

McCann, Philip; Sheppard, Stephen

Conference Paper

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42nd Congress of the European Regional Science Association: "From Industry to Advanced Services - Perspectives of European Metropolitan Regions", August 27th - 31st, 2002, Dortmund, Germany

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: McCann, Philip; Sheppard, Stephen (2002) : An analysis of the gender determinants of UK graduate migration behaviour, 42nd Congress of the European Regional Science Association: "From Industry to Advanced Services - Perspectives of European Metropolitan Regions", August 27th - 31st, 2002, Dortmund, Germany, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<https://hdl.handle.net/10419/115661>

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An Analysis of the Gender Determinants of UK Graduate Migration Behaviour

Philip McCann* and Stephen Sheppard**

1. *Introduction*

The theoretical relationships between human capital acquisition, employment returns and migration behaviour are well rehearsed. Many models variants of the basic Becker (1964) type formulation have been applied to employment search models, and empirical evidence generally supports the basic conclusions of these formulations. In general, higher human-capital individuals tend to be more migratory, thereby achieving greater employment returns both by reason of their greater human-capital and also their mobility. Within this general area, there is one specific problem which has received very little attention, and this is the question of how these relationships are affected by gender. As a result of the interaction between human-capital acquisition and search behaviour, are men more geographically mobile than women or not? Without any empirical evidence to the contrary, most (male) commentators would tend assume that men are more mobile than women. Here, the implicit assumption is that men tend to be more attached to their careers than women, and that they are more likely to make the necessary moves required in order to achieve promotion. On the other hand, women are implicitly assumed to be relatively more attached to their locality than men, for reasons of family support networks etc. The seminal work of Ravenstein (1886), however, cast doubt on some of these arguments in that his fifth 'law' of migration suggests that women are more mobile than men, at least across short distances. Where this is empirically found to be true, it is often assumed that the reasons for this are related to coupling and marriage, in that women may be more migratory than men because they will tend to move according to the employment locations of their male partners or spouses (Detang-Dessendre and Molho 2000). Controlling for these life-cycle effects, it is thus assumed that we will still see that women are less migratory than men, because the wages they earn (Naylor et al. 1998) and the number of hours they work tend to be lower than men (Madden 1981). Once again, however, the overall evidence on these points is very limited. More importantly, however, the existing evidence concerning gender differences in migration behaviour largely ignores the interaction between human-capital and migration.

The issue we explore in this paper is the effect of gender on the interaction between human capital acquisition and employment-migration behaviour among UK university graduates. We examine the migration behaviour of students from domicile to higher education and then on from higher education to first employment. Controlling for the effects of human-capital acquisition as well as variations in regional economic conditions, we estimate the relationship between employment mobility and gender. Our results produce both strong and surprising conclusions: women are more inter-regionally mobile than men, even controlling for gender differences in occupations.

* Department of Economics, University of Reading, UK

** Department of Economics, Williams College, USA

2. Human Capital, Graduate Migration and Regional Labour Markets

Migration research suggests that the likelihood of an individual graduate moving between regions will be positively related to the human-capital characteristics of the individual (Sjaastad 1962), as well as to inter-regional differences in both regional wages and regional employment opportunities. At the same time, there is also a large body of research, which suggests that the extent of the previous migration of an individual is highly correlated with their subsequent migration behaviour (DaVanzo 1976, 1983; DaVanzo and Morrison 1981; Vanderkamp 1971; Newbold 1997). Combining human-capital migration models (Sjaastad 1962; Schwartz 1973; Bartel 1979) with models of spatial job-search (Simpson 1992; Hertzog et al. 1985; Molho 1986), we would therefore expect a positive correlation between previous migration and subsequent on-migration, and a positive correlation between these migration-on-migration elasticities and long-run real wages, even allowing for differences in the human-capital of any individual (Becker 1964) and the employment opportunities available at any particular location (DaVanzo 1978). In the case of university graduates, these arguments would imply that students graduating with higher grades and qualifications would generally be expected to be more migratory than students achieving lower grades, because their returns to migration will tend to be relatively higher. At the same time, in the case of university students, these arguments would also imply that the likelihood of a graduate moving in order to enter employment after university will be positively related to the extent of the initial migration from domicile to higher education (McCann and Sheppard 2001). The actual strength of these effects and resulting migration propensities will obviously differ according to differences in the extent to which local wage variations reflect purely local as against national economic conditions, as this will determine exactly how informative the individual's wage at a particular location will be as a benchmark for comparing alternative market opportunities (Richmond Cooper 1994). Yet, the general theoretical argument still holds that a greater initial migration propensity of a student should increase the subsequent migration propensity of the graduate, and by searching for higher real wage employment positions in order to generate the requisite returns, the search area and expected migration distance of the individual graduate should also increase with their level of human-capital.

