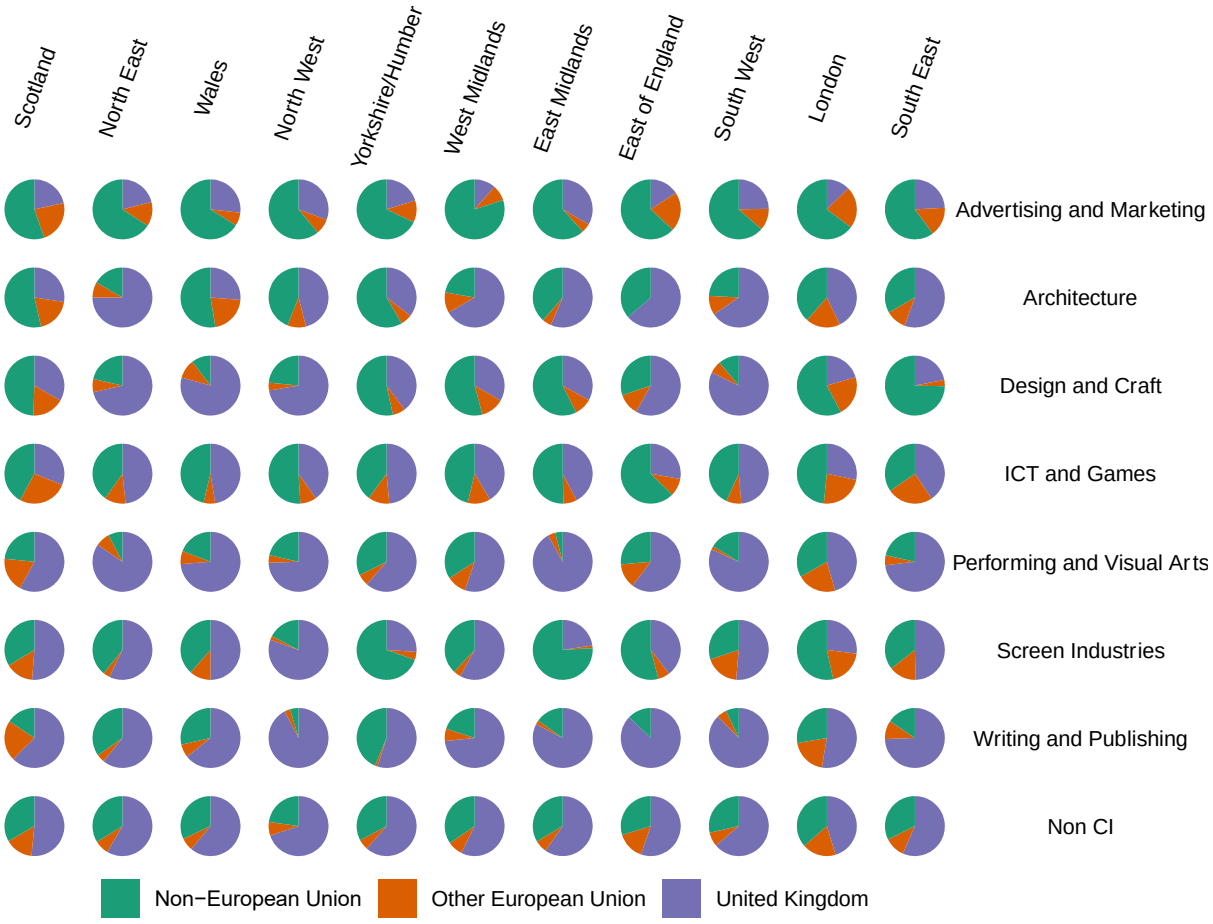
More specifically, PG programmes are more international, across the board, relative to the undergraduate programmes. For PG students' enrolment, in a large number of circles, the share of UK students is a minority. Among the international students, Non-EU dominate over Other EU students in almost all region-CI disciplines. Nonetheless, in some cases, Other EU students represent a significant fraction of the student body, such as for all creative UG disciplines in London, and for "Advertising and Marketing" and "ICT and Games" across most regions. "Architecture" also receives a substantial fraction of EU UG students. These patterns are broadly similar for the PG degrees, with the notable difference of a much larger share of international postgraduate students. "Writing and Publishing" is characterised by the lowest enrolment rates of international students. However, the London and Yorkshire and the Humber institutions have a substantial share of international students in PG subjects. "Performing and Visual Arts" has a similar pattern overall, with some regions standing out in terms of non-EU and Other EU enrolments.

Figure 6: UG Students Region-Discipline Distribution



Notes: Pie charts indicate the share of students by origin for each region (column) and subject (row), for 2017/18. Source: Authors' elaborations based on HESA data.

Figure 7: PG Students Region-Discipline Distribution

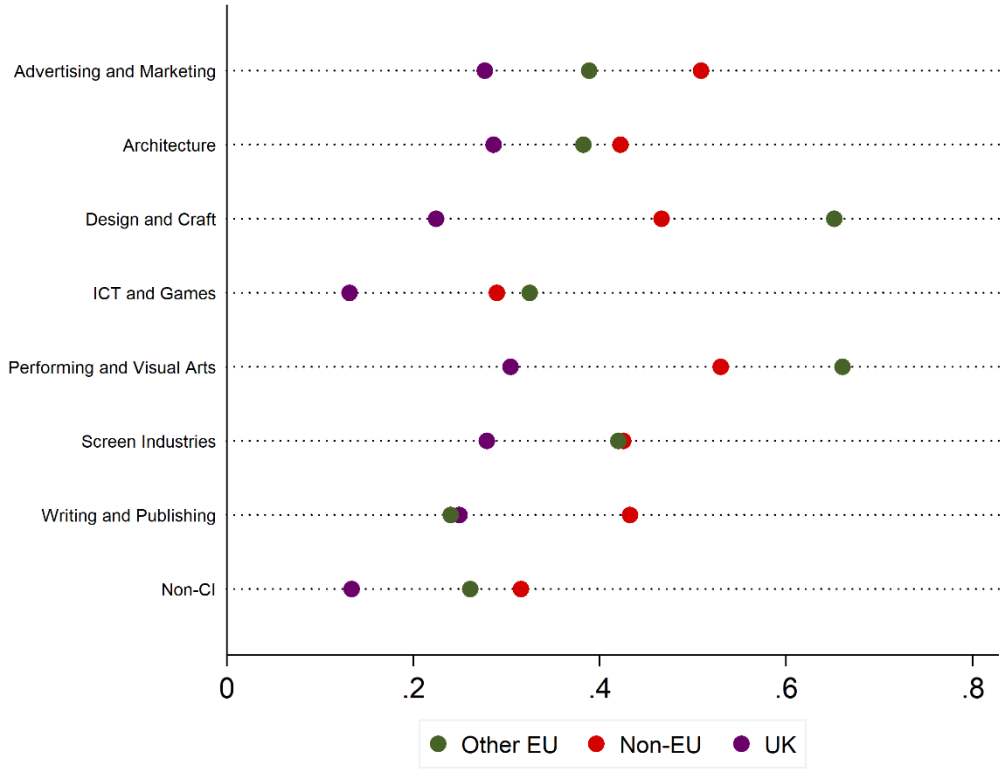


Notes: Pie charts indicate the share of students by origin for each region (column) and subject (row), for 2017/18. Source: Authors' elaborations based on HESA data.

In order to better understand regional inequality in the distribution of students, Figures 8 and 9 report the Gini indices of the regional distributions of domestic, EU and Non-EU students, for UG and PG students respectively. An index closer to one denotes higher regional inequality, i.e., a higher regional concentration of students. Interesting patterns emerge from these figures. First, domestic students are, in general, more dispersed than international students irrespective of whether in UG or PG degrees (i.e., international students, whether Other EU and Non-EU, are more regionally concentrated). Second, at the UG level, all students in creative degrees,

