

National and international graduate migration flows

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Abstract

This article examines the nature of national and international graduate migration flows in the UK. Migration equations are estimated with microdata from a matched dataset of *Students and Destinations of Leavers from Higher Education*, information collected by the *Higher Education Statistical Agency*. The probability of migrating is related to a set of observable characteristics using multinomial logit regression. The analysis suggests that migration is a selective process with graduates with certain characteristics having considerably higher probabilities of migrating, both to other regions of the UK and abroad.

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Introduction

One of the key outputs of the higher education sector is the production of skilled labour. It is well-known that, on average, the employment rates and earnings of graduates are considerably above those of non-graduates, suggesting that employers to a certain extent value the skills being generated by the UK higher education sector. It is equally well-known that there is a tendency for graduates to study in and stay after graduation in the region where they studied. However, there is a considerable amount of movement of graduates between different regions of the UK, for example between England, Northern Ireland, Scotland and Wales. Likewise, there is a considerable amount of movement abroad. The main purpose of this article is to quantify the extent of this movement. In addition, an attempt is made to explore empirically the determinants of graduate migration flows.

Data

The analysis is based on microdata collected by *Higher Education Statistical Agency (HESA)*¹. More specifically, information is merged from two data-sets for five graduation cohorts of higher education institutions (HEI) students, covering the academic years 2002/03 to 2006/07.

The first dataset is the *Students in Higher Education Institutions*². This primarily consists of information provided by the HEI at which the individual studied. As is discussed in more detail below, variables include subject of study, level of study, class of qualification, mode of study, age, gender and place of domicile.

The second dataset is the *Destinations of Leavers from Higher Education Institutions (DLHE)*³. The data are collected through a questionnaire, administered approximately six months after the student has graduated. Detailed information about employment and further study is collected.

In this merged dataset, there are three postcodes of interest. The *first* is the postcode corresponding with the individual's so-called 'place of domicile'. This is the postcode of the student's permanent or home address prior to entry to the programme of study. Although imperfect, for the vast majority of graduates this will also be the place where they completed at least some of their secondary schooling. The *second* postcode is 'place of study'. This is simply the address of the HEI attended. The *third* is the postcode that corresponds to their 'place of employment six months after graduation'. Subject to data limitations discussed below, with these three postcodes it is possible to identify if an individual has moved from their place of domicile to their place of study and from their place of study to their place of employment. For those in employment six months after graduation it is possible to calculate migration rates once the level of geographic aggregation has been decided.

The *Destinations of Leavers* survey also interviews graduates who have moved abroad. Therefore, with these data it is not only possible to identify graduates who have moved to other parts of the UK ('national movers'), but also graduates who have emigrated abroad ('international movers'). For the purpose of this article, the level of geographic aggregation for national movers is four countries of the United Kingdom: England, Northern Ireland, Scotland and Wales. Such a division makes considerable sense when it is remembered that Northern Ireland, Scotland and Wales have elected devolved administrations whose responsibilities include matters related to all levels of education. For some analysis, England has been further disaggregated into the nine standard

'NUTS1' regions⁴: East, East Midlands, London, North East, North West, South East, South West, West Midlands and Yorkshire and Humber⁵.

There are a series of problems associated with using differing postcodes to proxy migration. Essentially, all these problems manifest measurement error. It is important to note that the survey did not collect any information on the graduate's home address (such as the postcode) at the time of graduation. The only information provided is the postcode of the student's permanent or home address prior to entry to the programme of study. Another problem is that given that 'place of employment' is measured six months after graduation, short-term repeat migration will be missed. For example, a graduate might move from their place of study three months after graduation and then move back to their place of study two months later. This individual would be miss-classified as a 'stayer'. Likewise, for distance learning students, such as those studying at the Open University, allocating place of study would almost certainly miss-classify them as 'movers'. In our analysis, all distance-learning students are assumed to be 'stayers'. There is also a problem dealing with HEIs that have multiple campuses since the data usually only report the name of the institution, with the researcher having to map the postcode. Although it is possible for some cases to identify the geographic location of the campuses, this weakness with the data generates some measurement error. It is also clear that many students commute. For example, it is believed that a sizeable number of students who study at HEIs in London, commute on a regular basis from regions outside London. Commuting is likely to be even more prevalent for students studying on a part-time basis. This is a potential further source of measurement error since for some of these students' place of domicile will not be the same as place of study given postcode information. As a consequence, they would be incorrectly classified as 'movers'.