At this stage, what is missing is the question of gender. For the UK labour market there is no previous empirical work on the effects of gender on the interaction between human-capital acquisition and this sequential migration behaviour of graduates. Where evidence on graduate-gender issues exists, there is either no migration element or no human-capital element to the analysis. For example, if we simply observe the human-capital acquisition of UK students, we see that men generally perform better than women (McNabb et al. 1998)¹. From our arguments above, this would tend to suggest that male graduates will be more mobile than women. However, the work of Fielding and Halford (1993) and Boyle and Halfacree (1995), which was based on data from the 1970s and early 1980s, found that female migration to the South East of England was biased much more to upwardly mobile

¹ Other things being equal, women perform better than men across the university population as a whole (Smith and Naylor 1998). However, in terms of actual degree grade outcomes, men still perform better. McNabb et al. (1998) find that the reason for this is that women are over-represented in subjects in which a lower proportion of top grades are given, and partly because of the under-performance of women at the top end of the academic scale.

employment status occupations for women than for men, and this was particularly the case for women working in the service sector. At the same time, movements away from the South East were associated with downwards labour mobility for women, whereas the effects on men were largely neutral. These observations suggest that women may be more responsive to differences in employment returns than men. However, although there was no evidence on the matter, these gender differences in migration were assumed by the authors to be related to possible age differences by gender between the census samples, and consequently to the types of coupling effects described above. As such, on the basis of the existing UK data and analyses, there is no agreement as to the relationship between gender, migration and human-capital acquisition, although most commentators would tend to either disagree with Ravenstein (1885), or alternatively explain his observations in terms of life-cycle and coupling effects.

3. Modelling the Sequential Migration Behaviour of University Graduates

In order to consider how these issues may be modelled in the case of UK students, to begin with, we first must draw attention to the initial migration decision made by a new student applicant. A student can consider university courses in many parts of the UK, and on the basis of the suitability of the course, and the prestige and reputation of the institution can make a decision as to where to apply for admission. At the same time, the higher educational institution can choose to admit or reject the student applicant on the basis of their educational qualifications. Spatial search arguments and human capital models would suggest that the higher the ability of the student applicant, the greater will be the range and variety of the potential set of choices available to the student. Consequently, we would expect that the migration propensity of the student from domicile to higher education will tend to increase with the ability of the student and the ranking of the institution, *ceteris paribus* (McCann and Sheppard 2001). However, whether an individual student actually chooses to study locally or alternatively to migrate to higher education, will also depend on a range of other economic and social variables which may affect the environment at both the domicile and higher educational locations.

On graduating from higher education and entering first employment, the graduate must make a second decision as to whether to migrate or not. All graduates can conduct a labour market search in the region of their domicile, the region of their higher educational institution, or they may seek to conduct a broader, national, labour market search. Students who choose to study in their home region, on graduating can either conduct a labour market search in the region of both their domicile and higher educational institution, or they may seek to conduct a broader, national, labour market search. For these students, the advantages of the first choice are that they may be able to exploit local labour market networks and connections to facilitate an efficient search for employment. On the other hand, a national search may produce more attractive employment in an occupation with a better growth potential, and higher real wages. These students, however, will tend to be relatively much more familiar with the community from which they have come, than they are with alternative areas, and this may increase their psychic costs of long-distance mobility. On the other hand, for students who chose to study in an alternative region, it may be that their psychic costs of mobility are relatively lower (DaVanzo 1976, 1983). This may allow them to more easily conduct a national labour market search, and consequently to continue to migrate, relative to students who studies in the region of their domicile. As such, the

subsequent migration behaviour of the students will be dependent on their previous migration decision.