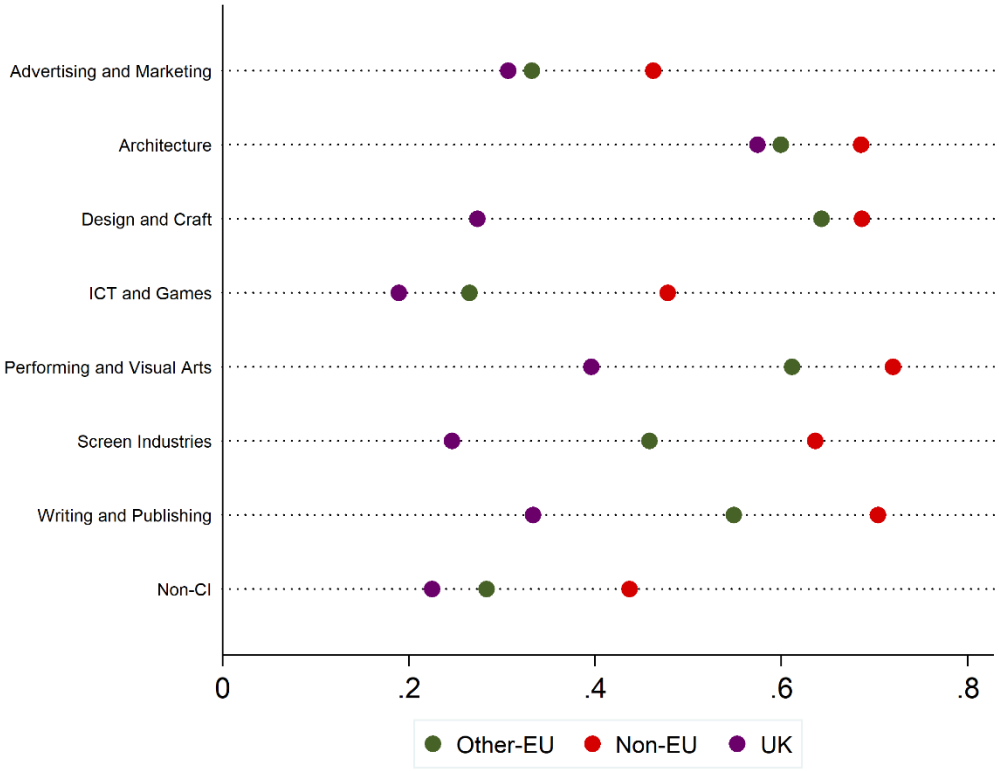
irrespective of nationality, tend to be more concentrated than those in non-creative degrees, except for "ICT and Games". This evidence could be a reflection of a smaller number of institutions offering UG creative degrees. At the PG level, domestic students, irrespective of the degree, tend to be more equally distributed. The only exception is "Performing and Visual Arts", where there is a higher concentration of students irrespective of nationality. Third, Non-EU students tend to be more regionally concentrated than Other EU students. The notable exception is that of UG students in "Design and Craft" and "Performing and Visual Arts", where Other EU students are more concentrated than Non-EU students. Finally, and interestingly, Non-EU PG students tend to be, irrespective of discipline, more unequally distributed than UG students.

Figure 8: Students' regional concentration by nationality (Undergraduate)



Notes: This graph reports the Gini index for undergraduate students by disciplines and nationality for 2017/18. Source: Authors' elaborations based on HESA data.

Figure 9: Students' regional concentration by nationality (Postgraduate)



Notes: This graph reports the Gini index for postgraduate students by discipline groups and nationality for 2017/18. Source: Authors' elaborations based on HESA data.

Table 2: Top 5 Other EU-Dependent Region-Creative Subject by Programme Level

Creative Subject	Region	Total	Other EU	% Other EU
Undergraduate				
Advertising and Marketing	London	1315	380	28.9
ICT and Games	London	3065	745	24.3
Architecture	London	1260	305	24.2
Advertising and Marketing	West Midlands	725	175	24.1
Screen Industries	Scotland	535	125	23.4
Postgraduate				
ICT and Games	Scotland	1045	280	26.8
ICT and Games	South East	850	210	24.7
ICT and Games	London	1850	430	23.2
Advertising and Marketing	Scotland	1065	245	23.0
Advertising and Marketing	London	2045	460	22.5

Notes: Northern-Ireland excluded due to incomplete information on student nationality. Based on academic year 2017/2018 only. Source: Authors' elaborations based on HESA data.

Table 3: Top 5 Non-EU-Dependent Region-Creative Subject by Programme Level

Creative Subject	Region	Total	Non-EU	% Non-EU
Undergraduate				
Architecture	North East	385	135	35.1
Design and Craft	London	4930	1610	32.7
Advertising and Marketing	North East	250	75	30.0
Architecture	London	1260	345	27.4
ICT and Games	London	3065	645	21.0
Postgraduate				
Advertising and Marketing	West Midlands	1000	800	80.0
Screen Industries	East Midlands	705	535	75.9
Design and Craft	South East	1025	765	74.6
Screen Industries	Yorkshire/Humber	460	320	69.6
Advertising and Marketing	Yorkshire/Humber	890	605	68.0

Notes: Northern-Ireland excluded due to incomplete information on student nationality. Based on academic year 2017/2018 only. Source: Authors' elaborations based on HESA data.

5. Regional and sub-sectoral effects of shocks to international enrolment

As discussed in the introduction, understanding the sensitivity to shocks to international recruitment is a quite critical issue. Here, we concentrate on the two main risks to international recruitment currently faced by the HE sector. The first is the COVID-19 pandemic, and the second is the change in EU students' status after Brexit. In what follows, we concentrate exclusively on trying to illustrate the possible reduction in student numbers and leave aside the issue of quantifying the financial impact on HEIs and the local economies.

Reliance on International Students and COVID-19

While universities are trying to reassure on the quality of their education provision by moving their offer online wholly or partially, health concerns, the inability to travel or the possibility to end in another lockdown in the academic year 2020-21 risks putting-off international students from coming to the UK. This reduction can have significant financial implications for many universities, from tuition fees to accommodation and additional spending on campus, but also for the offer of degrees as universities may decide to drop from their offer those degrees with smaller student numbers and less financially viable. The impact of a low student turnout will also be felt by the cities and regions where international students study.

Social distancing on campus means that universities will need to reduce significantly student numbers who receive person-in-person teaching and will have to move much content delivery online. At the same time, several factors conflate to reduce international demand: travel restrictions, selective lockdowns, and, not least, the income effects of the most significant economic shock the world has seen in the

post-war period. Therefore, COVID-19 represents a significant risk for UK HEIs, and it is likely going to affect them until a successful vaccine is found and a programme of vaccinations if rolled out globally.[7] Which regions and creative subjects are most exposed to this shock?

In order to assess this, we simply consider as more exposed those creative subjects and those regions that have the most significant shares of international students.[8] We can start by looking again at Figures 6 and 7, where we portrayed the UK, Other EU and Non-EU enrolment in creative degrees across the UK regions and disciplines. From these figures, in general, UG degrees seem more shielded to the pandemic than PG degrees. The greater exposure of PG degrees could potentially re-orient some resources from PG international degrees to UG domestic degrees, provided that domestic student recruitment, currently underpinned by student loans, will stay healthy.

Among the disciplines and regions, some are more exposed than others, whether at UG or PG levels. In Tables 2 and 3, we rank region-disciplines that have the highest share of Other EU and Non-EU students' enrolment for the last year available, 2017/18. For the Other EU students, the Top 5 list includes regions and disciplines that have about 20% to 25% of enrolment based on these students in both UG and PG levels. "Advertising and Marketing" and "ICT and Games" repeatedly feature, as does London for UG and Scotland for PG. For non-EU students, the picture in Table 3

[7] A recent report from the Institute for Fiscal Studies, presented an assessment of HEI finances under a scenario of substantially reduced income from foreign students (Drayton and Waltmann, 2020).
[8] This is clearly an over-simplifying assumption. Different creative degrees could be affected differently from the COVID-19 pandemic depending on their ability to be transferred online and the need for person-in-person teaching. On a purely speculative level, degrees such as those related to "Performing and Visual Arts" could be more difficult to fully transfer online from a pedagogical standpoint and less appealing for students than, say, "ICT and Games".

is even starker. Here, we find that the Top 5 for non-EU students enrolled in UG region-disciplines goes up to 30% for "Architecture" in the North-East and PG between 70-80% for larger cohorts.

Based on the above evidence, however, the COVID-19 pandemic is likely going to have unequal effects on creative disciplines and the regions that host international students. This effect is also likely going to be disproportionate on the PG offer with a risk of reducing the variety and level of the HEIs creative offer.

Changes to tuition fee status and EU students

Another risk is the possible drop in EU students caused by the post-Brexit arrangements for EU nationals. A crucial aspect of the UK HE system concerns the differential fee status applied to students based on their nationality. In UG degrees, fees for UK and EU students have been, so far, capped as reported in Table 4. However, HEIs have not faced fee caps for non-EU international students. As a result of strong international demand and the international attractiveness of the UK HE sector, the fees charged to international students have been substantially higher than the home fees. Table 5 reports the average fees charged to international Non-EU students in the academic year 2019/20, broken down by region and distinguishing between creative disciplines and non-creative disciplines (Table C2 in the Appendix also reports figures for 2017/18 for comparison).

EU students arriving after the 1st of January 2020 will lose home treatment and fee status in England and Scotland and will need to look at the fees charged by the

receiving HEI (Northern Ireland and Wales still need to announce their policy).[9] While UK HEI could still charge home fees to EU students, this is quite unlikely as it could be interpreted as discriminatory versus non-EU nationals. UK HEIs could lower overall international fees in order to lure both EU and non-EU students. Since each institution is different and faces a different demand elasticity, strategic considerations will apply to this choice.[10] Potentially, institutions with more inelastic demand could keep prices high, and those with more elastic demand could lower prices. Here, we are going to adopt the simplifying assumption that upon the end of the transition period, HEI will charge EU students the same fees they currently charge to non-EU students.

Beyond fees, however, other factors could affect the choice of EU students to study in the UK. These include factors such as the need to apply for a student visa, the possible lack of mutual recognition of degrees and professional qualifications, and the access to student loans in England and Scotland (Northern Ireland and Wales still need to announce their policy). Since all the above worsen the status quo for EU students, considering only the effect of tuition fees, as we do here, provides only a 'minimum case scenario'.

Of course, in the presence of strong international demand, a reduction in demand from EU students could be replaced with demand from non-EU students with no changes in overall enrolment. While such replacement would offset the financial impact, it would still produce the effect of reducing the diversity of the student body.

