Improving Migration and Population Statistics
Improved estimation of student migration within England and Wales

1. Introduction

1.1   There is no register of migration within England and Wales. At present the Office for National Statistics (ONS) uses changes in GP registrations as a proxy for internal migration within England & Wales. One of the known limitations of relying on GP registration changes is that young people, particularly young men, can be slow to change their registration when they move.

1.2   One of the most common reasons for migration among young people is to attend a course at a higher education establishment, so this limitation of the current internal migration estimation process is a key issue in the estimation of internal migration for this population sub-group.

1.3   Movements of students attending higher education institutions are complex and include transfers to the place of study, moves during the study period and moves after completing their course. Each of these moves if not correctly identified will result in error in ONS population statistics.

1.4   Higher Education Statistics Agency (HESA) data have great potential to improve internal and international student migration estimates. This was recognised by the 2006 Inter-departmental Taskforce on Migration Statistics and the 2007 local authority Case Study report. Previous investigations into using this data have concluded that the absence of students term-time address has been a serious limitation as students do not always live in the same local area as their university campus. Term-time address has been collected by HESA for the first time for the academic year 2007/08, alongside students' home address (domicile).

1.5   This document sets out proposed methods of using HESA data to supplement patient registration data to improve internal migration estimates by improving the estimation of higher education students. Methods are presented for adjusting both moves made when students begin their studies and moves made at the end of studies. As students / former students will eventually re-register with a GP at some point, a 'double counting adjustment' is also described which prevents adjusted moves being double counted.

1.6   Additional information on the assumptions made as part of the student adjustment is provided in Annex 1 and Annex 2 to this paper. Annex 6 assesses the impact of the student adjustment and validates a number of the key assumptions used.

2.   Overview of current internal migration estimates

2.1   The current method of making internal migration estimates within England & Wales uses changes in GP registrations. At local authority level, changes are calculated by comparing cross-sections of GP lists taken a year apart[1]. A move within England & Wales is identified by matching each patient's NHS number between these cross-sections and checking whether residential postcode has changed to a postcode within another local area[2].

2.2   Regardless of the sources available, accurate recording of student migration can be difficult as residency patterns of students do not always sit easily within the usual residence framework. Most notably students may regard themselves as having two addresses, their term-time address and their parent's address. They usually spend time at both addresses between mid-years.

2.3   Mid-year population estimates assume that students are resident at their term-time address as this is likely to be the place they spend a greater proportion of the year. Even if a student moves back to their parental home over the summer, it is unlikely that they will re-register with a GP for this period if they plan to return to university in the next academic year.

2.4   Students moving to university to study will move after the mid-year reference point (June 30th) preceding the start of the academic year. Assuming they re-register with a GP, a student moving in the academic year 2007-8 will be counted at their home address in mid-2007 but at their term-time address in mid-2008. The issue of reference points is more problematic for students at the end of their studies as, particularly for undergraduate studies, the academic year often ends before the mid-year reference point. Hence former students may be registered at a new address they have only lived at for a fraction of the mid-year to mid-year period. However in such cases students would only appear as resident for two mid-year to mid-year periods even if they were on a three year course.

2.5   Increasingly complex patterns of study can be difficult to pick up using the patient re-registration approach. A student who spends six months studying at a different university would only be picked up by official internal migration estimates if they changed their GP registration.

3.   Overview of student adjustment

3.1   Central to the proposed method is the use of HESA data to identify (and adjust for) internal migration moves made by first year undergraduates and students at the end of their studies who did not change their GP registration when they moved. The proposed adjustment contains a number of elements. This largely reflects the fact that the HESA data are a by-product of an administrative system, the primary purpose of which is not migration measurement.

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[1] These cross-sections are extracted at 31 July each year, with age calculated as at 30 June. This reference date is based on the assumption that it takes about a month to register with a GP after moving.
[2] Patient registration moves are constrained to moves on the NHS Central Register (NHSCR). There are a number of reasons why more moves are captured on the NHSCR, mostly to do with no address being available one year previously e.g. babies under one year old. This constraining process is outside the scope of this project so will not be considered further.

3.2   The proposed adjustment consists of:

- an adjustment to the number of moves made by first year undergraduate students in the year to mid-2008 based on HESA data on students' domicile and term-time address
- an adjustment to the equivalent number of moves made by first year undergraduate students between mid-2001 and mid-2007 based on similar HESA data. Additional assumptions are made in the absence of HESA data on students' term-time address prior to academic year 2007/08
- an adjustment to the number of moves made by students at the end of their studies between mid-2001 and mid-2008. The approach uses a range of sources in the absence of HESA data on students' address in the year after their studies, and
- a double counting adjustment to avoid counting moves of students/former students twice, when they do eventually re-register

Further detail on each of the adjustments is provided below and in supporting annexes.

3.3   HESA data used in the adjustments have been anonymised and are aggregated to local authority level. ONS have recently established a new legal gateway to access identifiable record level data using the 2007 Statistics and Registration Service Act. However, these data were not available to feed directly into the mid-2008 based estimates.

3.4   Start of study adjustment – mid-2008

3.4.1   In the year to mid-2008 it is possible to make use of the HESA data on students' term-time address. Moves of first year undergraduates between local authorities are identified on the HESA data by comparing term-time local authority to domicile local authority (usually parental address). Importantly, this comparison is made by single year of age and sex. Where the HESA data identify more moves than the equivalent count on the patient registers, the former will be used as the new internal migration estimate between these local authorities.

3.4.2   The start of study adjustment is based on HESA data for first year undergraduate students only. Moves of postgraduates and undergraduates transferring universities or moving across local authority boundaries between study years are not included. This is because domicile local authority refers to a permanent or parental address prior to study rather than previous term-time residence. Only for first year undergraduates is it assumed that domicile is where the student lived in the previous year[3].

3.4.3   A simplified representation of the approach is shown in Figure 1. This presents a hypothetical example for four local authorities: LA1, LA2, LA3, and LA4. In this example the number of moves in the HESA data is greater than on the patient registers in two cases: From LA1 to LA2 and from LA3 to LA2. This approach is only able to identify adjustments because student moves are concentrated at very specific ages; most students begin university at ages 18 or 19.

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[3] This limitation was also highlighted by users through the user engagement process carried out at the end 2009. Data on two years' term-time residence was not available in time for this method, but will be investigated as part of the next phase of the Migration Statistics Improvement Programme.

Figure 1: Local authority to local authority student adjustment approach, single year of age and sex specific

Patient Register Data				HESA Data			
		Residence at time (t+1)				Residence at time (t+1)	
Residence at time (t)		LA 1	LA 2	LA 3		LA 1	LA 2	LA 3
LA 1	X	20	15	LA 1	X	25	10
LA 2	10	X	20	LA 2	5	X	15
LA 3	15	10	X	LA 3	7	20	X

3.4.4   The true number of moves between the local authorities will be greater than, or equal to, the new adjusted estimates. This is because it is not possible to distinguish between students and non-students changing their GP registration in the patient register-based flows and so the adjustment will be smaller than if student moves could be separately identified. ONS plan to develop methods further once access to identifiable record level data has been established. By matching at record level it will be possible to identify which individual moves were not recorded on the patient registers, potentially resulting in larger adjustments.

3.4.5   The adjustment is dependent on student moves being particularly concentrated in a small number of age groups. For this reason it is important for age to be directly comparable in both sources. HESA were commissioned to calculate age at mid-year so to be directly comparable to the patient register data. Again in the longer term, record level data will contain actual date of birth.

3.4.6   It has been necessary to make a number of assumptions in the introduction of this adjustment. Detailed descriptions of the assumptions are provided in Annex 1 but can be summarised as:
   a)   In the absence of any term-time address information, all students migrating to Staffordshire and Southampton Universities are assumed to be living in the same local authority as that of the campus at which they study. At Salford University 90 per cent of migrating students are assumed to live in Salford with 10 per cent living in Manchester
   b)   Term-time address is imputed where necessary for student migrants in relation to the term-time residence of student migrants who did provide this information at the same university campus
   c)   If a student is living at their parental home, their domicile local authority is assumed to be their term local authority
   d)   It is assumed that term-time address is incorrect if this is not within the region or neighbouring region containing the campus of the university[4]
   e)   Home address on patient registers at mid-year is assumed to be the same as the home address at the start of the academic year
   f)   Term-time local area of residence remains the same up to June 30th following the end of the academic year

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[4] With the addition that students could study in London, commuting from the East Midlands, even though this region not actually adjacent to London.

3.5   Start of study adjustment – mid-2002 to mid-2007

3.5.1   To avoid a step change to the internal migration and population estimates series it is necessary to adjust back to mid-2002. At mid-2001 the series was rebased using results from the 2001 Census.

3.5.2   Adjustments for start of study moves are made using the same broad approach as described for the mid-2008 estimates. It was however necessary to use the term-time distribution of first year undergraduate migrants in academic year 2007/08 for the back-series as, prior to academic year 2007/08, HESA only collected information on students' campus and domicile address. Hence for each year of the back-series, moves between domicile and term-time local authority on the HESA data were identified by first imputing term-time local authority based on the 2007/08 distribution between campus and term-time address for students who moved to study.

3.5.3   A key assumption for the back-series adjustment is that the same distribution across local authorities is used for each new cohort of first year undergraduate migrants between 2001 and 2008.

3.6   End of studies adjustment – mid-2002 to mid-2008

3.6.1   Adjusting for moves made at the end of study is more complex as there is no second source equivalent to the HESA data which identifies where former students move to in the year after their studies. This section outlines the method used, with further detail on the assumptions made provided in Annex 2.

3.6.2   The end of studies adjustment method for the series mid-2002 to mid-2008 has four elements. These involve the estimation of:
   (a) number of people who end their studies each year
   (b) number of these former students who move to a different local area after their studies
   (c) number of these former students moving who don't re-register with a GP
   (d) destination of those former students identified in (c)

(a) Number of people who end their studies each year

3.6.3   HESA collects data on the number of students who end their studies each year and (for academic year 2007/08) where they lived during term-time. This includes those who graduate and those who did not complete their studies. In the absence of term-time address information prior to 2007/08, for the back-series it has been assumed that the geographic distribution of final year students is the same as for those in their final year in 2007/08. Where term-time address is missing in 2007/08 this is imputed using the same approach as for the 'to study' adjustment[5].

(b) Number of former students who move to a different local area after their studies

3.6.4   An estimate of the proportion of former students moving local area after their studies is taken from 2001 Census data. Using the question on address twelve months ago, it is possible to identify who left each local authority as a proportion of

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[5] With the exception of those students living at their parental home, from which it can be assumed that the existing domicile address is also in fact the term-time address, and is therefore used directly.

how many people previously lived there. However, it is not possible to directly identify which of these migrants in the Census had just finished their studies. To identify end of studies moves, Census records were only used if individuals held an undergraduate degree at age 22 or if they held a postgraduate qualification at 23. As in the majority of cases these are the minimum ages at which these qualifications could have been attained 12 months previously, it is assumed that these individuals had graduated in the past twelve months.

3.6.5   The rate at which graduates left the local authority is calculated as:

$$= \frac{\text{'Census graduates' who left the local authority}}{\text{'Census graduates' in the local authority 12 months before the Census}}$$

(c) Number of former students who move but don't re-register with a GP

3.6.6   An estimate of the proportion of former students who do not re-register with a GP when they finish studying is produced by first estimating the rate at which former students do re-register. This 'registration rate' is based on a comparison between the number of moves from each local authority in the patient registers between mid-2000 and mid-2001 and the number of moves from the 2001 Census, by sex and for each single year of age between 17 and 28. As the patient registers cannot identify people who used to be students, the Census data are not restricted to graduates.