The *DLHE* survey is a sample of graduates six months after graduation. Since it is a sample, there is always a concern about its overall representativeness. HESA claims a response rate above 75 per cent. They also state that the data are representative of the graduate population. It is hard to substantiate this claim. However, we are not aware of any hard empirical evidence to the contrary. Likewise, our discussion with other researchers using the data does not support the view that the data are non-representative. Nevertheless, graduates who have been more successful in finding appropriate employment, may exhibit a higher response rate. For example, those employed in what are termed 'non-graduate jobs' might have a lower response rate. Along similar lines, those who were less successful might be more reluctant to report details relating to their employer (like postcode). It may also be the case that individuals report the postcode of their firm's head office rather than the postcode of their actual place of work. Finally, there is the problem of those who work remotely, who through the use of information technology and the internet 'work' geographically away from their employer. Again, it is difficult to establish the seriousness of these problems. However, only a negligible percentage of graduates in employment six months after graduation included in the database did not report all three postcodes of interest to us. It is worth noting that the majority of these issues would be less problematic, and could be dealt with in a more systematic way, if the survey collected the postcode of where a graduate actually lives, in addition to the postcode of their place of employment.

The above discussion has highlighted some of the problems using postcode information to identify migration patterns. In this respect it is clear that the data have some important limitations. However, it should be kept in mind that the seriousness of these problems is likely to become more important, when the level of geographic disaggregation is greater. Since the primary focus of the

analysis included in this article is on the movements of employed graduates within and between the four countries of the UK and abroad, we believe that our findings are relevant.

It is important to stress that HESA does not compile similar data for international students, so all the estimates reported in this article refer to UK-domiciled students. In addition, all estimates are reported separately for 'undergraduate graduates' (including individuals being awarded qualifications below degree-level) and 'postgraduate graduates'. Although it is common to pool these two groups together, our analysis suggests that they are quite different. Formal statistical tests (not reported here) indicate that they should be treated as distinct populations, particularly in regression analysis.

Findings

Although this article is primarily concerned with migration after graduation, **Table 1** is a cross-tabulation of country of domicile by country of study for the five graduate cohorts pooled together. If all graduates studied in their country of domicile, then the diagonal cells in this matrix would each be 100 per cent. Although the majority of graduates study in their country of domicile, there is a considerable amount of movement from country of domicile to country of study. For example, of Wales-domiciled undergraduate graduates 33.5 per cent studied in England. Likewise, of Northern Ireland-domiciled postgraduate graduates 20.5 per cent studied in England.

Table 1 **Country of domicile by country of study, HEI graduate cohorts, 2002/03 – 2006/07**

		Country of study			
		England	Northern Ireland	Scotland	Wales
(a) Undergraduate graduates, per cent					
Country of domicile	England	95.4	0.02	1.4	3.2
	Northern Ireland	13.9	75.9	9.6	0.6
	Scotland	6.8	<0.1	93.0	0.2
	Wales	33.5	<0.1	0.6	65.9
<i>Number of observations = 1,159,324</i>					
(b) Postgraduate graduates, per cent					
Country of domicile	England	96.8	0.2	1.3	1.8
	Northern Ireland	20.5	73.9	4.5	1.1
	Scotland	11.7	0.3	87.4	0.5
	Wales	26.8	0.2	0.8	72.2
<i>Number of observations = 351,547</i>					

Source: Authors calculations with HESA data (see text)

Table 2 shows the estimated 'stayer', 'national mover' and 'international mover' rates for both undergraduate and postgraduate graduates for each graduation cohort and for the five cohorts pooled together. The data suggest that for those in employment six months after graduation, the

majority are stayers. The pooled estimates indicate that 92.4 per cent of undergraduate graduates and 92.2 per cent of postgraduate graduates were employed in the same country as they studied. Likewise, 7.6 per cent of undergraduate graduates and 7.7 per cent (of postgraduate graduates had moved. As the table shows, the national mover rate is about twice as large as the international mover rate. It is interesting to note that there is no clear trend from year to year.

Table 2 Stayer, national mover and international mover rates, HEI graduate cohorts, 2002/03 – 2006/07

(a) Undergraduate graduates, per cent			
Cohort	Stayer	National Mover	International Mover
2002/2003	92.3	5.2	2.6
2003/2004	92.4	5.3	2.3
2004/2005	92.1	5.5	2.4
2005/2006	92.6	4.9	2.5
2006/2007	92.7	5.0	2.4
All years	92.4	5.2	2.4
(b) Postgraduate graduates, per cent			
Cohort	Stayer	National Mover	International Mover
2002/2003	92.1	5.3	2.6
2003/2004	92.3	5.1	2.5
2004/2005	91.9	5.4	2.7
2005/2006	92.4	4.9	2.7
2006/2007	92.4	5.0	2.6
All years	92.2	5.1	2.6

Source: Authors calculations with HESA data (see text)

Table 3 is a cross tabulation of country of study by country of employment six months after graduation. Similar to Table 1, if all graduates were employed in the country in which they studied, the diagonal cells in this matrix would be 100 per cent for each of the four countries and '0 per cent' for the 'Abroad' cell. This is clearly not the case. Again, there is a considerable amount of regional variation. More specifically, graduates of English HEIs have the highest stayer rates. 95.7 per cent of undergraduate graduates and 94.9 per cent of postgraduate graduates are employed in England. The lowest stayer rates are for graduates of Welsh HEIs. Only 61.3 per cent of undergraduate graduates and 64.1 per cent of postgraduate graduates are employed in Wales. As the table shows, about a third of Welsh HEI graduates are employed in England. Graduates in Northern Ireland have the highest international mover rates, with 3.9 per cent of undergraduate graduates and 3.4 per cent of postgraduate graduates employed outside the UK.