Here we model these two types of student separately, in order to reflect the fact that the initial migration-education decision on leaving secondary school and attending higher education, itself implies a self-selection process. Our model therefore proceeds, first to estimate the binary choice between studying in the home region as against migrating to higher education. Adjusting for selection in this process, we then estimate the likelihood of mobility exhibited on choosing post-graduation employment. That is, we model the movement from the educational institution to employment location for the students who studied in their home region, and also for those students who had moved away to study.

The modelling process is in two stages. In order to model the first stage of this process, in which the student applicant decides whether to study in the home region or to migrate to another region, we can construct a very general migration probability model which combines the migration features of the human capital model, with those of the search model and the distance deterrence argument. Suppose there are J potential locations ($j = 1, \dots, J$) which the migrant may move to, and the distance from the migrant's current location L to each location, d_{Lj} , varies by location. If we assume not only that information is spatially mediated, but also that personal and family ties play an inhibiting role in the migration decision, then the migration decision will also be subject to distance-deterrence effects (Gordon 1978). Therefore, we can write the potential utility function of the individual moving from L to location j as:

$$U_j^* = U_j(A, p_{ij}, d_{Lj}) \quad (1)$$

where A is a vector of personal human-capital characteristics, and p_{ij} are the expected returns² to education from a particular institution i at a particular location j . Utility in this sense is therefore understood to represent the expected returns to human capital of the individual migrant, and these expected returns allow for the long-run expected employment characteristics associated with the subject studied and the institution attended. Introducing a random error of unexplained institution and location variables given as e_j , the migration-utility function becomes:

$$U_j^* = U_j(A, p_{ij}, d_{Lj}) + e_j \quad j \in J \quad (2)$$

and is now composed of a deterministic portion of observable characteristics and a random portion containing the unobservable attributes at the alternatives. At this initial stage, the potential migrant does not have complete information about the employment characteristics of all the various possible employment locations available. We can assume, however, that they do have relatively complete information about the location of their original domicile, and also the location of the higher

² This definition of expected local employment returns is broader than simply remuneration, however, and also includes characteristics which reflect long-term employment probabilities, such as unemployment and activity rates, as well as the position of the area within the national rank-ordering of the urban hierarchy, proxied by the population density.

education institution. On the basis of the observable characteristics at the two locations we therefore model their education-migration decision on leaving secondary school and enrolling in higher education, as one in which the primary decision is whether to study in the domicile region or to migrate out of the region in order to study elsewhere.

The probability that the individual will maximise the potential returns to human capital by studying in a higher education institution in an alternative region, rather than in the domicile region is the probability that they will ‘migrate’ from their current domicile location L to the location of the educational institution j :

$$P(M_{Lj}) = \text{prob}\left(U_j(A, p_{ij}, d_{Lj}) + e_j > U_{j'}(A, p_{ij'}, d_{Lj'}) + e_{j'}; j' \neq j; j', j \in J\right) \quad (3)$$

Within a logit framework (Nelson 1987; Wrigley 1985) this structure allow us to estimate the odds that an individual will choose to study in the home region relative to studying in an alternative region.

In the second stage of the modelling process we split up the sample into those students who studied in their home region and those who studied in other regions. Within logit framework we then estimate the odds of a particular student migrating from education to employment at a particular location after graduation, as a function of a range of individual, institutional and locational variables. In the case of students who had attended higher education in their domicile region³, within a dichotomous logit model we estimate the odds of the student remaining in their domicile and education area for employment, as against moving away to an alternative employment location. On the other hand, for students who had initially moved away from their domicile area to study, within a multinomial framework we estimate the logit odds of the student entering employment in their education area, or in a completely new area, relative to returning to employment in their domicile area. We control for a range of human-capital, (higher educational) institutional, and local economic variables, and separately try to capture the effects of gender on this sequential migration behaviour