3.6.7   The rate at which moves were not identified on the patient registers is then calculated as one minus the above.

(d) Destination of those former students not re-registering

3.6.8   Elements (a) to (c) identify how many former students need to be adjusted from each local authority. The final element allocates these individuals to the first post-study destination. Again 2001 Census data have been used for this purpose. A matrix of local authority to local authority moves was constructed for this purpose, disaggregated by sex using the same Census qualifiers information i.e. 22 year olds with an undergraduate degree and 23 year olds with a postgraduate qualification.

3.7   Double Counting Adjustment

3.7.1   As students/former students are likely to re-register with a GP eventually there is a risk that moves will be double counted if they were adjusted for using the methods outlined above. Hence the need for a double-counting adjustment: adding back those moves which had originally been adjusted.

3.7.2   An investigation into the length of time it took to re-register was based on students at halls of residence at Bournemouth, Aberystwyth, Newcastle upon Tyne, and Northumbria universities. Students were identified as being resident in halls if their GP registration identified their resident postcode as that of a hall. Those resident in a hall in 1999 were tracked over time to identify how much longer than three years it took to re-register (assuming the maximum length of time an individual could live in a hall was three years). Further detail is provided in Annex 3.

3.7.3   The 'to study' double-counting adjustment begins three years after the initial adjustment was made using the gender specific proportions in table 1. This assumes that students continue to be registered with their domicile GP until they begin to start re-registering at end of their studies. The 'end of studies' double-counting adjustment

begins adding back in those who were adjusted in the year after the adjustment was made. These gender specific proportions are also shown in Table 1.

Table 1: Phasing of Double-Counting Adjustments

Adjustment and double counting adjustment in year:	Students moving 'to study': percentage to counter-adjust		Former students 'from study': percentage to counter-adjust	
	males	females	males	females
x+1			19	39
x+2			9	15
x+3	42	71	5	8
x+4	23	18	4	1
x+5	10	5	2	3
x+6	7	2	1	1

4.   Summary

4.1   Students' term-time address information collected for the first time by HESA in 2007/08 identifies moves between local authorities within England and Wales independently from the source used by ONS to identify such moves, the patient registers. The method outlined in this paper to adjust for moves 'to study' makes use of anonymised HESA data. ONS are in the process of establishing a legal gateway to gain access to identifiable record level HESA data on which further research (and adjustments) can be based.

4.2   It has been necessary to supplement the 'to study' adjustment with an 'end of studies' adjustment. There is however no equivalent source to the HESA data which identifies where students move to at the end of their studies. As a result use has been made of 2001 Census data to identify how many people move local authority at the end of their studies and what proportion re-register with a GP when they do so. Details of how use of Census data was validated are provided in a separate paper assessing the student adjustment impacts.

4.3   Both the 'to study' and 'end of studies' adjustments are required, as higher education students / former students can be slow to re-register with GP when they move. As re-registration will take place at some point there is a risk that moves that have been adjusted will be counted twice. The double counting adjustment described in this paper is being implemented to avoid this.

Annex 1. Start of Study Adjustment Assumptions

A1.1 Introduction

A1.1.1 This annex provides further detail on the assumptions made for the 'to study' adjustment.

A1.2 Missing term-time address data

A1.2.1 Term-time address data is not available for all students. Data on this key variable are either missing for the whole institution or for a proportion of students. See Table A.1 for a summary of missing term-time information.

Table A.1 – Summary of Percentage of Records with Missing Term-time Address Data (2007-08)

Percentage of Records missing Term-time Address	Number of Campuses
100%	3
75-99%	2
50-74%	9
25-49%	10
10-24%	26
0-9%	156

A1.2.2 Universities have returned no term-time address data for three campuses. An assumption has been made that during term-time, students at these campuses (in Southampton and Staffordshire) are resident in the same local authority as the campus at which they study. Salford University returned data for only one per cent of students. In the case of Salford 90 per cent of migrating students are allocated Salford and 10 per cent to Manchester. This reflects the fact that there is a Salford University hall of residence in Manchester. Contact with the university has also revealed that those students without a place in halls are provided with information about accommodation in both Salford and Manchester. Note that 26 per cent of those studying at Salford University lived at their parental home. Of these, 10 per cent were living in Salford and 76 per cent of these were living in local authorities surrounding Salford.

A1.2.3 More commonly, term-time address is missing for a proportion of students. In these cases term-time address is imputed for student migrants in relation to the distribution of those student migrants[6] who did provide a term-time address. Those imputed are taken from first year undergraduates as second or third years may not be resident in the same local authority.

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[6] A student migrant is defined here as being one who is not living in their parental home during term-time.

A1.3 Feasible term-time residence

A1.3.1 Initial research indicated that in some cases the term-time address provided was not plausible given the location of the university campus. This may relate to domicile being incorrectly entered as term-time address. It is assumed that term-time address is incorrect if this is not within the region or neighbouring region containing the campus of the university.

A1.3.2 A further assumption is made to exclude all students on distance learning courses (including all those at the Open University) and on sandwich/placement years. Such students could be resident anywhere in the country. Furthermore the adjustment only includes full-time students; part-time students are less likely to migrate to study.

A1.4 Home address in GP registers at mid-year is assumed to be the same as the home address provided at the start of the academic year

A1.4.1 HESA data refers to academic year rather than mid-year and so it is necessary to assume that home address did not change between mid-year and the start of the academic year. This is unlikely to be an important issue as in most cases home local authority will have remained the same even if address did not.

A1.5 Term-time local authority of residence remains the same up to June 30th following the end of the academic year

A1.5.1 As students can move throughout the year, term-time address may change in some cases. It is assumed that, while address may change, the term-time local authority remains constant and so does not affect the adjustment.

Annex 2.   End of study adjustment assumptions

A2.1 Introduction

A2.1.1 This annex provides further detail on the assumptions made for the 'from study' adjustment.

A2.2 Reference date

A2.2.1 Final year students are only moved out of their term-time address if they finished their studies before 31st December of that academic year. This assumption is required as otherwise many final year students, graduating in May/June, will be removed from their term-time address even though they would have spent the majority of the year in that area. As a result students on three year courses would only appear as resident in two mid-year estimates.

A2.2.2 Those who finish their studies after 31st December will be removed from their term-time address in the following mid-year estimate. As a new group of students leave each year, the effect of this assumption will only be apparent where there are substantial year on year changes.

A2.3 Overseas students remaining in England and Wales

A2.3.1 The proposed adjustment does not cover international migration as such moves are not estimated using patient registers. However, foreign students who remain in the UK at the end of their studies are part of the usually resident population so any move within England and Wales should be identified in the patient registers.

A2.3.2 National Insurance Number (NINo) data are used to estimate the proportion of overseas students that stay in the UK at the end of their studies. Each NINo allocation contains a date of registration and a date of first entry into the UK. Where date of registration is three years after date of first arrival, this is regarded as a proxy for students who have completed their studies and began working. The approach indicates that between 40 and 60% of overseas students remain in England and Wales after their studies each year.

A2.3.3 It is unclear how many overseas students who remained in England and Wales moved local authority at the end of their studies and what proportion re-registered with a GP when they moved. Once the number of overseas students remaining in England and Wales at the end of their studies had been estimated, the same methods are applied as for the students who originated in England and Wales.

A2.4 Missing data

A2.4.1 As with first year HESA data, some term-time address data are missing for former students who had finished studying. Where term-time address is missing, it is imputed using the same approach as for the 'to study' adjustment. The exception to this is for those students living at their parental home, from which it can be assumed that the existing domicile address is also in fact the term-time address, and is therefore used directly.

A2.5 Feasible term-time residence

A2.5.1 An assumption is used to identify whether a term-time address is feasible given the campus of study. The approach to identifying an unfeasible term-time address is the same as used at the start of study.

A2.6 Appropriateness of Using 2001 Census Data

A2.6.1 It is assumed that it is appropriate to use 2001 Census data in three parts in the 'end of studies' adjustment. These are:
- in estimating the proportion of graduates/post-graduates who move local authority at the end of their studies
- in combination with GP registration data to estimate the proportion of young adults who change their GP registration when they do move, and
- in distributing former students to first destination local authority

A2.6.2 Particular care has been taken to validate whether it is appropriate to use 2001 Census data for the purposes listed. Reference was made to the number of moves made by young adults in the patient registers and to the Destination of Leavers from Higher Education (DLHE) survey.

A2.7 Identification of graduates and postgraduates in 2001 assuming three year undergraduate degrees and one year postgraduate qualifications

A2.7.1 It has been assumed that all undergraduate degree courses last three years and all postgraduate courses last a single year to identify recent graduate migrants on the 2001 Census. These census data are used to calculate rates to apply to all leavers regardless of length of course. This is potentially problematic if the characteristics of the minimum age qualifiers (i.e. their likelihood of leaving the local authority of study, their likely first destination) are substantially different to the characteristics of those on alternative length courses: for example sandwich degrees.

A2.8 Rate of re-registration for all persons is valid for students at the end of their studies

A2.8.1 The rate of re-registration was based on a comparison between 2001 Census moves and moves on the patient registers which occurred between mid-2000 and mid-2001. It was however not possible to identify which moves in the patient registers were made by those who had recently graduated. It is assumed that students have the same re-registration rate as all people moving between local authorities. As rates are age and sex specific, many of the moves are likely to have been made by former students in their twenties.

A2.9 Re-registration rates constrained to one where required

A2.9.1 In some cases when the re-registration rate is calculated the result is greater than one. This indicates that more moves were recorded on the patient registers than on the census. In such cases the rate has been fixed at one so assuming that all moves are re-registered. A rate of more than one may occur for a number of reasons. These include slightly different reference periods and under-coverage in the census.

A2.10 Those students who don't complete their studies have the same destinations as qualifiers

A2.10.1 It is not possible to identify individuals in the Census who left before completing their studies. As a result it is assumed that these "withdrawals" have the same destinations as qualifiers.

Annex 3.   Double-counting adjustment

A3.1 Introduction

A3.1.1 The main limitation with basing internal migration estimates on changes in GP registrations is not that young people never change their GP registration - it's that they are slow to do so. If a new student doesn't change their GP registration when they move to university an adjustment is made - out of domicile A into study area B. However, at some point in the future they are likely to update their GP registration to a new address - this will be recorded in the GP registers as a move out of domicile A into new location C (which may or may not be equal to study area B), i.e. a move is counted twice. See Figure A3.1.