Table 3 Country of study by country of employment six months after graduation, HEI graduate cohorts, 2002/03 – 2006/07

		Country of employment six months after graduation				
		England	Northern Ireland	Scotland	Wales	Abroad
(a) Undergraduate graduates, per cent						
Country of study	England	95.7	0.3	0.6	1.2	2.3
	Northern Ireland	3.4	91.8	0.8	0.1	3.9
	Scotland	11.5	1.5	83.5	0.3	3.3
	Wales	35.7	0.2	0.4	61.3	2.4
		<i>Number of observations = 837,279</i>				
(b) Postgraduate graduates, per cent						
		Country of employment six months after graduation				
		England	Northern Ireland	Scotland	Wales	Abroad
Country of study	England	94.9	0.4	1.0	1.0	2.6
	Northern Ireland	6.6	88.3	1.4	0.3	3.4
	Scotland	11.0	0.7	85.4	0.3	2.6
	Wales	32.5	0.5	0.9	64.1	2.0
		<i>Number of observations = 306,924</i>				

Source: Authors calculations with HESA data (see text)

Table 4 examines the relationship between country of study and country of employment in more detail. This table shows the distribution of employed graduates broken down further using English regions⁶. It is interesting to note that the share of graduates from Northern Ireland, Scotland and Wales moving to London is not excessively large. The highest rate is 5.5 per cent for postgraduate graduates who studied in Wales. The lowest rate is 0.4 per cent for undergraduate graduates who studied in Northern Ireland. However, when English regions are considered, there is considerable variation. For undergraduate graduates the lowest stayer rate is 41.8 per cent for graduates of HEIs in the South East, with 25.7 per cent of the total moving to London. For undergraduate graduates the highest stayer rate is 71.3 per cent for graduates of London-based HEIs.

The ranking is somewhat different for postgraduate graduates, where the lowest stayer rate is 47.8 per cent for graduates of East Midlands HEIs, with 8.1 per cent of the total moving to London. The highest stayer rate is 71.1 per cent for graduates of North West HEIs. This is slightly higher than the 70.6 per cent for graduates of London HEIs.

Table 4 Distribution of employed graduates six months after graduation, HEI graduate cohorts, 2002/03 – 2006/07

(a) Undergraduate graduates, per cent	Stayed	London	Rest of England	Rest of UK	Abroad
Place of Study					
England	93.5	-	-	2.1	2.5
Northern Ireland	92.9	0.4	1.7	0.9	4.0
Scotland	83.7	3.9	7.0	1.8	3.6
Wales	62.3	4.4	30.2	0.6	2.5
South East	41.8	25.7	28.1	1.9	2.4
East Midlands	42.9	11.2	41.9	1.7	2.3
West Midlands	52.5	11.9	31.4	2.2	2.0
Yorkshire and Humber	54.7	7.8	33.1	1.5	2.9
South West	55.2	13.9	23.8	3.7	3.4
East	58.9	17.9	19.0	1.3	3.0
North East	59.9	8.9	25.3	3.0	3.0
North West	68.1	5.8	20.4	3.5	2.2
London	71.3	-	25.6	0.9	2.2

Number of observations=812,433

(b) Postgraduate graduates, per cent	Stayed	London	Rest of England	Rest of UK	Abroad
Place of Study					
England	94.6	-	-	2.5	2.9
Northern Ireland	90.0	1.1	3.8	1.7	3.5
Scotland	85.5	3.2	7.5	1.0	2.9
Wales	65.1	5.5	26.0	1.4	2.1
East Midlands	47.8	8.1	39.5	2.6	2.1
South East	52.7	22.5	20.0	2.1	2.7
East	55.3	15.9	21.3	2.2	5.2
West Midlands	56.0	9.3	29.9	3.0	1.8
Yorkshire and Humber	61.4	5.4	28.5	2.2	2.5
South West	62.5	10.2	20.3	3.7	3.3
North East	67.6	5.8	20.4	3.6	2.5
London	70.6	-	24.7	1.2	3.5
North West	71.1	4.7	17.5	4.5	2.2

Number of observations=298,136

Source: Authors calculations with HESA data (see text)

Table 5 reports on a further source of variation between country of study and country of employment. More specifically this table shows the stayer, mover and international mover rates broken down by place of study and place of domicile. Basically, the rates are calculated separately for graduates who studied in their country of domicile (for example, England-domiciled students studying in England) and for graduates who studied in a country different to their county of domicile (for example, Northern Ireland, Scotland and Wales-domiciled graduates who studied in England). The latter group is 'Rest of the UK'. What is immediately clear is that there are large differences in rates between 'own-domiciled' and Rest of the UK-domiciled graduates. In all cases, the stayer rate is considerably lower for Rest of the UK-domiciled graduates. For example, for undergraduate graduates who studied in Scotland, the stayer rate for Scotland-domiciled students is 92.0 per cent compared to 37.4 per cent for Rest of the UK -domiciled graduates. In addition, for undergraduate graduates it is always the case that the international mover rate for Rest of the UK-domiciled graduates is higher than for own-domiciled graduates. For postgraduate graduates this is also the case for graduates of English, Welsh and Scottish HEIs, but not for graduates of Northern Irish HEIs.