[9] See https://study-uk.britishcouncil.org/moving-uk/eu-students for greater detail.
[10] The elasticity measures the percentage change in student demand given a percentage change in tuition. For instance, and elasticity of -0.10 would indicate that for each 10% increase in tuition fee, the demand (student enrolment) would fall by 1%. A number closer to zero would indicate that demand is inelastic; demand fluctuates little with prices changes. In contrast, a value in excess of -1 would indicate that a price change gives a more-than-proportional change in student demand. Theoretically, elasticities could very well vary by student characteristics (e.g. their country of origin, but also their income levels), institution, or subject. However, it is generally challenging to observe or estimate such elasticities for specific groups.

Moreover, in the present context set by the COVID-19 crisis, this substitution effect is unlikely in the short term, and higher fees could simply result in smaller demand.

Table 4: Caps in UK/EU UG Fees by Devolved Nation (2019/2020)

	England	**Northern Ireland**	**Scotland**	**Wales**
Fees cap	£ 9250	£ 4395	No fee	£ 9000

Note: Fee caps applied to home domiciled students and EU students in first-cycle studies (Source: UCAS)

Here, we report some back-of-the-envelope estimates of the impact of change in fee status for EU students. Since EU students are about to lose their domestic fee status, an increase in fees is likely going to affect their decision to undertake their higher education in the UK. In order to evaluate how the inflow of EU students may be affected from such a change, we assume – in a static perspective – that they will be charged the same tuition fees charged to Non-EU students. Table 5 reports the mean region-discipline fees charged to non-EU students. Then, combining this information with the fee cap on domestic students, we can compute the implied percentage change in fees for EU students for each degree, *d*, in the region, *r*.

Table 5: Mean Non-EU Fees by Region and Discipline, 2019/20

	East Midlands	East	London	North East	North West	Scotland	South East	South West	Wales	West Midlands	Yorkshire/H.	*Overall*
Adv & Marketing	13733	13327	13870	15215	15175	13003	14404	14528	13044	13005	14237	13979
Architecture	16253	15078	15062	15567	17518	16869	15566	15810	14050	13300	16920	15775
Design & Craft	15512	13113	15408	12775	14366	17365	14623	14522	12256	13764	14879	14793
ICT & Games	16174	16561	17188	16947	15388	16619	17629	16383	14350	15573	16527	16413
Perf & Vis Arts	14360	14024	16161	15062	13908	16425	15465	14802	12575	14089	15011	14909
Screen Industries	14591	13838	14445	13416	13411	15087	15003	14894	12960	13607	14867	14316
Writing & Pub	14081	13443	14116	13588	13089	12695	14148	13979	12889	12688	14142	13682
Non-creative	16141	15120	16360	16393	15356	17201	16477	16122	14433	15171	16520	16039
Overall	15883	14914	16108	16118	15130	17009	16226	15833	14166	14943	16232	.

Notes: Mean fees applied to foreign students (non-EU) by discipline and region in the academic year 2019/20. The last column and row refer to the discipline and region, respectively. Source: Authors' elaborations based on data provided by Newcastle University.

$$\%\Delta \text{Fees}_{d,r} = \frac{Int.Fees}{Dom.Fees} - 1 \qquad (1)$$

In eq. (1), *Dom.fees* is the capped amount of fees currently applied to EU students (see Table 4). Assessing the impact of the increase in fees on EU student numbers requires an estimate of the price elasticity of demand. Estimating the elasticity of international education demand is a rather complicated task that goes beyond the scope of this paper. There are very few attempts in the literature to estimate such elasticity. Here, we greatly simplify the analysis by relying on previous estimates by Beine et al. (2017), who estimate an enrolment elasticity to fees $\hat{\eta} = -0.084$ for European UG students enrolling in UK HEIs. In particular, Beine et al. (2017) exploit the regional variation in domestic fees induced by different caps across the UK in order to estimate the elasticity to fees for a cross-sectional sample in the academic year

2011/12.[11] In carrying out their estimation exercise, they also control for several relevant factors relating to the "environmental" and institutional setting, such as the cost of living, proxies for the quality of HEIs, capacity, as well as students' origins. While the elasticity provided by Beine et al. (2017) is useful as it is specific to EU students' demand for UG degrees in the UK, it has the limitation that it is non-specific to creative degrees and it is not spatially-differentiated. Future work could try to compare elasticities for creative and non-creative degrees and degrees offered across different regions.

We use this estimate to obtain implied changes in Other EU students due to the change in fees calculated in equation (1), that is:

$$\%\Delta EU\ Students_{d,r} = \%\Delta Fees_{d,r} \cdot \hat{\eta} \qquad (2)$$

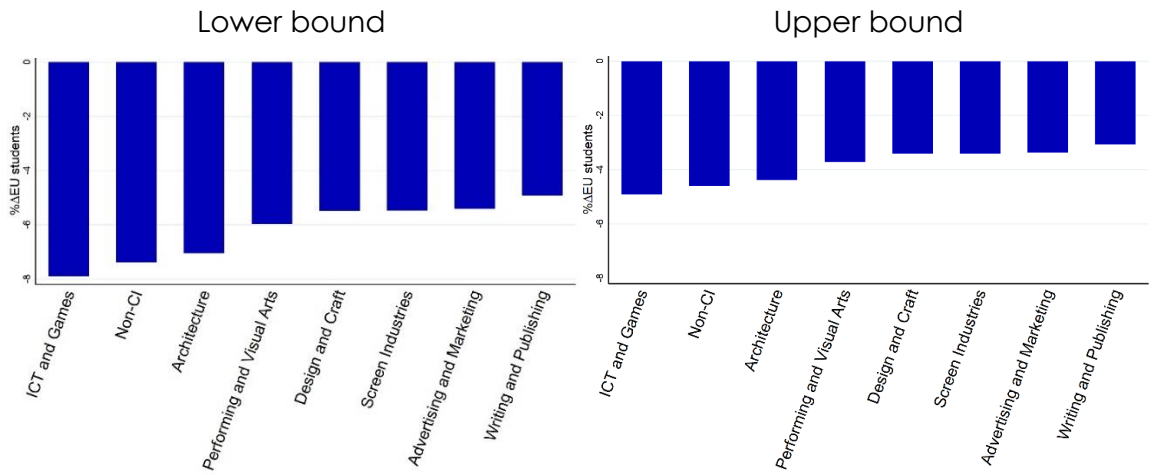
Given that the elasticity by Beine et al. (2017) refers only to UG students, we limit our analysis to this level of study. Also, we limit the exercise to England and Wales. We exclude Northern Ireland (where students' original domicile is not reported) and Scotland (where the effect is likely going to be very different than in other regions because of the starting point of zero-fees for EU students). Figure 10 reports the results for the creative subjects, nationally, of the calculations based on eq. (2). We prefer reporting estimates based on the confidence interval estimates around the elasticity, $\hat{\eta}$, reported by Beine et al. (2017). The reported range reflects the uncertainty around the elasticity and the sensitivity of its estimate. The lower and upper bounds of the confidence interval can be interpreted as different scenarios of

[11] Beine et al. (2020) provide a much higher estimate of the demand elasticity of foreign students (non-EU) for Italian degrees at -0.8.

the impact of an increase in fees on student numbers (point estimates are in the Appendices).

In relative terms, "ICT and Games" subjects are the most affected (with a decrease between 5% and 8%), also relative to the non-CIs degrees, and Writing and Publishing the least affected (with a decrease between 3% and 5%).

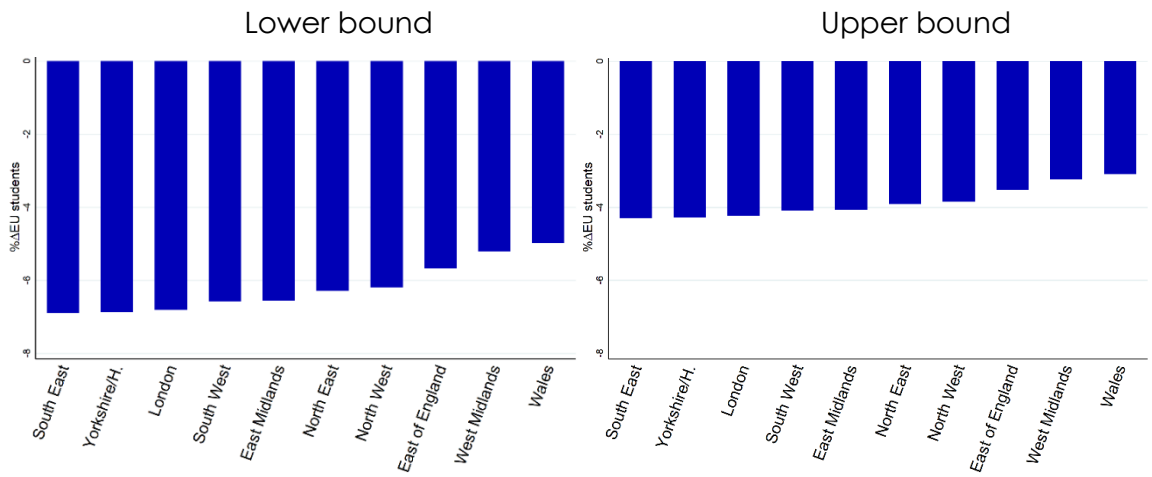
Figure 10: Implied % change in EU students by discipline group



Notes: This graph breaks-down by discipline the implied percentage change in EU students following an increase in fees for EU students determined using eq. (2). Left (right) panel reports predictions using lower (upper) bound of estimated coefficients from Beine et al. (2017). Source: Authors' elaborations.