Figure A3.1: Visual representation of moves
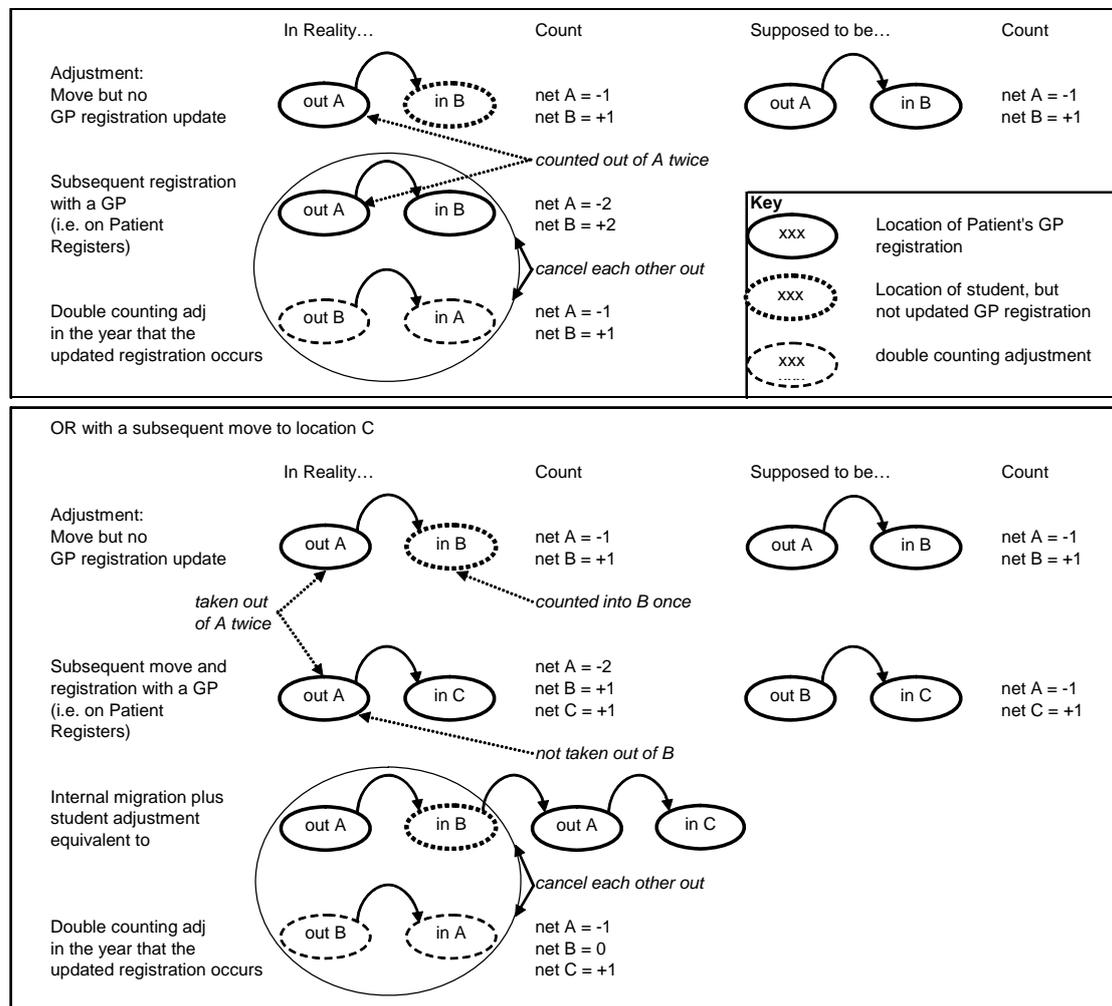
A3.1.2 To counteract this, we propose a further adjustment, whereby all uncaptured moves that have had to be adjusted will eventually be counter-adjusted (see Figure A3.1). This will happen over the course of a few years.

A3.2 Evidence of registration lag

A3.2.1 An evidence base for a counter adjustment has been provided by an analysis on students living in halls of residence at Bournemouth, Aberystwyth, Newcastle and Northumbria universities (See Annex 4). Patients registered at the postcodes of the halls of residence in 1999, identified as living at the relevant postcodes, were tracked over GP registrations data through to 2007 using their NHS number. Students found in these halls of residence in 1999 had been registered at that address for over the previous three years. It was assumed that a student could live in the hall for a maximum of three years, after which they would have to move out. The analysis therefore counted how long after three years it took for these patients to change their GP registration.

A3.2.2 It is recognised that there are limitations with this analysis, notably that:
- Students don't necessarily live in halls for 3 years – some might stay longer, some shorter
- Reasons for difference between males and females might not be clear – females may be more likely to move out of halls earlier, as well as more likely to change their GP registration more quickly than males

A3.2.3 Further work is planned on this subject with HESA post coded data, especially when we have more than one year of term-time postcode information.

A3.2.4 Table A3.1 shows the number of patients found in the sample halls postcodes in GP registers in 1999, whose date of acceptance was within 1 year, along with the rate at which these registrations were changed over the following 4 years.

Table A3.1 Patient registrations found at halls postcodes in mid-1999 where date of acceptance within 1 year

		Changes of registration in subsequent years						
				Year				
	1999	**2000**		**2001**		**2002**		**2003**	
Males			$\%^2$		$\%^2$		$\%^2$		$\%^2$
stayed	1660	961	58%	635	38%	367	22%	219	13%
registered within LA[1]		529	32%	166	10%	89	5%	36	2%
registered out of LA[1]		170	10%	160	10%	179	11%	112	7%
Females									
stayed	1773	543	31%	192	11%	62	3%	29	2%
registered within LA[1]		999	56%	214	12%	40	2%	6	0%
registered out of LA[1]		231	13%	137	8%	90	5%	27	2%

1 tracing patients who moved out of halls in each year

2 percentage of 1999 halls residents

Source: Office for National Statistics – based on GP registration data

A3.2.5 Table A3.1 demonstrates that males are either slower at moving out of halls than females or they are slower at changing their GP registration – in practice, it will be a mixture of both. To try and eliminate the effect of staying in halls longer, it is assumed that students can only stay in halls for 3 years, and any registrations remaining after that are the result of a lag. Only 3 per cent of females still have their registration at the halls by the end of the 4th year, whereas 22 per cent of males' registrations are still there – if our assumption holds, these are patients who have moved but not changed their registration.

A3.3 Phasing of double-counting adjustment

A3.3.1 Until we start the matching work we don't know when the late registration is actually made, so a number of assumptions have been made as to when the double-counting adjustments start from.

A3.3.2 For students moving to study, we assume they:
- don't change registration all through their studies
- are on a 3 year course, and
- start to change GP registration once they finish their studies

A3.3.3 For former students finishing their studies, moving local authority and not changing registration straight away, we assume they:
- start changing registration 1 year after finishing

A3.3.4 See Figure A3.2 for an illustration of the phasing of double-counting adjustments.

Figure A3.2: Illustration of the phasing of double-counting adjustments
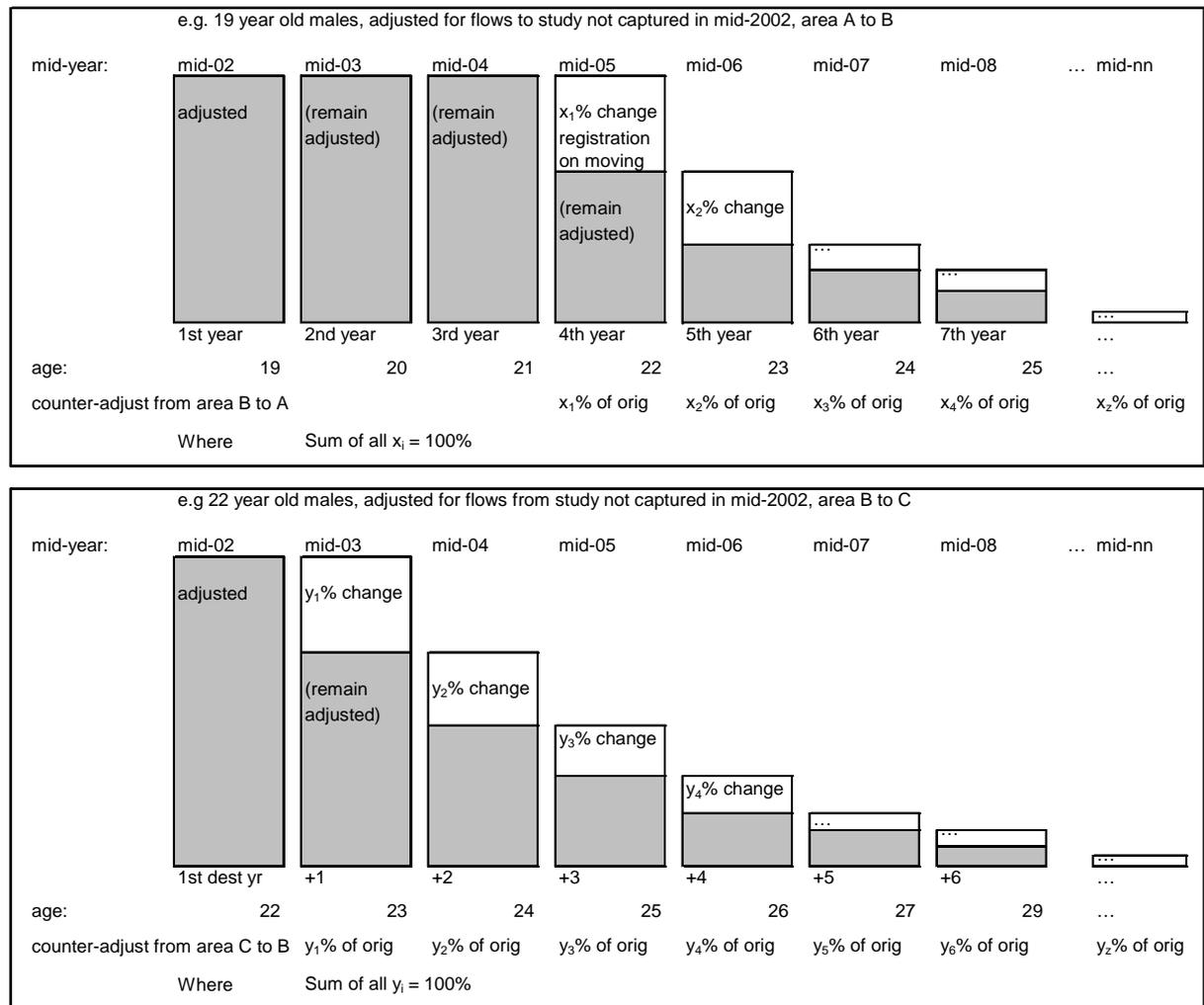
A3.4 Data used as basis for double-counting adjustment

A3.4.1 There is no direct evidence of how long students take to change their GP registration after moving. However, as mentioned in A3.2 above, we have done a longitudinal study of the GP registrations in a small sample of Halls of Residence. See Annex 4 for more detail, but it can be summarised as follows.

A3.4.2 **Data - GP registrations data, 1999 to 2007**

A3.4.2.1   Areas - Postcodes of university halls of residence within 3 local authorities:

- Bournemouth
- Ceredigion, and
- Newcastle-upon-Tyne

A3.4.2.2   Method

- Linked halls of residence postcodes with postcodes on 1999 GP registers. Found patients registered at halls of residence postcodes in 1999; extracted matched records by: NHS number, date of birth, sex, date of acceptance of record, postcode = 1999 Population of Interest (PoI)

- 2000 GP registers: linked 1999 PoI NHS numbers; extracted matched records postcodes
- 2001 GP registers: linked 1999 PoI NHS numbers; extracted matched records postcodes
- …etc up to 2007

A3.4.2.3　　　From this set of data, we were able to calculate what proportions of registrations remain in the halls and what proportion move (either within the local authority or outside it)[7].

A3.5 Double-counting adjustment for adjusted students moving to study

A3.5.1 The linked GP data show patients still registered at the halls postcodes after 3 years who are found in 1999. The data also show those in their second year at the halls postcode in 1999, so in their third year at the postcode in 2000, and those in their first year at the postcode in 1999, so in their third year at the postcode in 2001. Table A3.2 shows how many records were found in each of these 3 years.