Table 5 Stayer, national mover and international mover rates by place of study and place of domicile, HEI graduate cohorts, 2002/03 – 2006/07

(a) Undergraduate graduates, per cent								
Place of Study	England		Northern Ireland		Scotland		Wales	
Place of Domicile	England	Rest of UK	Northern Ireland	Rest of UK	Scotland	Rest of UK	Wales	Rest of UK
Stayer	97.1	53.9	92.0	37.4	90.4	24.3	92.0	50.3
National Mover	0.7	41.9	5.6	54.5	8.6	71.6	4.0	43.9
International Mover	2.2	4.3	2.4	8.1	1.1	4.1	3.9	5.8

(b) Postgraduate Graduates, per cent								
Place of Study	England		Northern Ireland		Scotland		Wales	
Place of Domicile	England	Rest of UK	Northern Ireland	Rest of UK	Scotland	Rest of UK	Wales	Rest of UK
Stayer	96.6	54.1	93.4	29.5	83.9	17.5	93.3	7.1
National Mover	0.9	40.7	4.6	63.7	14.8	79.0	3.2	90.4
International Mover	2.5	5.3	2.0	6.8	1.4	3.5	3.5	2.5

Source: Authors calculations with HESA data (see text)

There also appears to be a relationship between 'place of domicile' and 'place of employment'. For example, around 13.3 per cent of those who studied in Scotland, Wales or Northern Ireland are England-domiciled graduates who returned to England to work. Of this total, 68.3 per cent returned to the same region of domicile (that is, they returned 'home'). Put differently, 2.9 per cent of England-domiciled students who moved to Scotland, Wales or Northern Ireland to study returned to England to work. 68.3 per cent of these returned to the same (NUTS1) region of domicile.

Table 6 shows the country distribution of international movers. The European Union is the main destination region. Of those who had moved abroad, 44.1 per cent of undergraduate graduates and 35.6 per cent of postgraduate graduates had moved to the European Union, with France, Germany, Ireland, Italy and Spain being the main destination countries. The most popular destination country for undergraduate graduates is France, accounting for 16.9 per cent of the total, followed by the United States at 9.2 per cent. The most popular destination country for postgraduate graduates is the United States for 14.5 per cent of the total. Somewhat surprisingly, Ireland is the second most popular destination country at 7.1 per cent. At first glance, it may appear 'surprising' that Ireland is the second most popular destination country for postgraduate graduates. The data suggest that there is a considerable amount of movement between Northern Ireland and the Republic of Ireland. In our data period there were 9,019 post-graduates studying in Northern Ireland. Of these, 311 moved abroad to work, which is 3.4 per cent of the post-graduates who studied in Northern Ireland. Of all those moving abroad to work, 63 per cent (196) moved to Ireland.

Table 6 Country distribution of international movers, HEI graduate cohorts, 2002/03 – 2006/07

Country of origin	Undergraduates per cent	Country of origin	Postgraduates per cent
European Union	44.1	European Union	35.6
France	16.9	Ireland	7.1
Ireland	7.0	Germany	5.7
Spain	5.5	France	4.9
Germany	3.8	Spain	3.3
Italy	2.9	Belgium	2.3
Austria	1.9	Holland	2.2
Holland	1.1	Italy	2.2
Belgium	0.9	Greece	1.9
Greece	0.6	Sweden	0.9
Poland	0.5	Cyprus	0.9
Cyprus	0.4	Austria	0.7
Sweden	0.4	Poland	0.5
Czech Rep.	0.4	Finland	0.5
Denmark	0.3	Denmark	0.4
Portugal	0.3	Czech Rep.	0.4
Finland	0.2	Portugal	0.4
Luxembourg	0.2	Luxembourg	0.3
Romania	0.1	Romania	0.2
Hungary	0.1	Hungary	0.2
Malta	0.1	Malta	0.1
Slovakia	0.1	Slovakia	0.1
Bulgaria	0.1	Bulgaria	0.1
Latvia	0.0	Latvia	0.0
Estonia	0.0	Lithuania	0.0
Lithuania	0.0	Estonia	0.0
Slovenia	0.0	Slovenia	0.0
United States	9.2	United States	14.5
Japan	6.4	Africa	8.4
Canada	5.1	Australia	5.2
Africa	5.0	Canada	4.0
Australia	4.5	Japan	3.1
China	3.9	Switzerland	2.9
Latin America	2.9	China	2.8
Switzerland	1.9	New Zealand	2.5
New Zealand	1.8	Latin America	2.3
Hong Kong	1.6	Hong Kong	1.3
India	1.3	India	0.9
Rest of the world	12.3	Rest of the world	16.5