Figure 11 reports the same exercise across regions. The effects are not dramatically different across regions with Wales the least affected with a reduction between 3% and 5% in EU students and the South East as the most affected with a reduction between 4% and 7%.

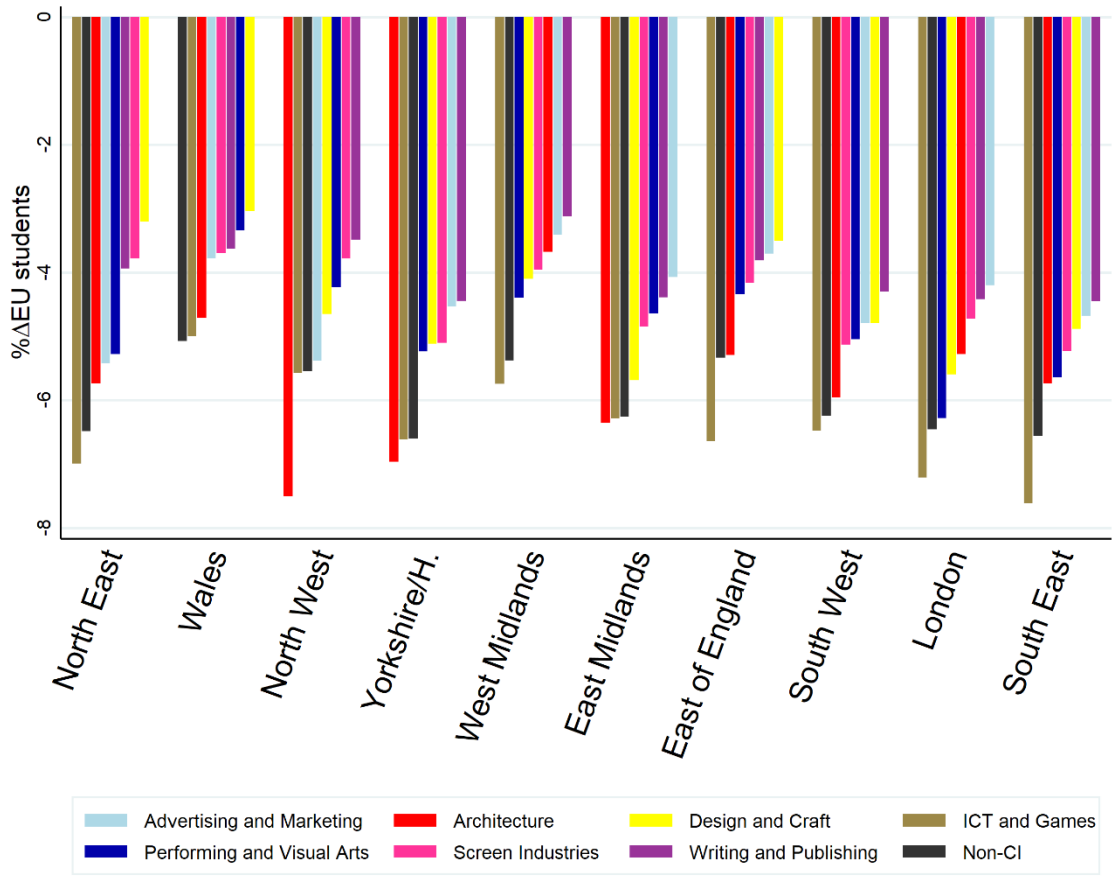
Figure 11: Implied % change in EU students by region



Notes: This graph breaks-down by region the implied percentage change in EU students following an increase in fees for EU students determined using eq. (2). Left (right) panel reports predictions using lower (upper) bound of estimated coefficients from Beine et al. (2017). Source: Authors' elaborations.

Figure 12 decomposes the effects shown in figure 10 and 11 by region-discipline. To simplify the presentation, we report here the point estimates (lower and upper bound estimates are available in the Appendices). Such breakdown is particularly interesting if one considers that the impact of a change in fees for EU students could impact local labour markets and local HEIs specialised in specific subjects. Overall, we can observe how the relative impact of a change in fees is quite different across the subjects and regions. "ICT and Games" is most affected in the South East, London, the North East, and the East of England. "Architecture" is most affected in the North West and in Yorkshire.

Figure 12: Implied %Change in EU UG Students by Region and Discipline



Note: This graph breaks-down by discipline and region the implied percentage change in EU students following an increase in fees for EU students determined using eq. (2). Source: Authors' elaborations

It is also interesting to look at the absolute numbers attached to the above scenarios. To this end, we apply the implied percentage changes to EU students by discipline and region to the enrolment figures for the year 2017/18 (the last year available) to obtain the overall change in student numbers. These results are reported in Table 6 (lower and upper bounds are in the Appendices). The reported numbers imply an overall drop of more than 3000 students from EU countries with around 600 (20%) from the creative degrees. Given that the students enrolled in the creative subjects were around 16.8% of the total in the academic year 2017/18, this would mean a slightly higher impact on the creative subjects compared to the non-creative subjects. Unsurprisingly, the highest fall in absolute student numbers (in both creative and non-creative disciplines) would take place in London and the South

East.[12] The absolute figures concerning non-creative disciplines are obviously higher than those for the creative ones. Within the creative degrees, London and the South-East are followed by East Midlands, South West and West Midlands.[13]

Table 6: Implied variation in EU students after expected % change in fees

Region	Creative	Non-Creative	*Total*
East Midlands	-50	-165	-215
East	-35	-195	-231
London	-221	-784	-1005
North East	-16	-127	-144
North West	-35	-162	-197
South East	-90	-345	-435
South West	-45	-139	-184
Wales	-24	-133	-157
West Midlands	-45	-226	-271
Yorkshire/H.	-26	-149	-175
Total	-588	-2425	-3014

Note: This table reports the implied absolute variation in UG European students resulting from the percentage change obtained as in eq. (1). Differences between column/row totals and their corresponding breakdowns are due to rounding. Source: Authors elaborations

[12] Recall that we do not account for differences in elasticities across regions or subjects. One may argue that London will not lose as much, as it can absorb more international students that would have gone to other regions instead under the status quo. We have no information to assess the extent of such cross-region interaction and the potential strategic pricing of HEI. Also, the current distribution of students could be not simply dictated by individual preference but by the availability of places in a given HEI of choice.

[13] It is worth pointing out that the variations reported in both Table 5 and Figure 12 depend on actual student numbers, as well as on the size of the implied variation in fees at the regional and subject level (which, in turn, depends on the domestic fees caps and the fees charged to international students). As an alternative, we could ignore the differences in fees changes across region-subject groups and consider, instead, the change that would take place if fees changed by the same amount across all region-disciplines. We report this analysis in Table C1 in the Appendix. We consider the minimum change in fees recorded across the aforementioned combinations to carry out this exercise (corresponding to "Wales" and "Design and Craft"). Although the main results from this additional analysis are similar, they highlight a higher drop in CI students relative to the total drop (for instance, the ratio between the variation in students numbers in CIs subjects and Non-CI subjects increases to 0.35 and 0.38 for the East Midlands and South West).

6. Conclusions

While much of the debate on the value of higher education in UK policy has concentrated on graduate earnings, in this paper, we take the perspective that the education sector is also an internationally competitive and exporting sector. In this sense, international students help to partly subsidise local students, an issue of great importance for the funding of all degrees, but creative degrees in particular. Creative degrees attract a considerable number of international students. Moreover, given the unequal spatial distribution of HEIs in the UK and their disciplinary specialisation, the effects of international students are also differently distributed across disciplines and regions. Similarly, the ability of the sector to keep attracting international students, especially in the face of shocks, has critical implications both nationally and at the local level.

Given the above motivation, in this paper, we have discussed the enrolment of international students across UK creative disciplines and regions. There are several motivations for looking specifically at creative degrees beyond the issue related to their funding. Skill shortages in the creative industries are a risk factor for an exponentially growing sector of the economy. Also, creative graduates, together with a diverse and cosmopolitan culture, are linked to higher local growth. Hence, looking at international creative students can have important implications for the UK's Industrial Strategy and the "levelling-up" agenda pursued by the present UK Government.

Using HESA data, we find that upward enrolment trends characterise most disciplines and regions, especially for postgraduate education. We also find that creative

degrees are more spatially dispersed than what would be expected on the grounds of the well-known spatial concentration of the creative industries. Similarly, international students in creative subjects, while less dispersed than domestic students, are still quite dispersed and provide benefits across the UK in line with the regional contribution of HEIs. While London and the South-East are the largest destinations for international students, in relative terms international students are essential across all regions.

Given that international students recruitment is currently under threat because of the COVID-19 pandemic and the potential reduction in students due to the post-Brexit arrangements for EU students, we also try to assess the impact of these shocks in terms of student numbers. These shocks are likely to produce effects that are different across sub-disciplines, HEIs and regions, and this analysis can be of potential interest for policy intervention. Indeed, our simulations show how specific sub-disciplines and regions are more likely to 'feel the squeeze' than others. Policymakers should take into account the heterogeneity of these effects and consider them in the current set of pandemic mitigation policies.