As we will see in the next section, in order to model the gender effects on the interaction between human-capital and migration we employ information on a range of personal characteristics, such as their gender, the highest degree grade of the individual students (which serves as a measure of their individual human capital), and also the distance previously migrated by the student from domicile to higher education, which serves as an indicator of their psychic costs of mobility. Once again, we include variables which reflect the economic environments both at the location of the higher educational institution and also at the location of employment, such as the occupational wage rates, the unemployment and activity rates. Moreover, we also include a measure of the respective locations’ positions in the national urban hierarchy by including both population density and the distance from London, on the argument that the market for graduate employment is dominated by the London

³ Here we define two locations as being in the same area if they are within 15 km of each other. The reason for this is that almost all individual UK urban areas have a radius of less than 15 km. The only real exception to this is London, but even here, from a travel time perspective, London is generally regarded as being made up of a series of distinct urban areas, each of which is less than 15 km in diameter.

economy (Fielding 1992, 1993; McCann and Sheppard 2001) Within this general framework, however, there are several points which need to be addressed.

First, the human-capital characteristics A of the individual student are comprised of two components, one of which is explicit and one of which is implicit. The explicit human-capital of the student is captured in our analysis by the highest degree level and grade achieved by the student. Meanwhile, the implicit human-capital of the student is the human-capital attributed to a student by potential employers, simply by reason of subject of study or attendance at a particular higher education institution, irrespective of their actual grade. This is proxied in our model by the 1996 Research Assessment Exercise (RAE) ranking of the institution.

Second, the wage levels we employ in our models are not the wages earned by graduates immediately on gaining first employment. Partly, this is because initial UK graduate earnings differ very little by region, except for London wages (IDS 1998; 1999, 2000; GRS 1998; AGR 1998). More importantly, however, migration-human-capital models are constructed as long-run models. In order to set the model within a human-capital framework it is therefore necessary to assume that an individual student enters a particular occupation on graduating from a higher education institution with a view to staying in that chosen occupation for life, as is done by other commentators (Naylor et al. 1998, 2000). For this reason, we use national average occupational wages as a measure of the expected average lifetime occupational earnings, corrected for regional wage variations. There are two reasons for adopting this particular approach.

The first reason is that, since we are modelling aggregate micro-data, we can assume that each individual student makes a migration decision on the assumption that the expected long-run average occupational wage at a location is exogenous of their own individual migration decision.

The second reason is that the acquisition of job-specific human-capital engenders 'lock-in' (David 1985) effects which contribute to individuals generally staying in the same occupation or occupational grouping over a lifetime or working. We assume that rational individuals are generally aware of this occupational hysteresis effect, such that we assume that most graduates who take on full-time work initially do so with a view to developing a career in that occupation. This allows us to discuss a human-capital model of job acquisition without any spatial component. However, in order to make a human-capital-migration model tractable, we must also assume that by taking a job in a particular location, the graduate who takes on full-time work initially does so with a view to developing a career both in that occupation and that region. We can defend these assumptions from the perspective that not only does the acquisition of job-specific human-capital engender 'lock-in' effects which contribute to individuals generally staying both in the same occupation or occupational group over a lifetime or working, but also that these lock-in effects are also spatially manifested. Moreover we assume that graduates are also aware of this spatial hysteresis effect, and that accepting employment in an area significantly increases the likelihood that they will actually continue to work both in that occupation and in that same particular area for the majority of their career. This feature of our model is different to many other human-capital models, in that we attempt to distinguish between the returns to human-capital characteristics of the individual gained through education, and the returns to human-capital characteristics of the individual gained via the migration process.

In order to convert an aspatial human-capital model to a spatial human-capital model, the average expected returns to an occupational type must therefore also be weighted by the particular location choice of employment using broadly defined regional occupational deflators.⁴ In the model above, these long-run expected spatial occupational returns are represented by area-specific characteristics p_{ij} and are *given by the present value of the real wage at that location.