Source: Authors calculations with HESA data (see text)

Regression analysis

In this section a multinomial logit regression model is used to examine the possible determinants of graduate migration flows. This model is non-linear which implies that its interpretation is less straightforward than for linear regression models. Essentially, it conveniently summarises how the probability of the outcome of interest is related to a set of explanatory variables. In our application the outcome variable takes on three possible values:

- (1) Stayer;
- (2) National mover; and
- (3) International mover, with the reference or baseline category being stayer.

Therefore the estimated effects are relative to this group⁷. In keeping with the descriptive analysis presented above, the model is estimated separately for undergraduate graduates and postgraduate graduates.

The explanatory variables are summarised in **Table 7**. All the variables used in the analysis are categorical, so the table gives the descriptive statistics as percentages. In our view, the use of categorical variables makes the interpretation of the results easier. Although this list of included variables is not complete, the selection does represent factors that others have found to be correlated with migration decisions⁸. The variables considered are:

- Sex
- Mode of study
- Disability status
- Ethnicity
- Class of qualification
- Subject studied
- Type of institution
- Age at graduation
- Moved to study
- Country of domicile
- County of study
- Cohort

Table 7 also shows the categories that were chosen as the excluded categories.

Most of these variables are self-explanatory, but several require further explanation. 'Class of qualification' was not available for postgraduate graduates. For the variables that had missing data, instead of removing them from the sample, variables representing missing information were created and these were included.

Although it is difficult to interpret the 'effects' of these variables, we believe that they help to reduce selection bias resulting from the exclusion of cases with missing information. The categories used for 'subject studied' were arrived at after some experimentation.

Table 7 **Descriptive statistics, variables included in regression analysis, HEI graduate cohorts, 2002/03 – 2006/07**

Variable		Undergraduate graduates per cent	Postgraduate graduates per cent
	Stayer	92.4	92.2
	National mover	5.2	5.1
	International mover	2.4	2.6
Sex	Male	40.0	38.8
	Female	60.0	61.2
Mode of study	Studied full-time	85.0	57.9
	Studied part-time	15.0	42.1
Disability status	Not disabled (excluded)	90.8	91.5
	Disabled	6.8	4.5
	Disabled missing	2.4	3.9
Ethnicity	White (excluded)	84.0	81.1
	Not white	12.3	9.7
	Ethnicity missing	3.7	9.2
Class of qualification	1st class	9.1	--
	2.1 class	39.2	--
	2.2 class (excluded)	25.3	--
	3rd class/Pass/other	12.0	--
	Class missing	14.4	--
Subject of study	Science	45.1	31.7
	Science-led	3.0	0.7
	Social science	22.1	27.3
	Social science-led	2.4	0.3
	Interdisciplinary	1.7	1.3
	Arts/Humanities (excluded)	25.4	38.8
	Arts/Humanities-led	0.4	0.1
	Subject missing	0.1	--
Type of institution	Russell group university	22.3	25.1
	Post-1992 university	39.8	31.2
	Old university (excluded)	25.0	32.9
	Specialist HEI	13.0	10.8
Age at graduation	Age < 24 (excluded)	70.2	23.8
	Age 25-29	10.1	27.6
	Age 30+	19.6	48.7
Moved to study	Yes	50.0	39.3
	No	50.0	60.7
Country of domicile	England (excluded)	82.9	81.7
	Scotland	8.4	9.6
	Wales	4.9	5.0
	Northern Ireland	3.8	3.7
Country of study	England (excluded)	81.9	82.3
	Scotland	9.3	9.6
	Wales	5.8	5.2
	Northern Ireland	3.0	2.9
Cohort	2002/03 (excluded)	19.7	19.0
	2003/04	20.5	19.4
	2004/05	18.3	18.7
	2005/06	20.8	21.2
	2006/07	20.7	21.6

'Science-led', 'Social-science-led' and 'Arts/Humanities-led' refer to joint and mixed qualifications with subjects from these fields dominant.

HEIs are divided into four groups:

- 'Russell' universities belong to a collaboration of twenty leading UK universities that receive around two-thirds of research grant funding in the UK
- 'Old' universities were already classified as universities before 1992 but do not belong to the Russell Group
- 'Post-1992' universities were classified as polytechnics until 1992
- 'Specialist HEIs' include those institutions where subjects including music, dance, drama or art are taught.