Also, given the widespread desire to increase international student numbers, it should be further recognised that UK creative degrees are internationally competitive and increasingly play their part in attracting international students. This attractiveness should also be considered when discussing their funding models, as international students generate export revenues that contribute to partly funding creative degrees. Furthermore, international students sustain the strength of the sector and have the potential to reduce skill shortages, especially, at advanced postgraduate level. Importantly, while not distributed equally, these students are

enrolled across the regions and contribute locally across the entirety of the UK, an issue of relevance for the levelling-up agenda.

The research presented in this paper represents a starting point for further research in the area. It would be essential to investigate the specific determinants of international demand and obtain more precise estimates of the specific elasticity of international demand for creative degrees. Future research could also address more directly the financial implications for individual HEIs and the regions of changes in student numbers. Also, it would be critical to better understand the effects of international students on sectoral and local labour markets, especially in light of the recently introduced changes to post-study visas. Finally, while most commentators agree that international students partly subsidise local students, more in-depth understanding is needed about their importance for the offer of creative subjects by UK HEIs. Indeed, even small changes in international recruitment could make the creative offer by specific HEIs more financially sustainable and thereby affect the upskilling opportunities for local workers.

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Appendix A: CI subjects and Higher Education Institutions.

Course groupings are based on Comunian, Faggian, and Jewell (2011). Note that the cited mapping is at the 4-digit JACS (v2) level, not at the level of principal subject (PS). Not all 4-digit JACS mapped to the Creative Industries are neatly mapped in the PS codes.

Table A1: Principal subjects mapped to Creative Industries

Creative Industry	Principal Subject
Advertising and Marketing	(N5) Marketing, (P2) Publicity studies
Architecture	(K0) Broadly-based programmes within architecture, building & planning, (K1) Architecture
Design and Craft	(W2) Design studies, (W7) Crafts, (W9) Others in creative arts & design
ICT and Games	(G4) Computer science, (I1) Computer science, (I6) Games, (I7) Computer generated visual & audio effects, (J9) Others in technology
Performing and Visual Arts	(W1) Fine art, (W3) Music, (W4) Drama, (W5) Dance
Screen Industries	(P3) Media studies, (W6) Cinematics & photography
Writing and Publishing	(P4) Publishing, (P5) Journalism, (P9) Others in mass communications & documentation, (W8) Imaginative writing

Table A2: Higher Education Institutions, by Region

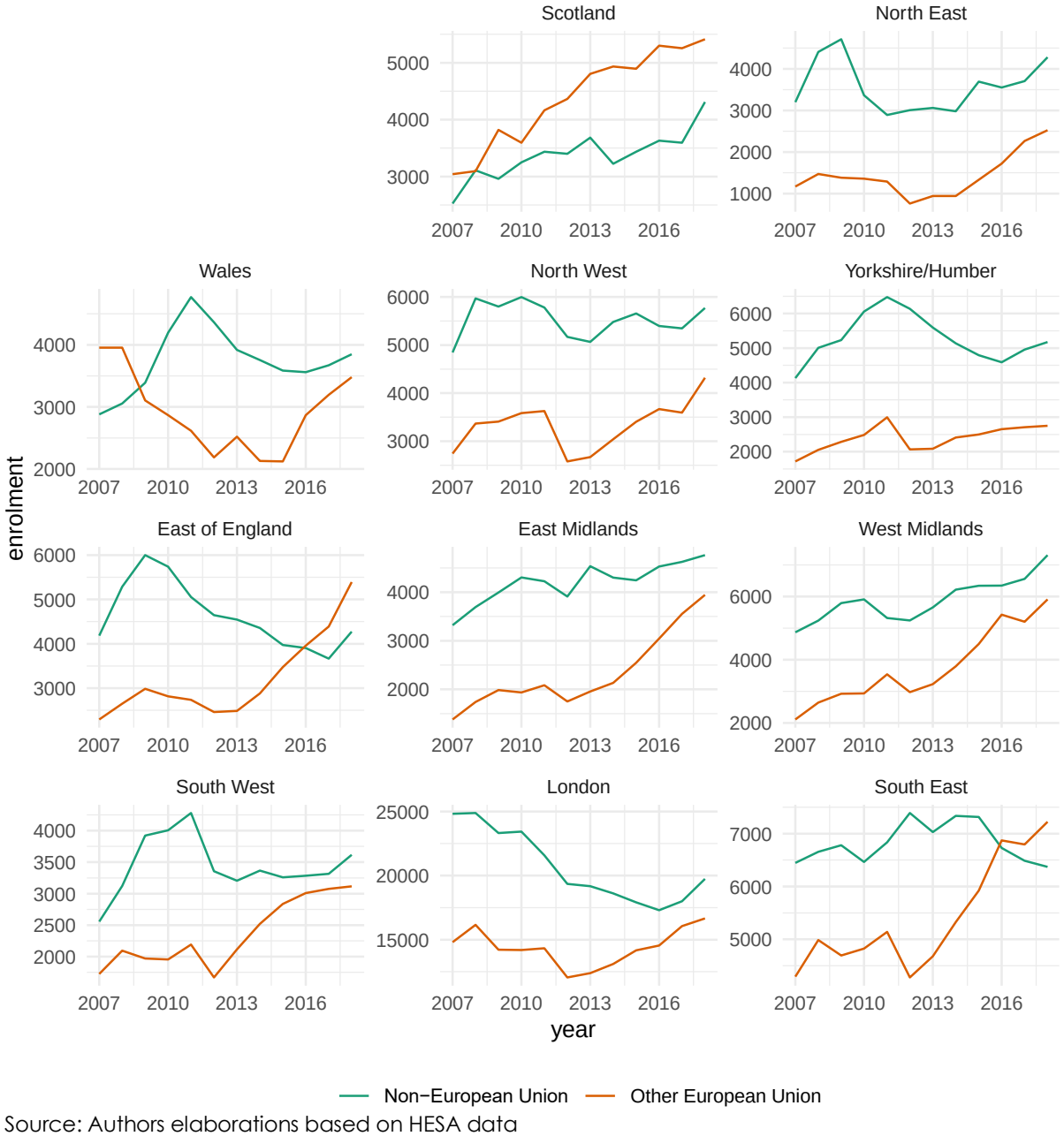
Region	Higher Education Institution
Northern Ireland	Queen's University Belfast, St Mary's University College, Stranmillis University College, Ulster University
Scotland	The University of Aberdeen, University of Abertay Dundee, The University of Dundee, Edinburgh College of Art, Edinburgh Napier University, The University of Edinburgh, Glasgow Caledonian University, Glasgow School of Art, The University of Glasgow, Heriot-Watt University, Queen Margaret University, Edinburgh, The Robert Gordon University, Royal Conservatoire of Scotland, The University of St Andrews, SRUC, The University of Stirling, The University of Strathclyde, University of the Highlands and Islands, The University of the West of Scotland
North East	University of Durham, Newcastle University, University of Northumbria at Newcastle, The University of Sunderland, Teesside University
Wales	Aberystwyth University, Bangor University, Cardiff University, Cardiff Metropolitan University, Glyndŵr University, Gower College Swansea, Grŵp Llandrillo Menai, The University of Wales, Newport, Grŵp NPTC Group, Swansea Metropolitan University, Swansea University, University of Wales Trinity Saint David, Trinity University College, University of South Wales, The University of Wales (central functions)
North West	The University of Bolton, The University of Central Lancashire, University of Chester, University of Cumbria, Edge Hill University, The University of Lancaster, Liverpool Hope University, Liverpool John Moores University,

	The Liverpool Institute for Performing Arts, The University of Liverpool, Liverpool School of Tropical Medicine, The Manchester Metropolitan University, The University of Manchester, Royal Northern College of Music, The University of Salford
Yorkshire/Humber	The University of Bradford, The University of Huddersfield, The University of Hull, Leeds College of Music, Leeds Arts University, Leeds Beckett University, Leeds College of Music, The University of Leeds, Leeds Trinity University, Sheffield Hallam University, The University of Sheffield, York St John University, The University of York
West Midlands	Aston University, Birmingham City University, The University of Birmingham, University College Birmingham, Coventry University, Harper Adams University, Harper Adams University, Keele University, Newman University, Staffordshire University, The University of Warwick, The University of Wolverhampton, University of Worcester
East Midlands	Bishop Grosseteste University, De Montfort University, University of Derby, The University of Leicester, The University of Lincoln, Loughborough University, The University of Northampton, University of Nottingham, The Nottingham Trent University
East of England	Anglia Ruskin University, University of Bedfordshire, The University of Cambridge, Cranfield University, The University of East Anglia, The University of Essex, University of Hertfordshire, Norwich University of the Arts, University of Suffolk, Writtle University College
South West	AECC University College, Bath Spa University, The University of Bath, The Arts University Bournemouth, Bournemouth University, The University of Bristol, Dartington College of Arts, The University of Exeter, Falmouth University, University of Gloucestershire, Hartpury University, Plymouth College of Art, University of Plymouth, Royal Agricultural University, University of St Mark and St John, University of St Mark and St John, University of the West of England, Bristol
London	Birkbeck College, The University College of Osteopathy, Brunel University London, The Institute of Cancer Research, City, University of London, Conservatoire for Dance and Drama, Courtauld Institute of Art, The University of East London, Goldsmiths College, The University of Greenwich, Guildhall School of Music and Drama, Heythrop College, Imperial College of Science, Technology and Medicine, Institute of Education, King's College London, Kingston University, University of the Arts, London, London Business School, University of London (Institutes and activities), London Metropolitan University, London South Bank University, London School of Economics and Political Science, London School of Hygiene and Tropical Medicine, Middlesex University, Queen Mary University of London, Ravensbourne University London, Roehampton University, Rose Bruford College of Theatre and Performance, Royal Academy of Music, Royal College of Art, Royal College of Music, The Royal Central School of Speech and Drama, The Royal Veterinary College, St George's, University of London, St Mary's University, Twickenham, SOAS University of London, The School of Pharmacy, Trinity Laban Conservatoire of Music and Dance, University College London, The University of West London, The University of Westminster
South East	The University of Brighton, Buckinghamshire New University, The University of Buckingham, Canterbury Christ Church University, The University of Chichester, University for the Creative Arts, The National Film and Television School, The University of Kent, The Open University, Oxford Brookes University, The University of Oxford, The University of Portsmouth, The University of Reading, Royal Holloway and Bedford New College, Solent University, The University of Southampton, The University of Surrey, The University of Sussex, The University of Winchester