Table A3.2: Stocks who have been registered in halls 3 years

	Change registration after further … years					
	1	2	3	4	5	6
Males						
number changing registration out of halls						
accumulated 3rd years　2047	864	466	212	148	72	52
2001 3rd years　635	268	148	66	40	17	24
2000 3rd years　653	247	140	77	70	8	14
1999 3rd years　759	349	178	69	38	47	14
percentage changing registration out of halls						
accumulated 3rd years	*42%*	*23%*	*10%*	*7%*	*4%*	*3%*
2001 3rd years	*42%*	*23%*	*10%*	*6%*	*3%*	*4%*
2000 3rd years	*38%*	*21%*	*12%*	*11%*	*1%*	*2%*
1999 3rd years	*46%*	*23%*	*9%*	*5%*	*6%*	*2%*
Females						
number changing registration out of halls						
accumulated 3rd years　778	554	142	42	17	4	6
2001 3rd years　192	130	33	12	1	2	5
2000 3rd years　237	179	42	9	6	0	1
1999 3rd years　349	245	67	21	10	2	0
percentage changing registration out of halls						
accumulated 3rd years	*71%*	*18%*	*5%*	*2%*	*1%*	*1%*
2001 3rd years	*68%*	*17%*	*6%*	*1%*	*1%*	*3%*
2000 3rd years	*76%*	*18%*	*4%*	*3%*	*0%*	*0%*
1999 3rd years	*70%*	*19%*	*6%*	*3%*	*1%*	*0%*

Source: Office for National Statistics – based on GP registration data

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7 It is known that some halls postcodes shared with non-halls uses. In one instance an old people's home. Limited ages to 18-50 to minimise risk of including non-students, but there may be other non-students still included.

A3.5.2 To use rates in Table A3.2 above, start to apply 3 years after the initial adjustment – i.e. for an adjustment made to 2002, start double-counting in 2005.

A3.6 Double-counting for adjustments made to 'post studies' moves

A3.6.1 The post-studies phasing uses a flatter rate based on a 5 year lag: an assumption of a 4 year degree and 1 year time lag. This is to take account of students on longer courses[8], also because that's when registration rates show an improvement.

A3.6.2 For double-counting the adjustment for students moving to study, we took all longitudinal changes within and outside the area – the double-counting problem comes from patients changing their registration at some point after they've been adjusted, so it doesn't matter whether they've done so within or outside the study local authority district, just the fact that that they've done it.

A3.6.3 However, for former students, we have already made the assumption that they've moved out of the local authority, so we need to base the double-counting adjustment pattern on the proportion of those starting in halls who move out of the local authority.

A3.6.4 Calculated in similar way to above, but basing phasing on patients found in halls after 4+1 years – see Table A3.3 for the years' data used.

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[8] See Annex 5 for rationale

Table A3.3 - Stocks who have been registered in halls 4+1 years

		Change registration after further … years					
		1	2	3	4	5	6
Males							
number changing registration out of LAD							
accumulated 4th+1 years	1006	196	92	54	41	22	14
2003 5th years	232	63	32	20	14	2	3
2002 5th years	460	71	32	21	15	15	4
2001 5th years	314	*62*	28	13	12	5	7
percentage changing registration out of LAD							
accumulated 4th+1 years		*19%*	*9%*	*5%*	*4%*	*2%*	*1%*
2003 5th years		*27%*	*14%*	*9%*	*6%*	*1%*	*1%*
2002 5th years		*15%*	*7%*	*5%*	*3%*	*3%*	*1%*
2001 5th years		*20%*	*9%*	*4%*	*4%*	*2%*	*2%*
Females							
number changing registration out of LAD							
accumulated 4th+1 years	120	47	18	9	1	3	1
2003 5th years	37	17	8	0	0	0	0
2002 5th years	36	12	5	5	1	1	1
2001 5th years	47	18	5	4	0	2	0
percentage changing registration out of LAD							
accumulated 4th+1 years		*39%*	*15%*	*8%*	*1%*	*3%*	*1%*
2003 5th years		*46%*	*22%*	*0%*	*0%*	*0%*	*0%*
2002 5th years		*33%*	*14%*	*14%*	*3%*	*3%*	*3%*
2001 5th years		*38%*	*11%*	*9%*	*0%*	*4%*	*0%*

Source: Office for National Statistics – based on GP registration data

A3.7 Summary

A3.7.1 The phasing in tables Table A3.4 and Table A3.5 below are used in the estimates.

Table A3.4: Phasing of double-counting adjustment 'to studies'

	Change registration after further … years					
	1	2	3	4	5	6
Male accumulated 3rd years						
% changing registration	*42%*	*23%*	*10%*	*7%*	*4%*	*3%*
cumulative %	*42%*	*65%*	*75%*	*83%*	*86%*	*89%*
Female accumulated 3rd years						
% changing registration	*71%*	*18%*	*5%*	*2%*	*1%*	*1%*
cumulative %	*71%*	*89%*	*95%*	*97%*	*98%*	*98%*

Source: Office for National Statistics – based on GP registration data

Table A3.5: Phasing of double-counting adjustment 'post studies'

	Change registration after further … years					
	1	2	3	4	5	6
Male accumulated 4th+1 yrs						
% changing registration	19%	9%	5%	4%	2%	1%
cumulative %	19%	29%	34%	38%	40%	42%
Female accumulated 4th+1 years						
% changing registration	39%	15%	8%	1%	3%	1%
cumulative %	39%	54%	62%	63%	65%	66%

Source: Office for National Statistics – based on GP registration data

Annex 4.　Longitudinal study of students living in halls

A4.1 Introduction

A4.1.1 Halls of residence for the following universities were chosen to create the Population of Interest (PoI) for a longitudinal study of PRDS data:
- Bournemouth University
- The Arts Institute at Bournemouth
- Newcastle Upon Tyne University
- Northumbria University
- University of Wales, Aberystwyth, and
- University of Wales, Lampeter

A4.1.2 The 'Student Village' accommodation at Bournemouth University/The Arts Institute at Bournemouth was excluded from this analysis due to an error in the postcode (recorded as main campus instead of the actual accommodation postcode).

A4.2 Methodology

A4.2.1 Postcodes for each of the halls of residence in the selected areas were identified and matched against postcodes in the Patient Register (PRDS) stocks for 1999.

A4.2.2 NHS numbers were then matched in each successive PRDS stock up to 2007, generating data on: the number of persons in halls in 1999, if and when they changed their GP registration, if they moved outside of the local authority, moved within the local authority, had moved but then stayed within the local authority, or stayed in halls in subsequent years. This created a PoI of approximately 8,600 persons with data on NHS Number, Sex, Date of Birth, Date of Acceptance and Postcode of Residence.

A4.2.3 Moves were calculated by matching postcodes between years. A "non-move" was recorded if postcodes between years remained unchanged, and a "move" was recorded where postcodes between years changed. "Moves" were further grouped into "moves within the local authority" and "moves outside of the local authority".

A4.2.4 As the selected postcodes may also cover residential addresses or other institutions such as nursing homes, a filter was created to exclude anyone from the POI aged under 17 or over 51 in 1999. A length of study variable was created from the acceptance date, based on the assumption that the acceptance date could be used as a proxy for starting studies. Any person with a length of study exceeding 15 years was also excluded.

A4.3 Notes

A4.3.1 The method assumes this sample is representative of all adjusted students. We are basing these registration lags on students who do change their registration, so who are necessarily only a sub-set of the whole student population. We assume therefore that these students found in halls are representative of all students in terms of registration tendencies/lags once they have got into halls, i.e. that x_i% change after i years, x_j% after y years etc. This is a reasonable assumption – a lot of halls

mandate local GP registration, but after that initial registration these students are likely to 'behave' in an average way like the rest who didn't change registration soon after a move.

A4.3.2 Assumed study year

- reference date for data is 30 June (although extraction date 31 July)
- study year = 1999 – year of acceptance + 1, for dates of acceptance Jan-Jun
- study year = 1999 – year of acceptance, for dates of acceptance Jul-Dec
- e.g. date of acceptance = Jan 99, study year = 1999-1999+1=1
- date of acceptance = Oct 89, study year = 1999-1998=1
- date of acceptance = Jul 99, study year = 1999-1999=0

Annex 5.   Rationale for choice of data for 'end of studies' double-counting adjustment

A5.1   The double-counting adjustment should only counter adjust for people who were in the original adjustment.

A5.2   The original adjustment will include primarily:
- '3 year degrees' who didn't re-register on leaving, i.e. 3 years plus a 1 or more year time lag
- '4 year degrees' who didn't re-register on leaving, i.e. 4 years plus a 1 or more year time lag
- there may also be some '5 year degrees', and some students who left after 1 or 2 years - but these will be a minority

A5.3   If '4 years' at a halls postcode is used as the start point, this will include:
- those registering after 3 years plus a 1 year time lag (in the adjustment)
- those leaving and registering immediately after 4 years (not in the adjustment)

A5.4   If '5 years' at a halls postcode is used as the start point, this will include:
- those registering after 3 years plus a 2 year time lag (in the adjustment)
- those registering after 4 years plus a 1 year time lag (in the adjustment)

A5.5   Hence, as we can't split the '3 year degrees' and '4 year degrees' we must use '5 years' to avoid removing (or double-counting) people who weren't in the original adjustment.

Annex 6.   Assessment of the impact of the student adjustment and validation of assumptions used

A6.1 Introduction

A6.1.1 Improving the estimation of student migration will in turn improve estimates of the total population. This annex is an assessment of the impact of the student adjustment on the mid-year population estimates. The assessment is split into two sections. Firstly the impact on the estimates of internal migration between mid-2007 and mid-2008 is considered as this is the only year for which Higher Education Statistics Agency (HESA) data on students' term-time address are available. There follows an assessment of the impact of the total student adjustment between mid-2002 and mid-2008 on the population estimates. This is explored with reference to the cumulative impact on the mid-2008 population estimates and on the age distribution in each year of the population estimates series.

A6.1.2 This annex also provides validation of some of the key assumptions used in the student adjustment. It was necessary to use a combination of data sources and assumptions in developing the adjustment. Specifically, as HESA does not collect information on where former students reside in the year after their studies, the 'from study' adjustment makes use of 2001 Census data. In validating the use of Census data between 2002 and 2008 reference is made to patterns of patient registration and results from the Destination of Leavers from Higher Education (DLHE) survey.

A6.2 Impact assessment of mid-2008 adjustment

A6.2.1 Impact of adjustment across all local authorities

A6.2.1.1   The overall size of the adjustment is presented in Table A6.1 below. As the adjustment is to migration within England and Wales, 63,400 migrants will be added to local authorities around the country with the same number being removed. The 42,500 'from study' adjustment also effects the local authorities former students go to as well as where they leave from. As a result the total gross 'to study' and 'from study' adjustment is 211,800 in the year to mid-2008.

Table A6.1 – Overall Student Adjustment at Start and End of Study for the year to mid-2008

Year to mid-2008	Total	Males	Females
'To study' adjustment	63,400	34,700	28,700
'From study' adjustment	42,500	27,900	14,600

Source: Office for National Statistics

A6.2.1.2   The 'to study' adjustment is clearly larger than the 'from study' adjustment. In part this is related to former students settling in the areas they studied in. However it will also be a function of the fact that the 'to study' adjustment can be directly identified using HESA term-time address data whereas for the 'from study' adjustment it has been necessary to use a range of assumptions. There may be a number of reasons why these assumptions tend to underestimate: for example there

are known to be issues with the completeness of census responses to questions on address one year ago.

A6.2.1.3 The 'from study' adjustment is much greater for males than females with the 'to study' adjustment being more evenly split. Larger adjustments for males would be expected for both as young men tend to be slower to re-register with a GP when they move.

A6.2.2 **Areas with the largest student adjustments**

A6.2.2.1 The ten largest adjustments have been identified in Table A6.2 ('to study') and Table A6.3 ('from study'). Local authorities receiving the largest 'moving to' adjustment in Table A6.2 all have very large student populations.

A6.2.2.2 A feature of the ten largest areas of departure in Table A6.2 is the much smaller size of the adjustments. This is an expected pattern as although students necessarily cluster in university places, they are drawn from all areas. Birmingham would be expected to feature on this list as it has by far the largest population. The presence of five London Boroughs, all of which are in outer London, is also apparent from this table.