The variable 'Moved to study' captures whether the individual moved region to study. In order to construct this variable, England was divided into the nine NUTS1 regions (as discussed above), Scotland was divided into seven regions based on a council area aggregations⁹, Wales was divided into three regions (South-, Mid- and North Wales); and Northern Ireland divided into two regions (Belfast and not-Belfast). These regions were constructed in such a way to insure that all regions have HEIs in them. Based on this classification, a graduate was classified as 'moved to study' if their region of domicile was not the same as region of study. It is quite well known in the migration literature that an individual who has moved in the past has a considerably higher probability of moving in the future. Although this variable is crudely measured, it is an attempt to capture this important form of 'path dependence'.

The estimates of the multinomial logit regressions models are summarised in **Table 8**. Because of the very large sample sizes, almost all of the coefficients are statistically significant at conventional threshold levels. For both equations, the pseudo- R^2 values are above 20 per cent, which implies a very good fit remembering that these models are estimated with micro-data. In fact, this is a high value given that the equations were estimated with individual-level data.

Turning first to undergraduates graduates, men compared to women have a higher probability of migrating. That is, men have a higher probability of being both national and international movers, although the effect is most pronounced for international movers. Graduates who studied full-time compared to those who studied part-time have a lower probability of being a national mover but have a higher probability of being an international mover. However, this finding must be viewed with some caution since those studying part-time likely have a higher probability of commuting (as discussed above). Graduates with a disability have a higher probability of migrating and the effect is similar for both types of moves. Being of non-white ethnicity is associated with a lower probability of migrating.

There is a clear gradient with respect to the class of qualification obtained. The higher the class of qualification obtained, the higher the probability of migrating, with the effect being larger on the probability of being an international mover compared to being a national mover.

The results for subject of study are more mixed. Science qualifications (compared to arts and humanities qualifications) are associated with a higher probability of being a national mover but a lower probability of being an international mover. The effect is similar for science-led qualifications

but less pronounced. Interdisciplinary qualifications are associated with a higher probability of migrating but the effect is largest on the probability of being a national mover. Social science qualifications are associated with a lower probability of being an international mover. However, the opposite is the case for social science-led qualifications; this area of study is associated with a higher probability of moving both nationally and internationally. There is little difference between arts and humanities-led qualifications and arts and humanities qualifications. Those who graduated from a 'specialist HEI' (such as an art or music college) have a higher probability of being a national mover and a lower probability of being an international mover. Compared to being a graduate of 'old universities', graduates of Russell Group universities have a higher probability of migrating while graduates of 'Post-1992 universities' have a lower probability of migrating. These effects are much stronger in the opposite directions on the probability of being an international mover. The results suggest that the probability of migrating declines sharply after the age of 30.

Table 8 Multinomial regression results of the probability of migrating, HEI graduate cohorts, 2002/03 – 2006/07

Variable	Undergraduate graduates				Postgraduate graduates			
	National mover	Coeff. in SE*)	International mover	Coeff. in SE*)	National mover	Coeff. in SE*)	International mover	Coeff. in SE*)
Male	0.125	10.7	0.252	17.2	0.169	9.0	0.492	21.0
Studied full-time	-0.091	3.6	0.199	5.0	-0.214	8.9	0.725	23.4
Disabled	0.114	5.2	0.125	4.6	0.023	0.5	-0.094	1.7
Disabled missing	0.227	4.9	0.125	2.1	0.365	7.9	0.300	5.7
Ethnicity Non-white	-0.396	15.1	-0.354	12.6	-0.171	4.2	0.182	4.9
Ethnicity missing	-0.028	0.9	0.155	3.9	0.232	7.7	0.232	6.4
1st class	0.151	7.1	0.400	15.9	--	--	--	--
2.1 class	0.084	5.8	0.246	13.4	--	--	--	--
3rd class/Pass/other	-0.342	16.3	-0.379	12.0	--	--	--	--
Class missing	-0.490	19.2	-0.594	14.6	--	--	--	--
Science	0.107	7.3	-0.614	33.5	0.694	30.8	0.358	12.2
Science-led	0.084	2.3	-0.376	8.8	0.894	8.8	0.298	2.2
Interdisciplinary	0.397	6.9	0.165	2.6	0.315	2.5	0.551	5.1
Arts/Humanities-led	0.116	1.2	-0.069	0.6	-0.720	1.2	0.233	0.5
Subject missing	-0.810	1.4	1.019	3.0	--	--	--	--
Russell group university	0.066	4.5	0.237	13.4	0.098	4.3	0.128	4.9
Post-1992 university	-0.200	12.5	-0.639	30.9	-0.251	9.2	-0.879	24.8
Specialist HEI	0.071	3.5	-0.687	23.6	0.259	7.7	-0.846	15.7
Age at graduation 25-29	-0.037	1.7	-0.093	3.2	0.099	3.9	0.643	21.0
Age at graduation 30+	-0.242	10.6	-0.763	21.0	-0.039	1.4	0.267	7.7
Moved to study	2.462	125.4	0.531	31.8	2.194	88.2	0.451	19.1
Scotland-domiciled	-0.470	18.2	-0.439	10.3	0.203	5.3	-0.111	1.7
Wales-domiciled	1.076	52.6	-0.249	5.9	0.752	22.3	-0.288	3.7
Northern Ireland-domiciled	2.095	68.3	1.267	25.4	1.742	37.5	0.987	12.7
Studied in Scotland	2.472	108.0	0.899	23.9	1.709	47.4	0.031	0.5
Studied in Wales	3.345	211.4	0.589	16.6	3.135	104.7	0.332	4.4
Studied in Northern Ireland	-1.237	27.4	-0.883	14.7	-0.572	9.3	-0.850	8.9
2003/04	0.021	1.2	-0.113	5.0	0.008	0.3	-0.027	0.7
2004/05	-0.034	1.9	-0.110	4.8	-0.012	0.4	0.020	0.6
2005/06	-0.046	2.5	-0.048	2.2	-0.059	2.0	0.049	1.3
2006/07	-0.055	3.0	-0.081	3.6	-0.057	2.0	0.033	0.9
Constant	-5.68	146.3	-3.72	75.8	-5.49	113.1	-4.91	88.5
Number in analysis	837,279				306,924			
Log likelihood	-202,01				-79,19			
Pseudo R ²	0.236				0.200			