Appendix B Additional Analysis on the Distribution of Students

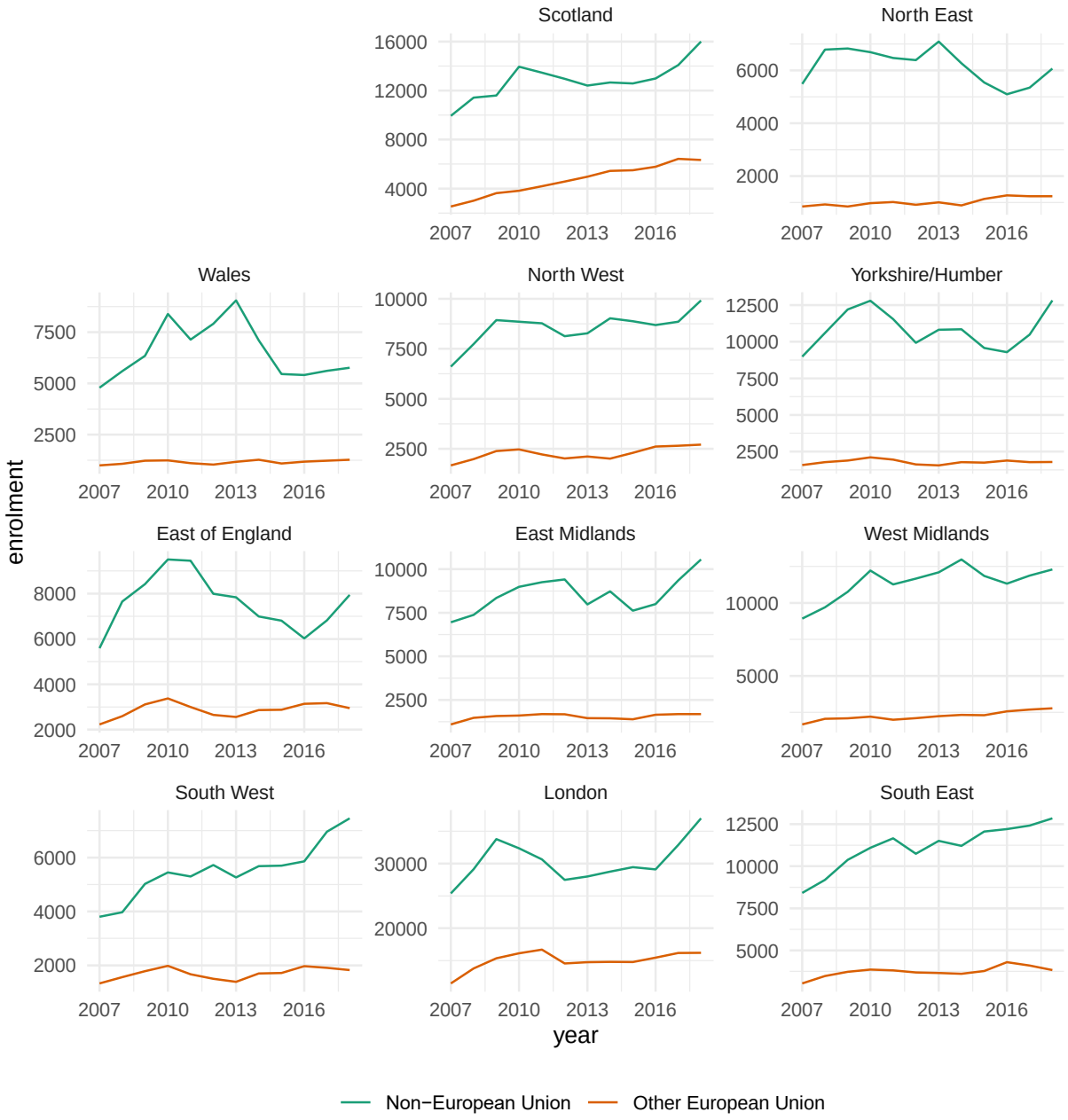
Figure B-1 presents an alternative representation of foreign student enrolment in CIs relative to Figure 5. The patterns are very similar to those presented in the main text, but the scales give a better sense of the absolute numbers involved.

Figure B-1: Trends of foreign enrolment in UG creative subjects, by region



Source: Authors elaborations based on HESA data

Figure B-2: Trends of foreign enrolment in PG creative subjects, by region

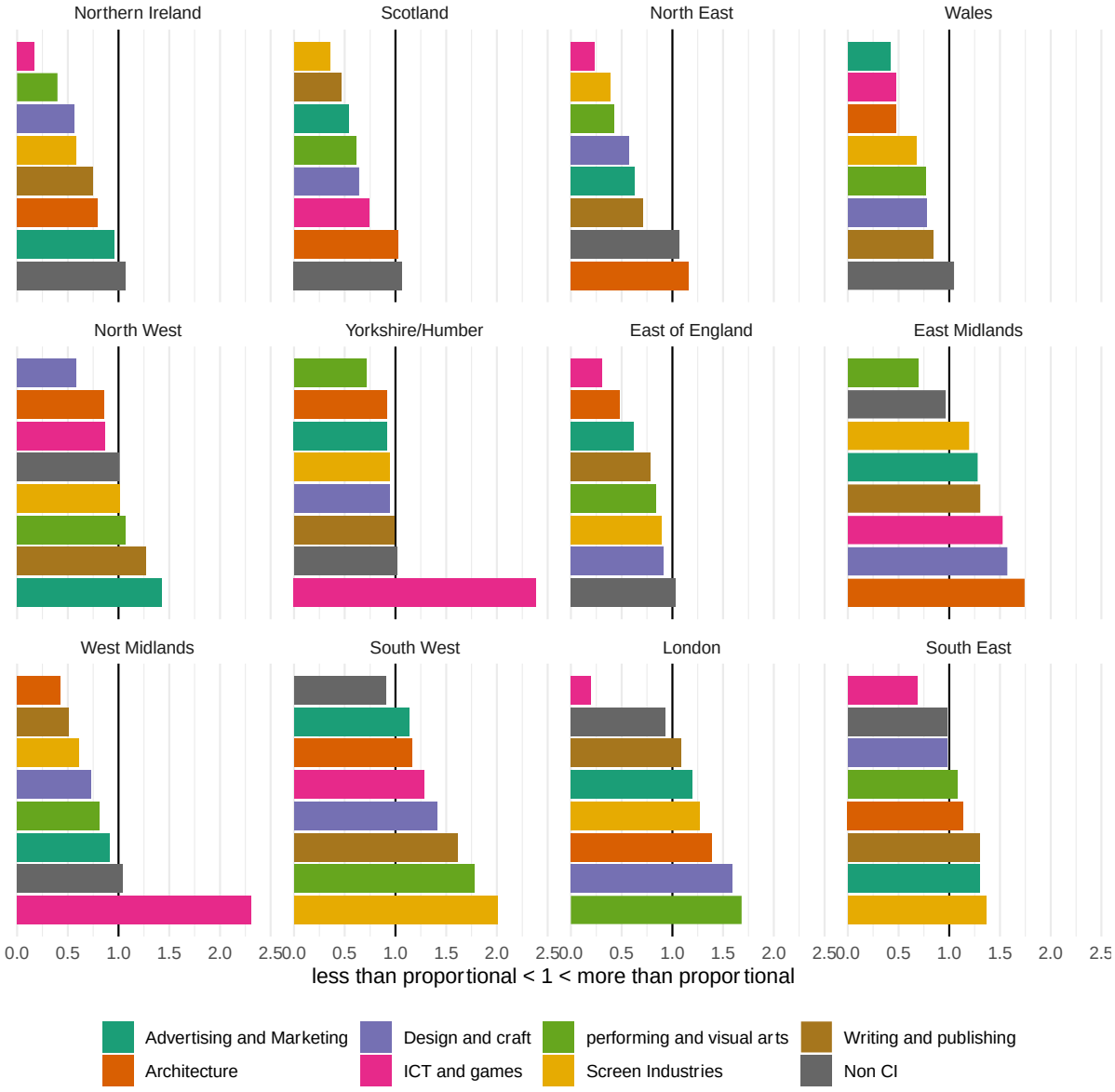


Source: Authors elaborations based on HESA data

Appendix B.3 Regions' shares of creative disciplines, UG and PG.