Table A6.2 – Areas with the largest 'to study' adjustments

Rank	Local authority	To study adjustment (destination)	Local authority	To study adjustment (departure)
1	Manchester	3,700	Birmingham	600
2	Leeds	2,900	Barnet	600
3	Liverpool	2,300	Croydon	500
4	Birmingham	2,300	Harrow	500
5	Sheffield	2,300	Stockport	500
6	Newcastle-upon-Tyne	1,800	Kirklees	400
7	Cardiff	1,700	Ealing	400
8	Nottingham	1,500	Wirral	400
9	Portsmouth	1,500	Bradford	400
10	Southampton	1,300	Redbridge	400

Source: Office for National Statistics

A6.2.2.3 Areas with large universities also dominate Table A6.3 as a greater number of moves 'from study' are identified. Inevitably, given the overall 'from study' adjustment, the local authority level adjustments listed in Table A6.3 are smaller than in Table A6.2. It is unclear the extent to which smaller adjustments reflect former students not moving at the end of their studies.

A6.2.2.4 London Boroughs are shown to be common first destinations in table 3. This is consistent with the availability of graduate employment opportunities in the capital. Maps showing the distribution of first destinations in the 'from study' adjustment are shown in A6.2.5 below.

## Table A6.3 – Areas with the largest 'from study' adjustments

Rank	Local authority	From study adjustment (departure)	Local authority	From study adjustment (destination)
1	Manchester	2,200	Wandsworth	1,300
2	Oxford	2,100	Lambeth	1,200
3	Leeds	1,600	Hammersmith and Fulham	700
4	Cambridge	1,500	Tower Hamlets	700
5	Nottingham	1,400	Southwark	700
6	Southampton	1,300	Ealing	700
7	Durham	1,200	Barnet	700
8	Sheffield	1,200	Islington	700
9	Birmingham	1,100	Westminster	600
10	Newcastle upon Tyne	1,100	Leeds	600

Source: Office for National Statistics

A6.2.3 Comparison of the 'to study' and 'from study' adjustments

A6.2.3.1   In order to consider the combined impact of the student adjustment on study areas, Figure 6.1 compares the 'to study' adjustment destinations to the 'from study' departures. An x=y line is shown to identify where values would be equal. Overall it is apparent that most areas receive a larger 'to study' destination adjustment than 'from study' departure. Durham, Cambridge and Oxford have been identified where the opposite is clearly the case. These areas are large attractors of students but do not retain graduates to the same extent as other major cities, therefore there will be a large 'from study' adjustment. If this coincides with high levels of student GP registration when they start their studies this will result in a higher adjustment out of the areas than in. In addition, the 'from study' adjustment includes overseas students staying in the UK after finishing their studies. These universities attract a large number of overseas students.

Figure 6.1 Comparison of 2007/8 'to study' and 'from study' adjustments
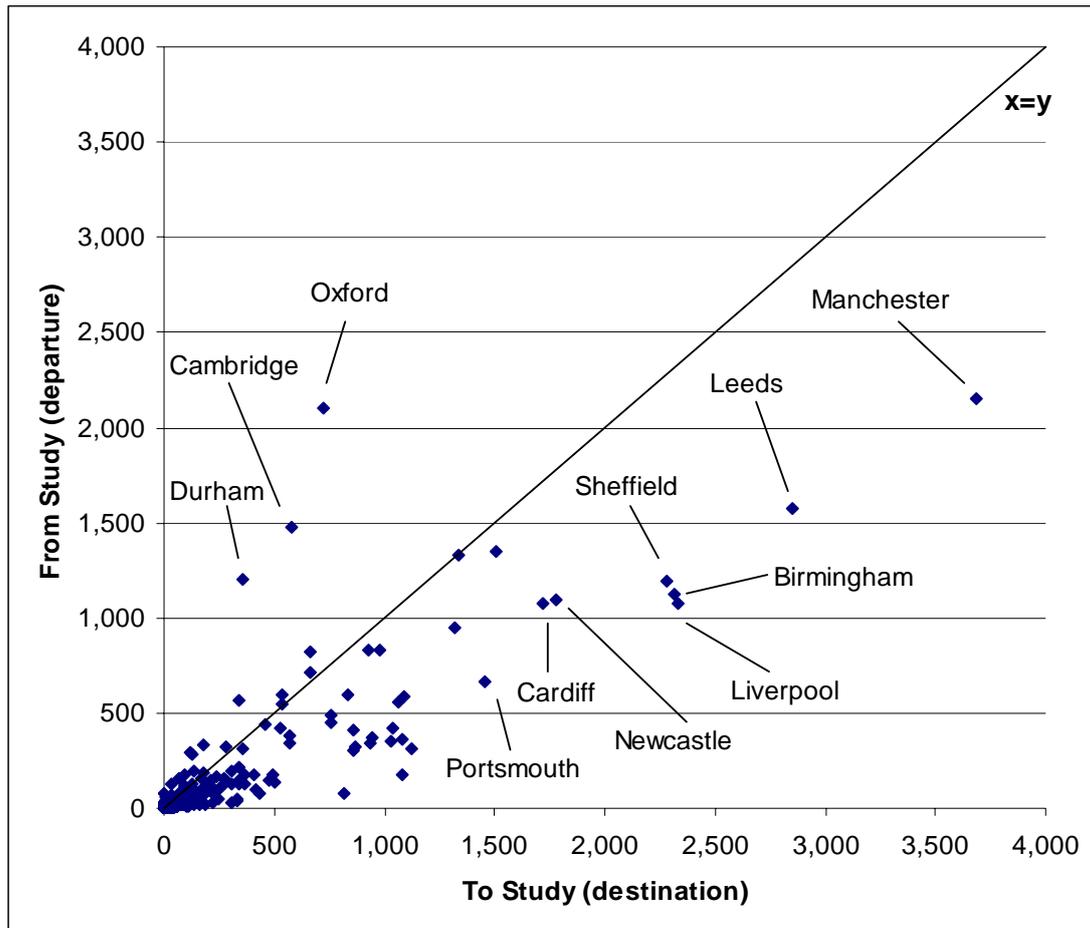
A6.2.3.2   Eight areas are labelled as outliers on Figure 6.1 where the 'to study' destination adjustment is clearly greater than the 'from study' departure adjustment. These are Manchester, Leeds, Birmingham, Sheffield, Liverpool, Newcastle, Cardiff and Portsmouth.

A6.2.4 **Adjustment relative to estimates using existing methods**

A6.2.4.1   To provide context for the adjustments, a comparison is made between the student adjustments and the unadjusted moves between local authorities in the patient registers. The patient registration moves are for ages 16 to 28 only, to make a more direct comparison to the student adjustment. Figure A6.2 shows the total addition to each local authority through the student adjustment compared to the number of moves to each local authority in the unadjusted patient registers. In this case the student adjustment refers to moves of first year undergraduates at the start of study and the first destination of former students. Figure A6.3 is the equivalent comparison for moves from each local authority. Both figures refer to the year to mid-2008.

A6.2.4.2   Overall Figure A6.2 shows that most areas receive a very small student in flow adjustment. This is as expected as students will cluster in areas with universities. Areas with large adjustments relative to their unadjusted estimates include Runnymede (Royal Holloway University): This is likely to relate to the relatively small size of the resident population. Relative to the unadjusted 07/08 'to local authority' estimates, Bradford has a small student adjustment. This is likely to

relate to moves being made for reasons other than study but could also be related to students re-registering quickly with GPs when they move to these places.

Figure A6.2 Total adjustment for moves to local authority compared to 2007/08 moves to local authority from patient registers
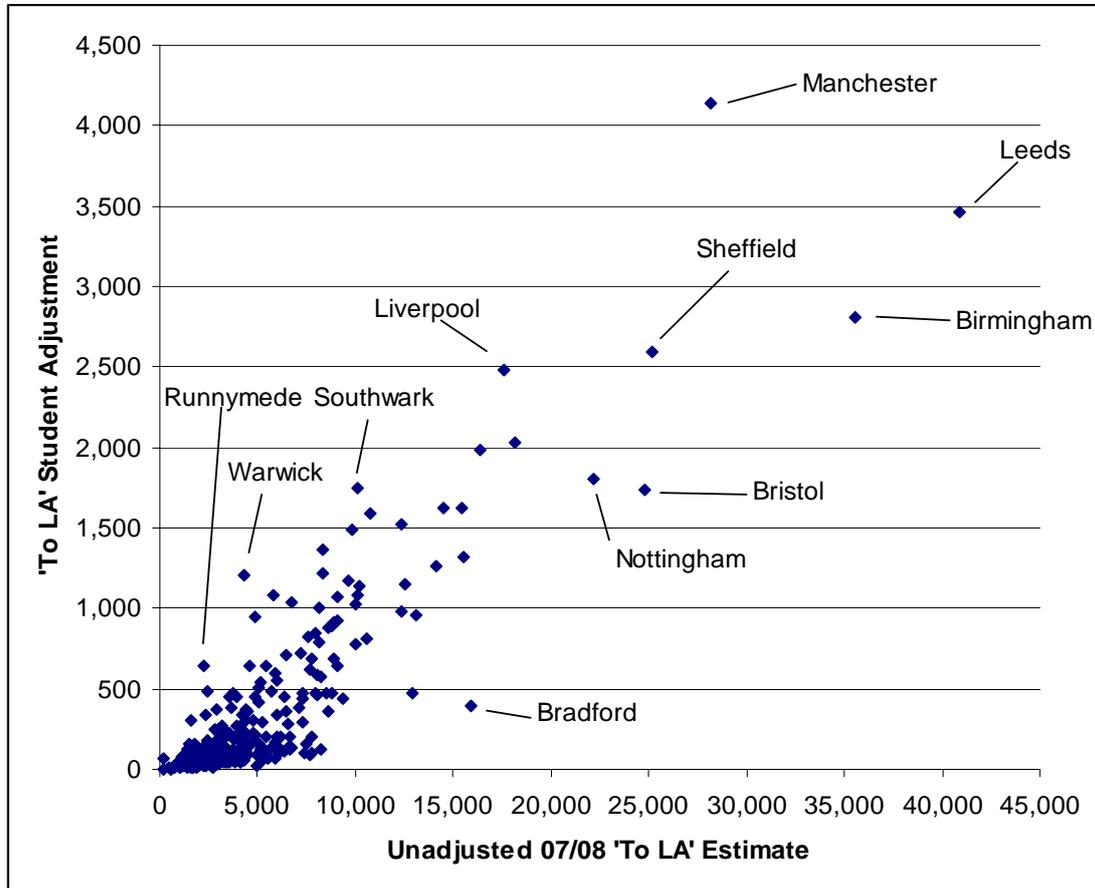

A6.2.4.3 A different overall picture is shown by Figure A6.3 as most areas have a 'from local authority' adjustment: students move from all areas to go to university. The large 'from local authority' adjustments in Oxford, Cambridge and Durham have been highlighted on this figure. Bradford and Birmingham are identified as areas where the 'from local authority' student adjustment is small relative to the large number of unadjusted moves from these places. Again this likely to relate to larger number of non-student moves.