Note: *) Ratio of coefficient to its standard error.

Graduates who moved regions to study have a higher probability of migrating. However, this effect is much larger on the probability of being a national mover compared to being an international mover. There are some clear differences by country of domicile and country of study. As was highlighted in Table 5, there clearly is an interaction between 'country of domicile' and 'country of study' that is not likely captured by the inclusion of dummy variables for each. It is our view that in order to understand how 'country of domicile' and 'country of study' affect the probability of migrating, country and domicile-specific equations need to be estimated. However, this task is outside the scope of this article. Finally, the results suggest that the probability of migrating has declined slightly for the more recent graduate cohorts in the analysis.

In terms of the direction of the effects of the included variables the findings for postgraduate graduates are surprisingly similar. However, there are some differences worth noting. The probability of postgraduate graduates migrating does not appear to be affected by disability status. Graduates of a non-white ethnicity have a higher probability of being an international mover. More recent cohorts of graduates have a lower probability of being a national mover.

How 'big' are the effects of these variables? One way to attempt to answer this is to use the regression equations to 'predict' the probability of migrating nationally and internationally for hypothetical graduates 'made up' of different combinations of the variables included in the regression equations. The obvious baseline for comparison is the hypothetical graduate who represents the mean values of the variables. For this graduate (Graduate A) the predicted probabilities of migrating are the same as the proportions in each category in the raw data (that is, the actual values, see Table 2). For illustrative purposes this hypothetical graduate is compared to one who is a white, non-disabled male who studied full-time, graduated between the ages of 20 and 24 with a 1st class science qualification from a Russell Group university and has moved to another region in order to study (Graduate B).

Table 9 Predicted migration probabilities, HEI graduate cohorts, 2002/03 – 2006/07

(a) Undergraduate graduates, per cent	Graduate A	Graduate B	Absolute difference	Percentage difference
Stayer	92.4	82.8	-9.7	-10.4
National mover	5.2	11.7	6.5	126.2
International mover	2.4	5.6	3.1	130.2
(b) Postgraduate graduates, per cent	Graduate A	Graduate B	Absolute difference	Percentage difference
Stayer	92.2	81.5	-10.7	-11.6
National mover	5.1	13.2	8.1	157.4
International mover	2.6	5.3	2.7	101.4

Note:

See text for further details.

Graduate A = mean values of variables

Graduate B = white, non-disabled, male, who studied full-time and graduated between the ages of 20 and 24 with a science qualification from a Russell Group university that he moved to in order to study.

The probabilities associated with these two graduates are given in **Table 9**. For both undergraduate graduates and postgraduate graduates, the probability of migrating is over twice as large for Graduate B compared to Graduate A. For undergraduate graduates, the probability of being a national mover increases from 5.2 per cent to 11.7 per cent and the probability of being an international mover increases from 2.4 per cent to 5.6 per cent. As the table shows, the increase in the propensity to migrate in percentage terms is about the same for both types of moves. For postgraduate graduates, the probability of national movers increases from 5.1 per cent to 13.2 per cent and the probability of being an international mover from 2.6 per cent to 5.3 per cent. Again as the table shows in this comparison the impact is larger in percentage terms on moving nationally compared to moving internationally.