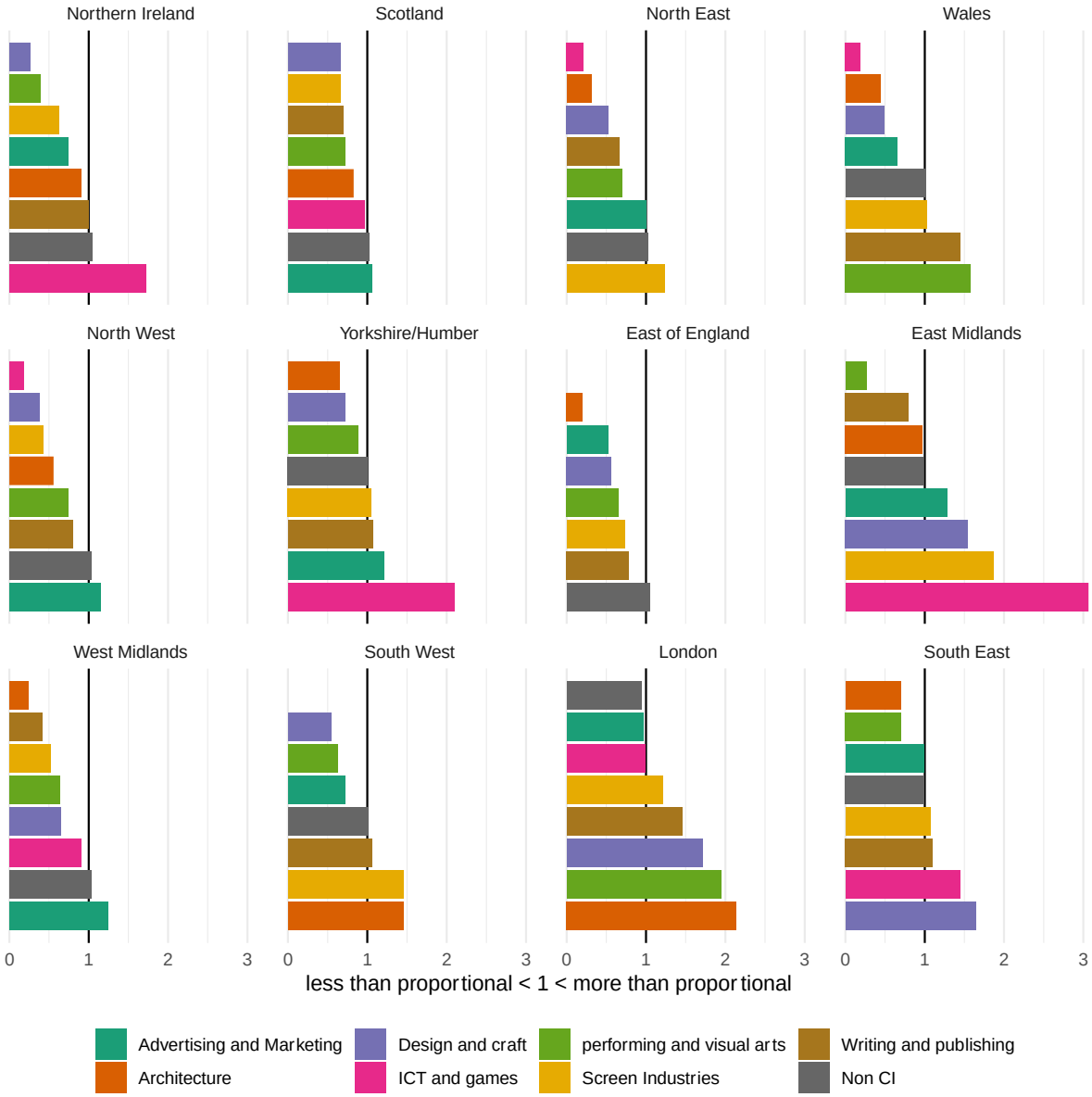
Figures B-3 and B-4 indicates shares of each creative subject discipline by region, for undergraduate and postgraduate levels, respectively.

Figure B-3: Undergraduate enrolment percentages



Notes: Bars by colour add to 100%. e.g. London has 25% of all national UG performing and visual arts students. Source: Authors elaborations based on HESA data

Figure B-4: Postgraduate enrolment percentages



Notes: Bars by colour add to 100%. e.g. London has 25% of all national UG performing and visual arts students. Source: Authors' elaborations based on HESA data

Appendix C: Additional Tables on Fees and EU students.

Table C1: Implied variation in EU students after equal % change in fees across regions-disciplines

	East Midlands	East	London	North East	North West	South East	South West	Wales	West Midlands	Yorkshire/H.	*Total*
Creative	-28	-22	-119	-9	-21	-47	-26	-17	-30	-14	-332
Non-CI	-80	-111	-369	-60	-89	-160	-68	-80	-128	-69	-1212
Total	-108	-133	-488	-69	-109	-206	-93	-97	-158	-82	-1544

Notes: This table reports the implied absolute variation in UG European students resulting from the percentage change obtained as in eq. (1), but considering an equal percentage change in fees, corresponding to the minimum increase in fees across region-discipline group combinations (equal to 36%). Differences between column/row totals and their corresponding breakdowns are due to rounding. Source: Authors' elaborations

Table C2: Mean International Fees by Region and Discipline, 2017/18

	East Midlands	East	London	North East	North West	Scotland	South East	South West	Wales	West Midlands	Yorkshire/H.	Overall
Adv & Marketing	12367	12367	13052	13658	13358	12106	12558	13222	13013	11772	12940	12765
Architecture	13862	13560	13592	14062	16310	15030	14014	14700	13993	12526	15017	14295
Design & Craft	13436	11963	14073	12094	12638	16436	13137	13321	11900	12598	13146	13454
ICT & games	14693	14544	15419	14987	14273	15430	15582	15423	13890	14144	15499	14979
Perf & Vis Arts	13159	12696	14991	12560	13035	15266	13615	13814	12565	13086	13068	13649
Screen Industries	13344	12233	13427	11854	12413	14377	13460	13620	12658	12603	13343	13180
Writing & Pub	12903	12218	12943	11746	12450	12183	12503	13385	12885	11892	12550	12652
Non-CI	14598	13595	14916	14251	14171	15714	14582	14820	13969	14031	14909	14619
Overall	14360	13422	14722	13964	13977	15579	14353	14574	13773	13804	14627	.

Notes: Mean fees applied to foreign students (non-EU) by discipline and region in the academic year 2017/18. The last column and row refer to the discipline and region, respectively. Source: Authors' elaborations

Table C3: Implied variation in EU students – lower bound (expected % change in fees)

	East Midlands	East	London	North East	North West	South East	South West	Wales	West Midlands	Yorkshire/H.	*Total*
Creative	-62	-43	-273	-20	-44	-111	-55	-29	-56	-32	-726
Non-CI	-203	-241	-967	-157	-199	-426	-172	-164	-279	-184	-2991
Total	-265	-284	-1240	-177	-243	-537	-227	-194	-335	-216	-3717

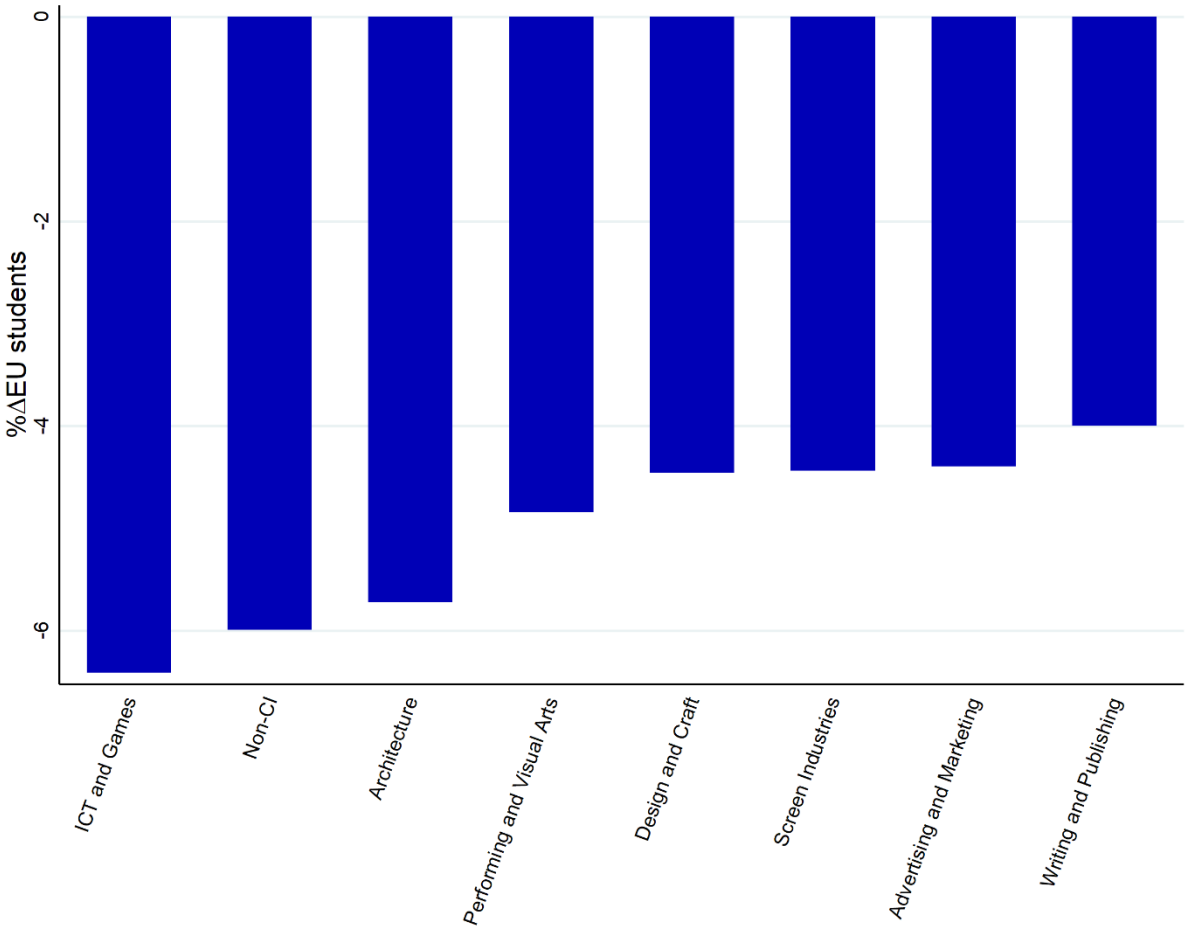
Note: This table reports the implied absolute variation in first-cycle European students resulting from the percentage change obtained as in eq. (2), but for considering the lower bound of the estimated elasticity coefficient. Differences between column/row totals and their corresponding breakdowns are due to rounding. Source: Authors' elaborations