Figure A6.3 Total Adjustment for Moves from local authority Compared to 2007/08 Moves from local authority from Patient Registers
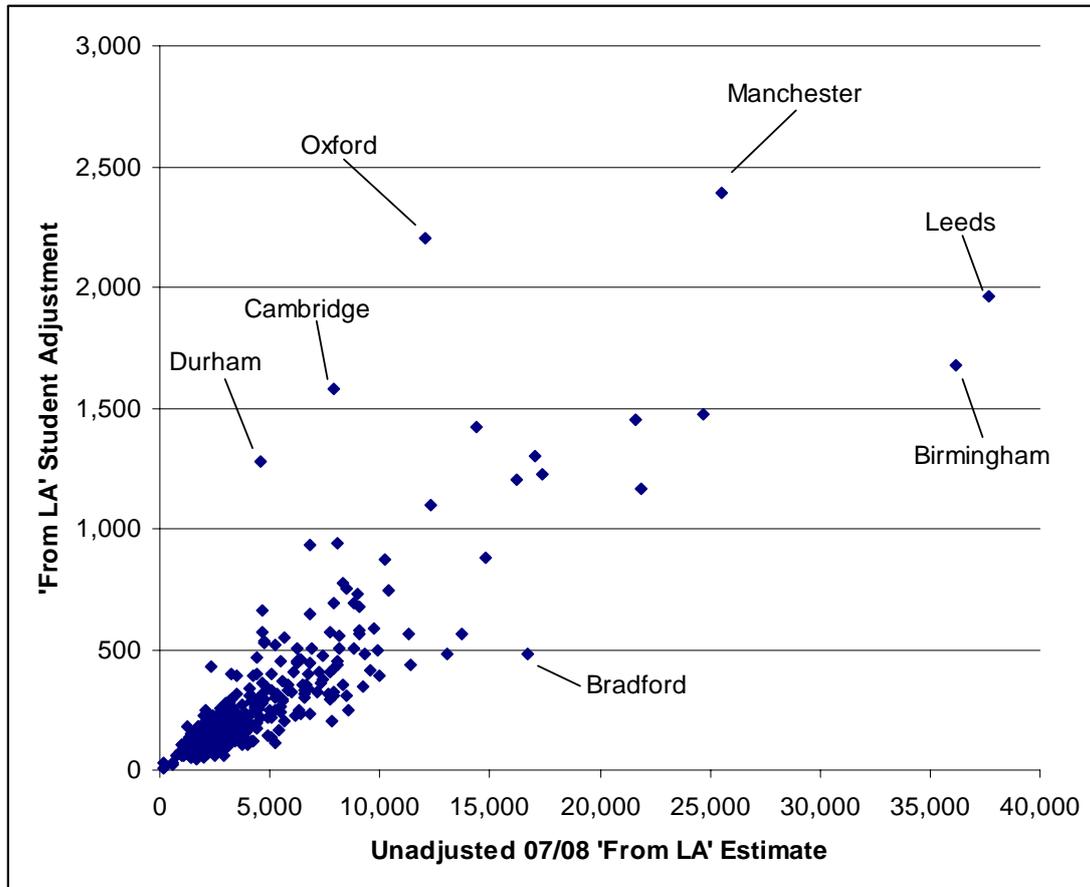
A6.2.5 **'From study' first destination**

A6.2.5.1   Map A6.1 and Map A6.2 demonstrate (for males and females respectively) where former students are distributed by the adjustment. The fact that the 'from study' adjustment is greater for males than females is apparent by comparing these maps.

A6.2.5.2   Areas which provide graduate opportunities are common first destinations for former students. On both maps former students are shown to be attracted to London and other large cities (Leeds, Manchester, Birmingham and Bristol). London Boroughs attracting the highest levels of former students include Wandsworth, Lambeth, Hammersmith and Fulham, Tower Hamlets, Southwark, Ealing, Barnet, Islington, Westminster and Haringey.

Map A6.1 – Distribution of male former students 2007/08

Total Adjustment Size

1 - 50
51 - 100
101 - 200
201 - 400
401 - 784
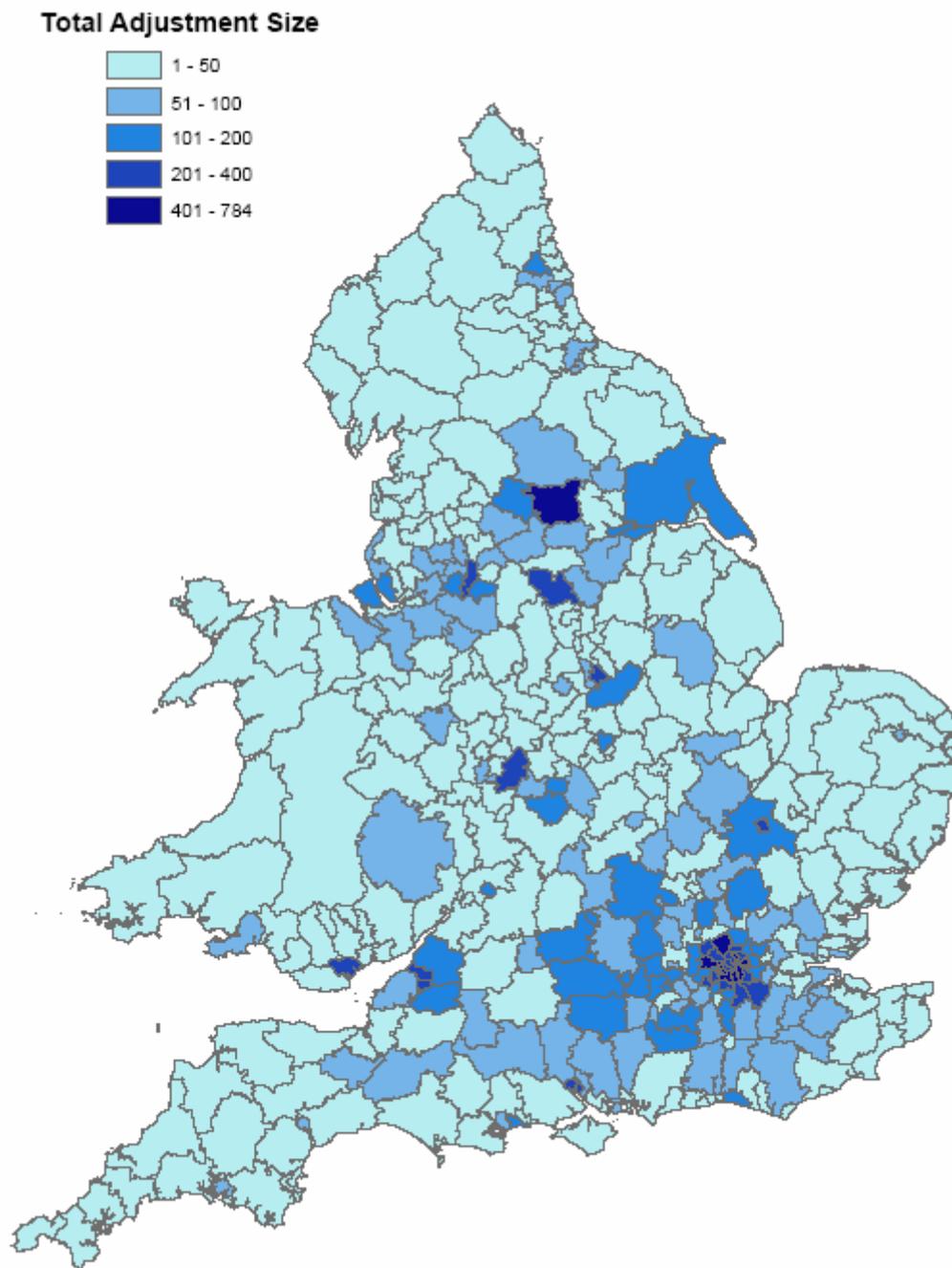
Map A6.2 Distribution of female former students 2007/08
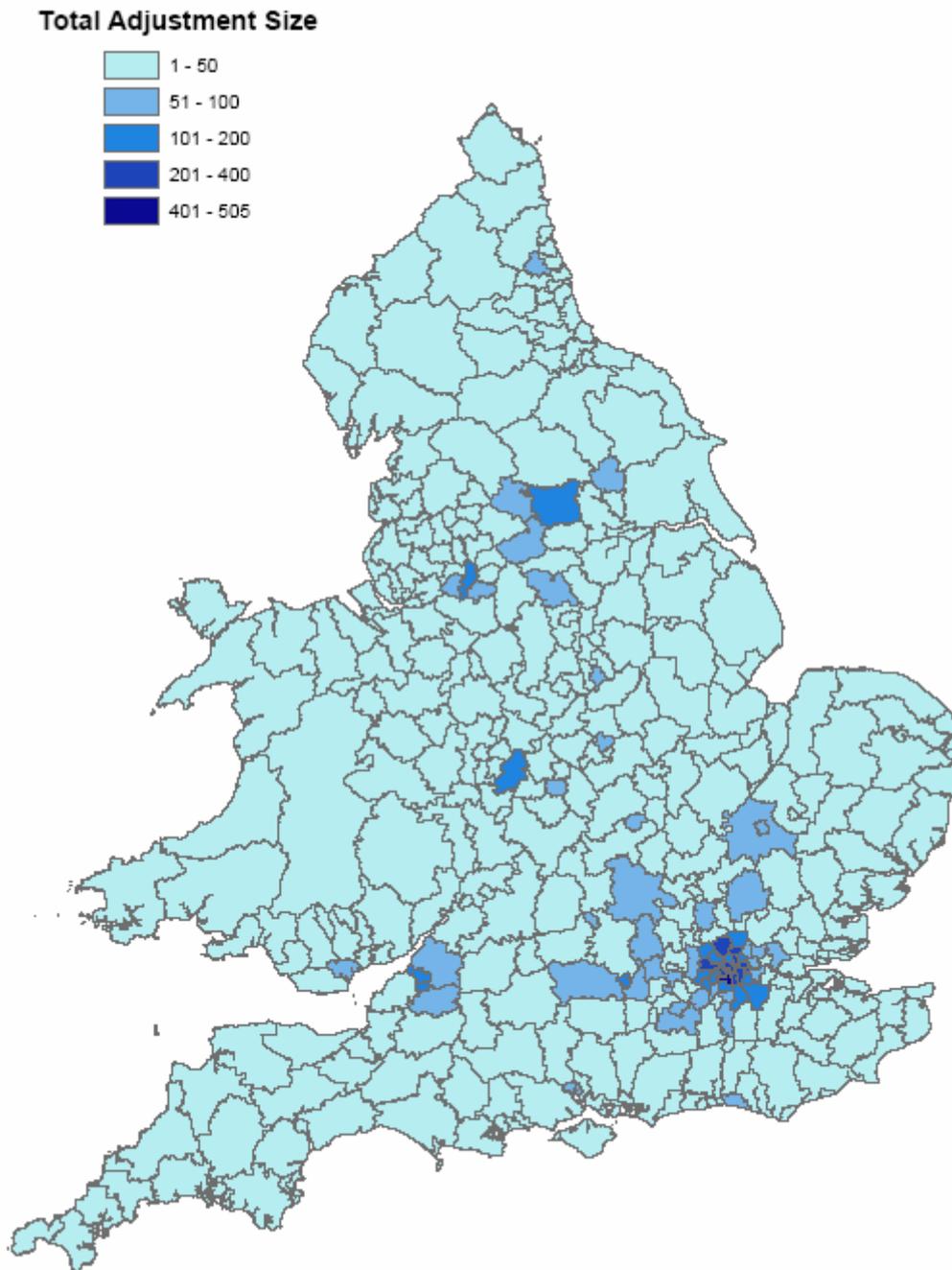
A6.3 Impact assessment mid-2002 to mid-2008

A6.3.1 **Cumulative impact on the mid-2008 population estimates**

A6.3.1.1   An assessment of the impact of the total student adjustment between mid-2002 and mid-2008 can be made with reference to the cumulative impact on the mid-2008 population estimates. This will include the combined impact of the 'to study'

and 'from study' adjustments as well as the double-counting adjustment[9] Table A6.4 identifies the local authorities where the cumulative impact of the student adjustment is largest.