Concluding comments

Data collected by the Higher Education Statistical Agency suggest that a large number of UK-domiciled graduates are working outside the United Kingdom six months after graduating. Of the five graduation cohorts spanning the academic years 2002/03 to 2006/07, about 2.4 per cent of undergraduate graduates and 2.6 per cent of postgraduate graduates were working abroad. There is also movement of graduates around the countries of the UK. Data for the same period suggest that about 2.1 per cent of undergraduate graduates of English HEIs are working in Northern Ireland, Scotland or Wales six months after graduation. The analogous estimates for Northern Ireland, Scotland and Wales are much higher at 4.3 per cent, 13.3 per cent and 36.3 per cent, respectively. It is also interesting to note that there is considerable variation in the proportion of graduates who return to their country of domicile after studying in one of the other countries of the UK. For example, 61.9 per cent of England-domiciled students who studied in Northern Ireland, Scotland or Wales returned to England to work. The analogous estimates for Northern Ireland, Scotland and Wales are 6.0 per cent, 60.2 per cent and 85.7 per cent respectively. The figures are similar for postgraduate graduates. The range of estimates is even wider when regions within England are considered.

Regression analysis indicates that the migration of graduates is a selective process. Migration is correlated with a series of characteristics, some of which capture academic performance, such as class of qualification obtained and age at graduation.

Key Findings

- For UK-domiciled graduates there is a considerable amount of movement between country of domicile and country of study.
- Of those graduates who are employed six months after graduation, the majority are employed in the same country where they studied.
- Graduates of English HEIs have the lowest migration rates while graduates of Welsh HEIs have the highest. Graduates of Northern Irish HEIs have the highest international migration rates.
- London is not the main destination of graduates who move nationally, although it is the single most common destination.
- Migration rates are generally much higher for graduates who did not study in their country of domicile, since many return to their region of domicile after graduation.
- The European Union is the most popular destination region for international movers, with the United States also being important.
- A multinomial regression analysis suggests that migration is a selective process with graduates with certain characteristics having considerably higher probabilities of migrating both to other regions of the UK and abroad. Characteristics that appear to be important include class of degree, subject studied, type of institution attended and age at graduation.

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References

- 1 HESA is the official agency for the collection, analysis and dissemination of quantitative information about higher education in the United Kingdom. One of its main objectives is to manage a system of data collection, analysis and dissemination aimed at facilitating research. Further information can be found at: www.hesa.ac.uk.
- 2 For background information and descriptive cross-tabulations see the following annual publication: *Students in Higher Education Institutions*, Cheltenham, Higher Education Statistical Agency. Available at: www.hesa.ac.uk/index.php?option=com_pubs&Itemid=122
- 3 For background information and descriptive cross-tabulations see the annual publication: *Destinations of Leavers from Higher Education Institutions*, Cheltenham, Higher Education Statistical Agency. Available at: www.hesa.ac.uk/index.php?option=com_pubs&Itemid=122

- 4 Eurostat (2009) 'The NUTS classification.' Available at: http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/regional_statistics/nuts_classification
- 5 For more detailed information on how the English regions are defined see :Office for National Statistics, Regional Trends. Available at: www.statistics.gov.uk/statbase/product.asp?vlnk=836
- 6 The sample sizes are different in Tables 3 and 4 because of missing postcode information. Therefore, it was not possible to allocate a specific NUTS1 region to all graduates working in England. The observations were therefore excluded from the calculations of the estimates presented in Table 4.
- 7 For a comprehensive treatment of the multinomial logit model see Chapter 24 in Greene, W (2007) *Econometric Analysis*. 6th Edition, London, Pearson Education.
- 8 See for example the studies of: Faggian, A and McCann, P (2006), 'Human Capital Flows and Regional Knowledge Assets: A Simultaneous Equation Approach', *Oxford Economic Papers*, vol 52: 475-500; Faggian, A McCann, P and Sheppard, S (2006) 'An Analysis of Ethnic Differences in UK Graduate Migration Behaviour'. *Annals of Regional Science*, vol 40: 461-471; Faggian, A, McCann, P and Sheppard, S (2007) 'Human Capital, Higher Education and Graduate Migration: An Analysis of Scottish and Welsh Students'. *Urban Studies* vol 44: 2511-2528; Faggian, A, McCann, P and Sheppard, S (2007) 'Some Evidence That Woman Are More Mobile than Men: Gender Differences in UK Graduate Migration Behavior'. *Journal of Regional Science*, vol 47: 517-539; and Faggian, A, Li, Q C and Wright, RE (2009) 'Graduate Migration Flows in Scotland'. *Fraser of Allander Economic Quarterly*, vol 33, no 1: 55-60.
- 9 Aberdeen City Region (Aberdeen City and Aberdeenshire), Dundee City Region (Dundee, Angus and Perth & Kinross), Edinburgh City Region (East Lothian, City of Edinburgh, Midlothian and West Lothian), Stirling (Stirling, Falkirk and Clackmannanshire), Fife, Glasgow City Region (Glasgow, North Lanarkshire, South Lanarkshire, East Renfrewshire, Renfrewshire, Inverclyde, East Dunbartonshire, West Dunbartonshire, East Ayrshire, North Ayrshire, South Ayrshire) and Highlands, Moray & Islands (Argyll & Bute, Highlands, Moray, Eilean Siar, Orkney, Shetland, Scottish Borders and Dumfries & Galloway).