Table C4: Implied variation in EU students – upper bound (expected % change in fees)

	East Midlands	East	London	North East	North West	South East	South West	Wales	West Midlands	Yorkshire/H.	*Total*
Creative	-39	-27	-170	-13	-27	-69	-34	-18	-35	-20	-451
Non-CI	-126	-150	-601	-97	-124	-265	-107	-102	-173	-114	-1859
Total	-165	-177	-771	-110	-151	-334	-141	-120	-208	-134	-2311

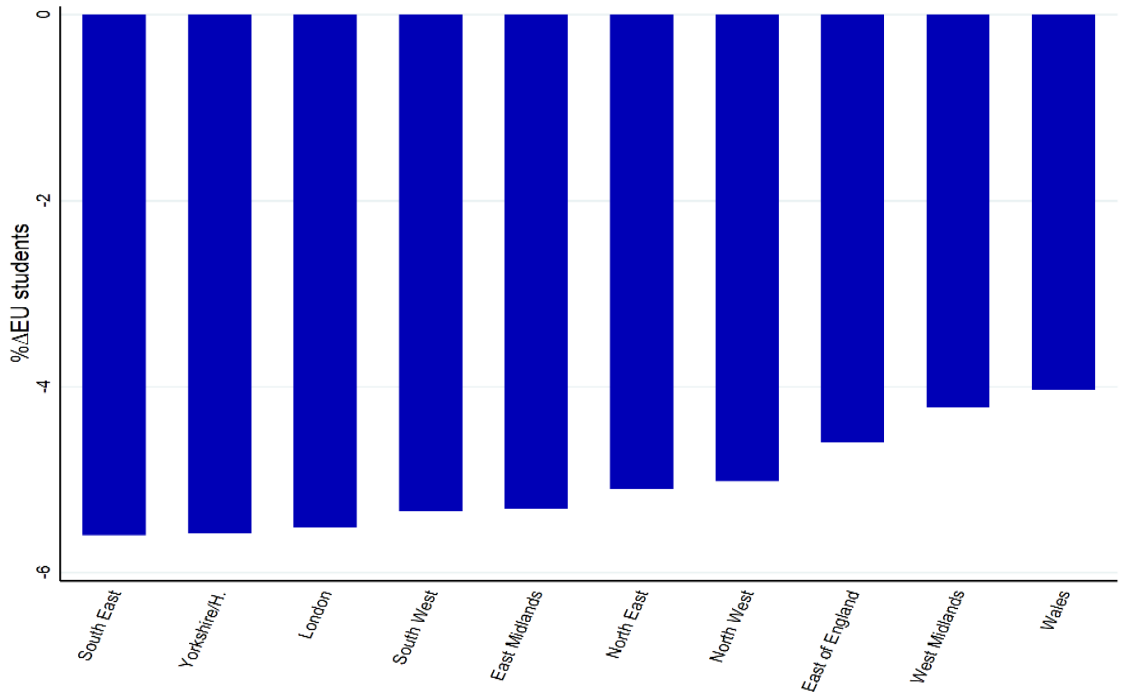
Notes: This table reports the implied absolute variation in first-cycle European students resulting from the percentage change obtained as in in eq. (2), but considering the upper bound of the estimated elasticity coefficient. Differences between column/row totals and their corresponding breakdowns are due to rounding. Source: Authors' elaborations

Figure C1: Implied %Change in EU Students by discipline group (point estimates)



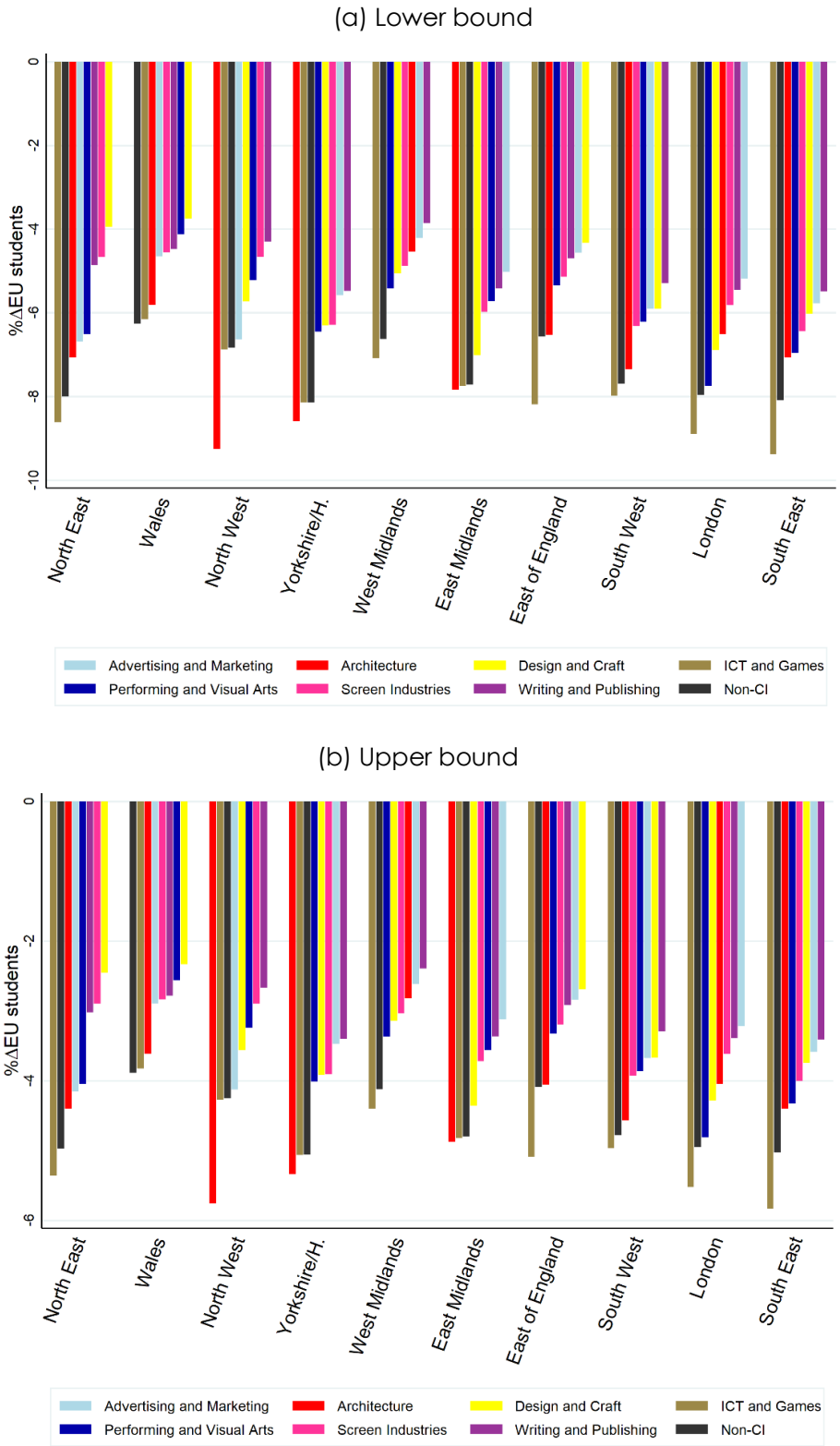
Notes: This graph breaks-down by discipline the implied percentage change in EU students following an increase in fees for EU students determined using eq. (2). Source: Authors' elaborations

Figure C2: Implied %Change in EU Students by region (point estimates)



Notes: This graph breaks-down the implied percentage change in EU students by discipline, following an increase in fees for EU students determined using eq. (2). Source: Authors' elaborations

Figure C3: Implied %Change in EU Students by Region and Discipline



Note: These graphs breaks-down the implied percentage change in EU students by discipline and region following an increase in fees for EU students determined using eq. (2). Top (bottom) panel reports predictions using lower (upper) bound of estimated coefficients from Beine et al. (2017). Source: Authors' elaborations

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