A6.3.1.2   The cumulative impact on the mid-2008 population estimate is largest in Leeds (+6,300). Within this, 19,900 additional moves were identified of first year undergraduates moving to Leeds and 10,200 leaving Leeds at the end of their studies. A proportion of these moves are counter adjusted across the period.

A6.3.1.3   As noted in A6.2.2, London Boroughs tend to have large positive adjustments as a result of being common first destinations for former students.

Table A6.4 Highest positive and negative student adjustments to the mid-2001 to mid-2008 series

Local authority	Total Series Adjustment	Local authority	Total Series Adjustment
Leeds	+6,300	Oxford	-5,300
Manchester	+6,000	Cambridge	-3,800
Liverpool	+5,100	Durham	-3,600
Southwark	+4,800	Lancaster	-1,700
Wandsworth	+4,600	Wirral	-1,500
Plymouth	+4,500	Stockport	-1,200
Tower Hamlets	+4,200	Wigan	-1,100
Lambeth	+4,100	Sefton	-1,100
Newcastle upon Tyne	+3,900	Ceredigion	-1,100
South Gloucestershire	+3,800	Rochdale	-1,000

Source: Office for National Statistics

A6.3.1.4   Areas feature in Table A6.4 as having large negative adjustments for two reasons. The first is a larger estimate of former students moving away at the end of their studies. This is the main cause for the largest negative adjustments in Oxford, Cambridge, and Durham. The second reason is a larger estimate of the number of moves away from areas by first year students.

A6.3.2 **Impact on age distributions in mid-year estimates**

A6.3.2.1   An alternative approach to assessing the impact of the adjustment across the series is to consider the impact on the age distribution within the population estimates. The age distribution of areas with large student populations are characterised by a clear peak around ages 19 to 22. If the patient register captured all moves when they took place, this peak in the age distribution should remain relatively static over time. An example of where the age distribution is not remaining static is provided by Ceredigion in Figure A6.4. Ceredigion contains the universities of Aberystwyth and Lampeter. In each successive year of the population estimates

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[9] It is necessary to apply a double-counting adjustment to avoid double counting moves which have been adjusted when students/former students do eventually re-register with a GP. Further information on the double-counting adjustment can be found in the main student adjustment paper.

the student peak is aged forward reflecting either an important change in the number of former students remaining in the area or the failure of former students to re-register when they leave.

A6.3.2.2   Figure A6.5 shows the age distributions for Ceredigion after the student adjustment has been applied. It is apparent that the ageing on of the student peak is less pronounced, although the effect has not been removed entirely. Another important difference between Figure A6.4 and Figure A6.5 is the size of the peak at ages 19-22 in the latter. This reflects the better estimation of first year undergraduates moving to Ceredigion resulting from the use of HESA data.

Figure A6.4 Unadjusted mid-year estimates 2001 to 2008 in Ceredigion
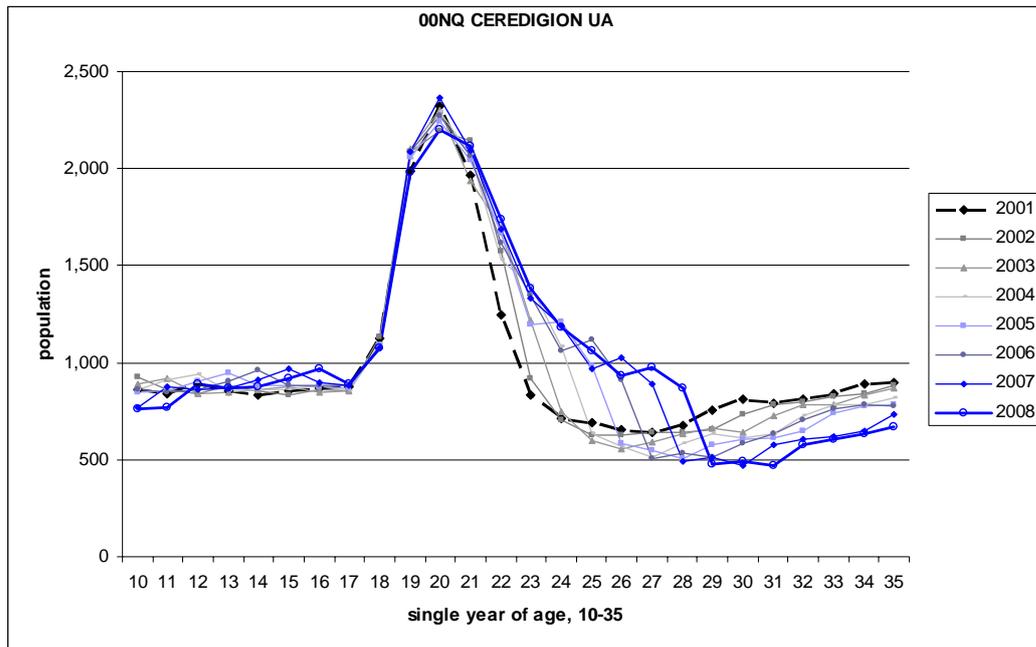
Figure A6.5 Adjusted mid-year estimates 2001 to 2008 in Ceredigion
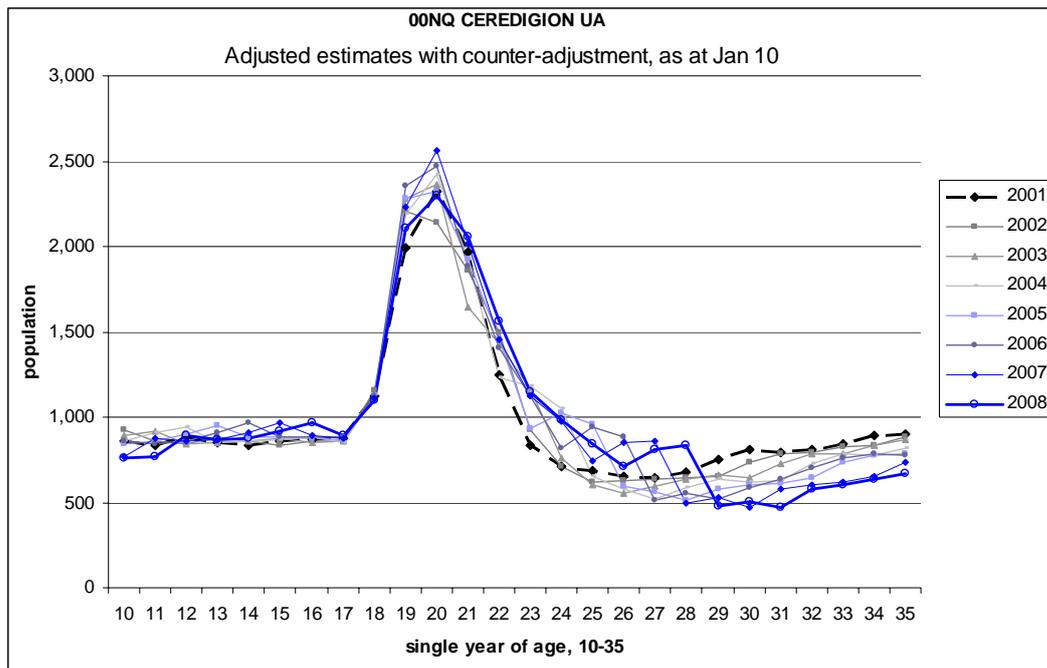
A6.3.2.3   Two further examples are shown to demonstrate the impact of the student adjustment on the age distribution of the mid-year estimates. Manchester is chosen as an area with a large student adjustment. The effect of both the 'to study' and 'from study' adjustments are apparent by comparing the pre- and post-adjustment age distributions in Figure A6.6 and Figure A6.7. As with Ceredigion, the peak at student ages (19-22) is higher after the adjustment has been applied. Although fewer former students appear to be aged on after the adjustment has been applied, the pattern is still clearly visible. One reason for this may be uncaptured migration out of Manchester by young non-students who also moved to the area in their late teens.

Figure A6.6 Unadjusted mid-year estimates 2001 to 2008 in Manchester
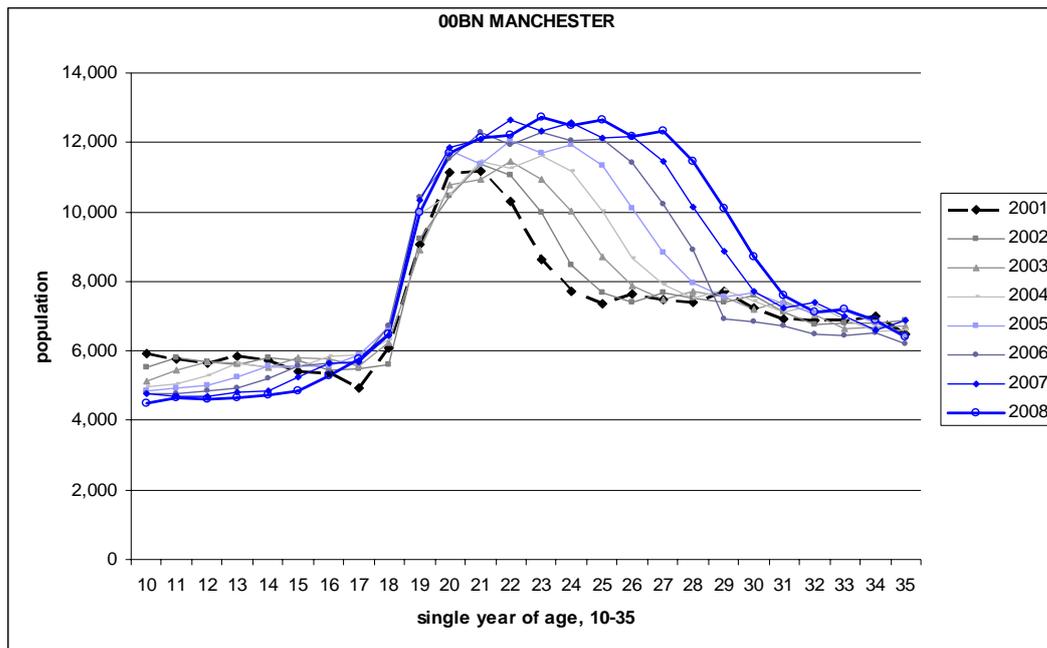
Figure A6.7 Adjusted mid-year estimates 2001 to 2008 in Manchester
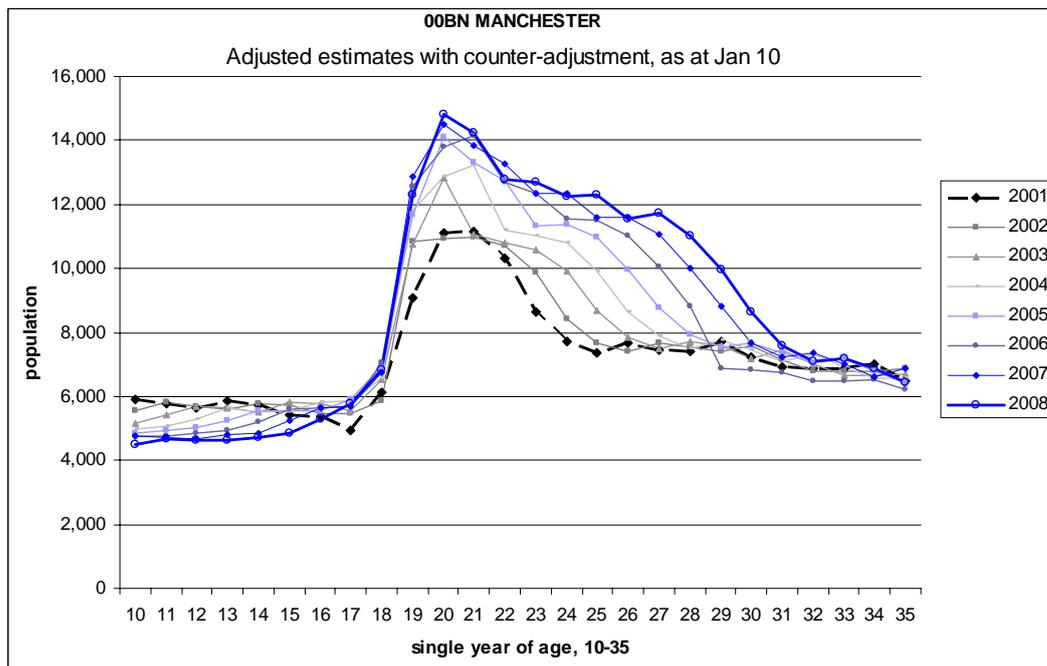
A6.3.2.4   The adjusted and unadjusted age distributions in the population estimates for Oxford are shown in Figure A6.8 and Figure A6.9. Oxford is the area receiving the largest reduction in its mid-2008 population estimate as a result of the student adjustment. As would be expected given the size of the 'from study' adjustment, there is a clear reduction in the ageing on of the student peak.