The final point regarding our analytical framework which needs to be addressed relates to the initial costs of acquiring human-capital. During the 1994-96 period in question, UK undergraduate students did not have to pay any higher education tuition fees, which are both set and paid for by the government. On the other hand, students were required to take out student loans to cover the cost of living and expenses, unless their families were sufficiently wealthy to pay for them. The point here is that the costs of UK higher education do not vary between subject studied or institution attended, except in as much as the costs of living vary between locations, and the fact that some postgraduate students will have paid the tuition fees for their postgraduate education. In general though, we can assume that for this particular sample of students, the costs of higher education vary only between location, and are neither subject nor institution specific. This means that variations between average nominal occupational returns will accurately reflect variations in average real occupational returns, except for the extent to which occupations are spatially uncorrelated at the national level.

5. Data

Our student information comes from the HESA student leavers' questionnaire, and provides us with data on 89,710 UK domiciled students who graduated from higher education in the 1994/1995 and the 1995/96 graduation. The survey provides information on the gender of the student, the subject studied in higher education, and the level of attainment of the student, in terms of the highest degree level achieved,⁵ and the grade of their respective degree. The HESA data gives us four digit standard occupational classification (SOC) and standard industrial classification (SIC 1992) descriptions of the work activities in which the individuals are engaged in, and classifies whether the activities are full-time, part-time, permanent or temporary. The HESA data also provides us with information about the higher education institution at which the student studied, and along with data from the 1996 Research Assessment Exercise, this provides us with insights into the potential human capital gains associated with each of the 190 higher education institutions in the UK, irrespective of the ability of individual student.

Our basic spatial unit of analysis are the fifty-four local authority district-based counties of England and Wales defined by the 1974 Local Government Act, plus the nine regional councils of Scotland as defined in 1975.⁶ Ideally, we would

⁴ These are broadly defined at the regional level, and at the one and two digit levels SOC levels, in order to allow for some job-switching within the same broad occupational group and regional area over the lifetime of employment.

⁵ In terms of Bachelor, Masters or Ph.D degree

⁶ In England, seven of these counties are the metropolitan county councils covering the largest urban agglomerations of over one million people. In Scotland, the three separate island councils are combined into a single council for the purposes of our analysis. The average employment size of the areas is 330825.

have liked to use either smaller areas of analysis, such as districts or wards, or alternatively the 1984 or 1998 travel-to-work areas, as the spatial unit of analysis for employment data, but wage data, productivity data, income data, and population density data, are only available at the county level of analysis. This is the lowest level of spatial disaggregation for which all the relevant information is available. The spatial data we employ comes from a variety of sources. Our nominal wage data by SOC classifications comes from the 1995 and 1996 New Earnings Survey (NES), which provides detailed wage data broken down by gender. Average nominal wage levels are provided for up to three digit SOC classifications. The NES data also provides us with nominal regional wages according to 25 and 23 two digit SOC groupings for men and women, respectively. Data on county unemployment rates, activity rates, and population densities,⁷ all come from the Office for National Statistics (1996, 1997, 1998). In addition, in order to construct spatial real wage indices, we use the residential cost data for all of the counties and Scottish councils provided by the Land Registry of England and Wales and by Scottish Homes. This gives us average current house prices by county and regional council.

Finally, in order to coherently integrate all of this individual, institutional and regional data in a genuinely spatial model of migration, we employ the information from the HESA survey which provides us with the postcode district details of the domicile, higher education institution, and first workplace locations of each student. There are 2700 postcode districts in Great Britain⁸, and our MAPINFO geographical information system allows us to identify the geographical centre point of each of the postcode districts. We can therefore use this information in order to estimate to a high degree of accuracy the distances of migration to and from higher education by the students in the survey.

The variables used in our models are listed in **Table.1**. County unemployment rate (UE) and economic activity rate (EACT) data come from the Office for National Statistics. Current indices of the quality of the higher education institutions attended (RAE96) come from the 1996 Research Assessment Exercise. In order to allow for the effect of geographical centrality and peripherality on migration behaviour, we employ a measure of the distance of the domicile and education and final employment locations from London (DLOND), which are mapped within our GIS framework, and we also include population density measures (PDN) in order to allow for the urban hierarchy. Dummy variables allow for domicile and education locations in Scotland (SCOTDOM) and Wales (WALESDOM), in order to see if there are any cultural, (education) institutional or linguistic effects on migration. Finally, we employ a variable that measures the number of higher education institutions within the domicile (DOMCOINS), education (EDUCOINS) and employment (FINCOINS) in order to pick up any possible educational clustering-agglomeration effects. The suffixes DOM, EDU and FIN, represent variables with respect to the domicile, education and final employment locations, respectively. Our gender variable GENNUM is defined as 1 represents male and 0 represents female.

⁷ We employ these variables as proxies for the position of a location within the national urban hierarchy on the basis that there is much evidence to suggest that the generation of job-opportunities for UK university graduates in particular, may be related to the rank-order of the area within the national urban hierarchy, which is centred around the South East of the England (Fielding 1991, 1992; McCann and Sheppard 2001).

⁸ The postcode districts have an average area of 84.9 sq. km and an average population of 21162

6. Results and Discussion

First, we must consider the cohort of students who chose to attend higher education in their home area.⁹ From **Table 2**, we see that for this group the odds of an individual becoming a 'late bloomer' (denoted as response category 1 in our model) who attends higher education in their domicile area and then moves away for employment after graduation, increases relative to the odds of remaining in the domicile area (mossback) is positively related to the variables GENNUM, FINCOINS, EACTFIN, WAGEFIN, POSTGRAD, FIRST, TWOONE, TWOTWO, DLONDON, DLONDEDU, and negatively related to UEEDU, UEFIN, EACTDOM, PDNFIN, DLONDFIN. In other words, graduates educated in their domicile area are more likely to move away to other regions for employment the higher is their level of human capital, the stronger is the economy in the destination region, the further is their domicile and education area from London, and the greater is the educational infrastructure in the destination region. Meanwhile, the odds of such graduates becoming 'late bloomers' tend to fall if the students come from a peripheral urban areas facing unemployment problems. In addition to these observations, male students educated in their domicile area are more likely to move away to other regions for employment than female graduates.

Second, we can consider the cohort of students who chose to attend higher education in a different area than that of their domicile area. Here we can rank the individuals ordinally on a scale of 1 to 4, as representing progressively more migratory behaviour. The response category 2 represents the 'bounceback' graduates who initially move away to other areas for higher education, but then return home to enter employment. The response category 3 represents the graduates we call 'stickers', who remain in the vicinity of their higher education for employment, rather than returning to their home area. Finally, the response category 4 represents the 'searcher' graduates who continue to migrate onwards for employment to an area which is neither that of their domicile or higher education. Once again, the benchmark case is the zero response category, which represents the 'mossback' students who remain in their domicile area for both education and employment.

From Table 2 we see that the migration propensity of the students who had moved away for education tends to increase across all the ranks of migration behaviour with the variables EACTFIN, RAE96, DLONDEDU, WALESDOM, SCOTDOM, TWOONE, TWOTWO, and THIRD, and tends to decrease across all the ranks of migration behaviour with the variables UEEDU, DOMCOINS, PDNEDU, PDNDOM, DLONDON, and SCOTEDU. In other words, high quality universities, and particularly those which are located in peripheral areas, tend to produce mobile students, and this is even more so if the students are Scottish or Welsh. On the other hand, if the students come from geographically peripheral areas, and particularly high density urban areas with large numbers of universities, their on-migration propensity tends to fall.

In addition, there are many variables which appear to affect the different ranks of migration in a selective manner. Observation of these variables suggest that there is something of a distinction between two groupings, in that 'bouncebacks' and 'stickers' together tend to behave rather differently to 'searchers'. Most notably, the variables

⁹ which account for 19.3% of the sample

POSTGRAD and FIRST are both positively associated with 'searchers' and negatively associated with 'bouncebacks' and 'stickers'. It would appear therefore that at the top end of the human-capital scale, the primary effect is to encourage further on-migration of the student. Our results therefore appear to be broadly consistent with human-capital models of migration.

For our purposes here, the most important observation is that of the gender variable GENNUM. As we have seen above, for the cohort of students who chose to attend higher education in their home area, male students appear to be more likely to move away to other regions for employment than female graduates. However, in the case of the cohort of students who chose to attend higher education in a different area than that of their domicile area, the only significant effect on migration behaviour initially appears to be in terms of the 'bounceback' students. From first observations, therefore, being male appears to increase the odds of a student returning to their home area for work, whereas the gender effects on the other ranks of migration behaviour appear, as yet, to be inconclusive.

A difficulty with this type of gender employment-migration analysis, however, is the fact that the estimates may be affected by gender differences in the employment distributions across sectors. For example, women are disproportionately over-represented relative to men in professional occupations within the public sectors of education, health and public administration. In the UK, it is the law that all such public sector employment positions in these sectors must be advertised in the national press. As such, this should reduce the distance deterrence effect on spatial information flows and increase the potential mobility of such public sector employees. In this case, women should be systematically more mobile than men simply because of this sectoral selection issue. Moreover, given that the sectoral grouping of health, education and public administration is the single largest employer in the UK, any such effects on migration should be non-trivial. It is therefore necessary for us to control for these differences. The model estimates reported in Table 3 differ from those in Table 2 in that SIC sector dummies 1-8¹⁰ are also included in the regression results reported in Table 3. As we see the estimates in Table 3 are to a large extent the same as those reported in Table 2. However, there are a few notable differences. Firstly, the coefficient estimates for the GENNUM variable become negatively significant for the 'searcher' as well as the 'late bloomer' category. Secondly, while three of the sector dummies (SICTWO, SICTHREE and SICEIGHT) are significant for all ranks of migration behaviour, only the SICEIGHT dummy variable appears to significantly affect the migration propensity in the same direction for all ranks of migration. The coefficient estimates here are all negative. In other words, women appear to be more migratory than men in the 'searcher' category representing maximum mobility, and this appears to be so even if we control for the national job-advertising policies adopted in the public sector where women are over-represented.

To further test the effect of this industry selection issue on gender migration questions, we add an additional interaction variable FEMEIGHT to the model, which is recorded as 1 in the case where a female is employed in SICEIGHT and zero where

¹⁰ Sector 1 is agriculture (SICONE), sector 2 is energy and water (SICTWO), sector 3 is manufacturing (SICTHREE), sector 4 is construction (SICFOUR), sector 5 is distribution, hotels and restaurants (SICFIVE), sector 6 is transport and communications (SICSIX), sector 7 is banking, finance and insurance (SICSEVEN), sector 8 is public administration, education and health (SICEIGHT).

a male is employed in SICEIGHT. The results of this are reported in Table 4. As we see, the negative estimate for the GENNUM variable is now highly significant for both 'stickers' and 'searchers' as well as still being positively significant for the 'late bloomer' category. As before, the SICEIGHT dummy variable coefficient estimates are all negative and highly significant. The FEMEIGHT variable only appears to have an effect on reducing tendency of women to remain in public sector occupations in the vicinity of their education.

7. Conclusions

For the cohort of UK university students who graduated from higher education institutions within their domicile area, male students appear to be relatively more migratory for employment purposes than female students. This observation would tend to concur with most commentators' implicit expectations. On the other hand, however, for the cohort of students who moved away for higher education, our findings suggests that female university graduates actually have a greater interregional migration propensity than male graduates. Women appear to be much more inclined either to enter into employment within the area to which they have migrated for education, or alternatively to continue to move onwards for employment purposes. This general observation has been arrived at by splitting up the graduate migration streams according to the previous domicile-education migration behaviour of the student, and then also controlling for both human-capital effects and regional economic effects, as well as the sectoral differences in male and female employment patterns. Moreover, our findings cannot be attributed simply to life-cycle effects or coupling and parenting behaviour, because the vast majority of the sample are far too young to be affected by either issue.

One possible explanation for our results could be that women may have to be more migratory than men in order to (partially) overcome the problems associated with informal gender bias. Our observations can be made consistent with the argument that if women systematically face greater problems in gaining employment than men, then in order for them to generate equivalent returns to the human-capital in which they have invested, they will have to be more migratory. This argument might be interpreted as a modern manifestation of Ravenstein's (1886) firth 'law'. Without any specific evidence on the issue of gender bias, however, our comments can only be speculative.

Data Appendix