Figure A6.8 Unadjusted mid-year estimates 2001 to 2008 in Oxford
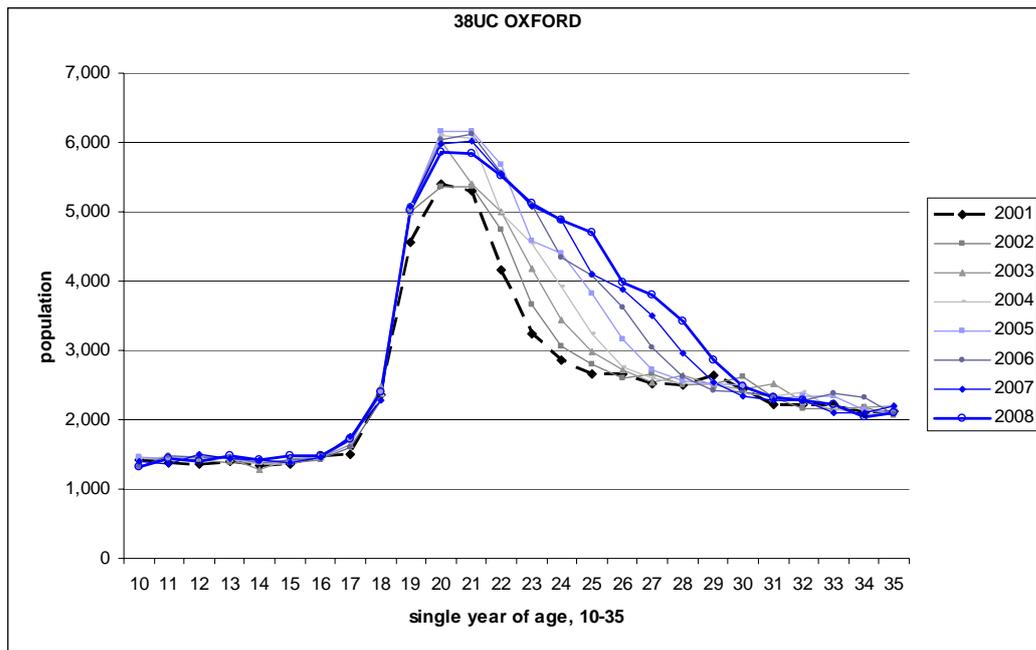
Figure A6.9 Adjusted mid-year estimates 2001 to 2008 in Oxford
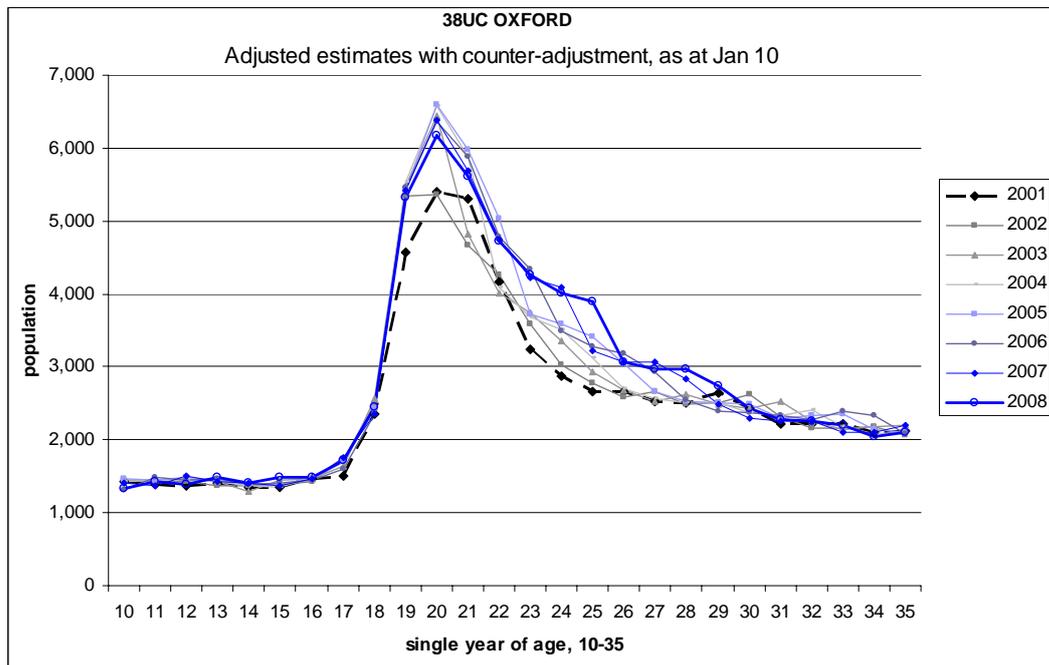
A6.4 Validation of the assumptions used

A6.4.1 A number of assumptions have been made in the development of the student adjustments. More assumptions have been made for the 'from study' adjustment in large part because HESA does not collect information from all former students on where they reside after the end of their studies. As a result it has been necessary to make use of 2001 Census data and assume that:

- The proportion of former students moving from each local authority at the end of their studies has remained constant since 2001
- The proportion of the former students who did re-register with a GP when they moved from an local authority at the end of their studies has also remained constant

A6.4.2 This section is a validation of the use of 2001 Census data in the 'from study' adjustment. Reference is made to how the number of patient registrations have changed since 2001 and results from the Destination of Leavers from Higher Education (DLHE) survey.

A6.4.3 The number of moves from each local authority in the patient registers is an indication of how patterns have changed over time, even if a proportion of those people who moved did not re-register. Figure A6.10 and Figure A6.11 compare the number of moves from each local authority in 2000/01 and 2007/08 separately for males and females. The comparison is made for 21 to 24 year olds only as these are the main ages at which students leave university. If more former students are moving local authority at the end of their studies or if more former students are re-registering moves at the end of study this should be reflected in these figures.

A6.4.4 Both male and female figures show little evidence of substantial changes in the number of patient registration moves from each local authority. The correlation between the 2000/01 and 2007/08 data is 0.978 and 0.9876 for males and females respectively.

A6.4.5 Though overall correlations are high, there are outliers for both males and females where there is some evidence of increased/decreased numbers of registrations over the period. The local authorities with the largest increases in moves of males aged 21 to 24 across the period were in Leeds and Nottingham where the number of re-registrations increased from 5,600 to 6,300 (13%) and 4,100 to 4,800 (17%) respectively. Large percentage changes are seen in Welwyn Hatfield, Canterbury, and Bath & North East Somerset.

A6.4.6 The recent increase in the number of people in higher education would suggest an increase in the number of students re-registering at the end of their studies would be found. Data from HESA suggest that overall the number of people in higher education increased from 1,980,000 in 2001/02 to 2,270,000 in 2007/08 (including overseas students and those studying at the Open University). A possible reason for this increase not being reflected in higher numbers of patient re-registrations at the end of study is that more students are attending universities which are local to them. Such local students are also more likely to stay in the area when they complete their studies.

A6.4.7 Figure A6.10 identifies two areas where the number of re-registrations in 2007/08 was much lower than in 2000/01, Three Rivers and Watford.

Figure A6.10 Comparing patient registration (PRDS) moves from each local authority in 2000/01 and 2007/08 (males)
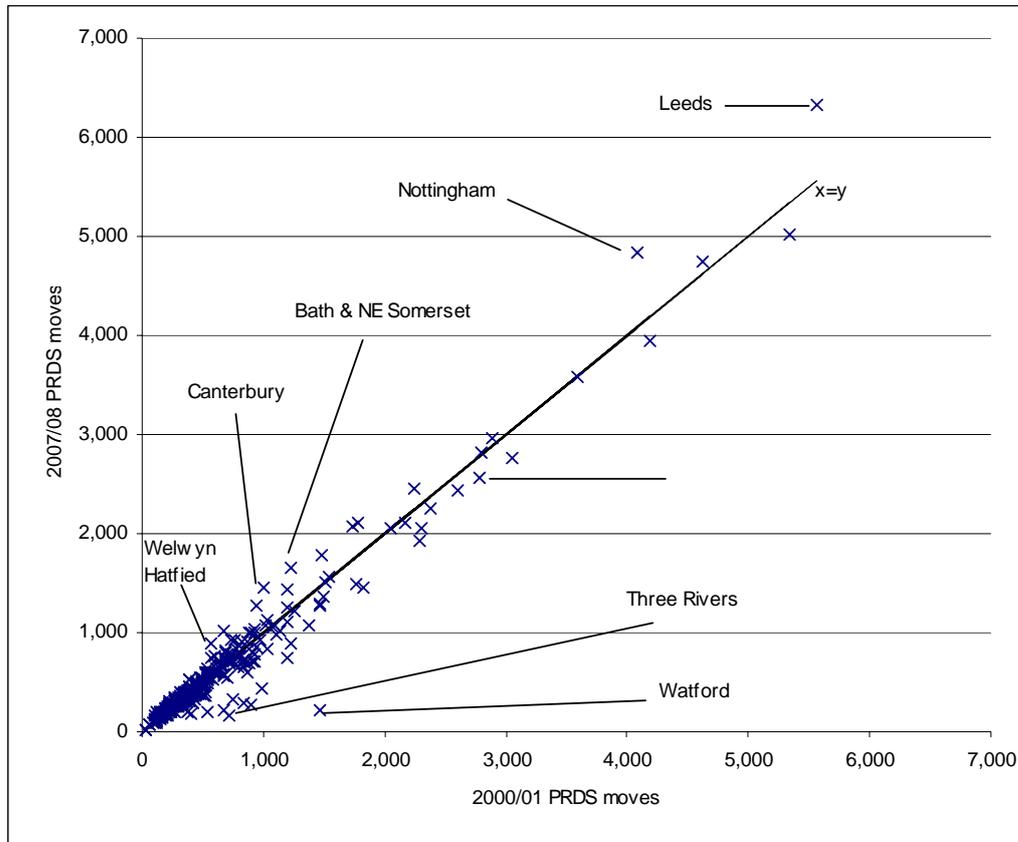
A6.4.8 Figure A6.11 shows many of the same areas as outliers. It is however noted that the increase in Leeds and Nottingham are greater. Women tend to be quicker to re-register than men so this suggests a change in the overall number of former students leaving rather than a change in the proportion of students re-registering.

A6.4.9 Evidence from the patient registers suggests that, for the majority of areas, there has not been a substantial change in the number of former students moving away from where they studied or in the number re-registering once they leave.

Figure A6.11 Comparing patient registration (PRDS) moves from each local authority in 2000/01 and 2007/08 (females)
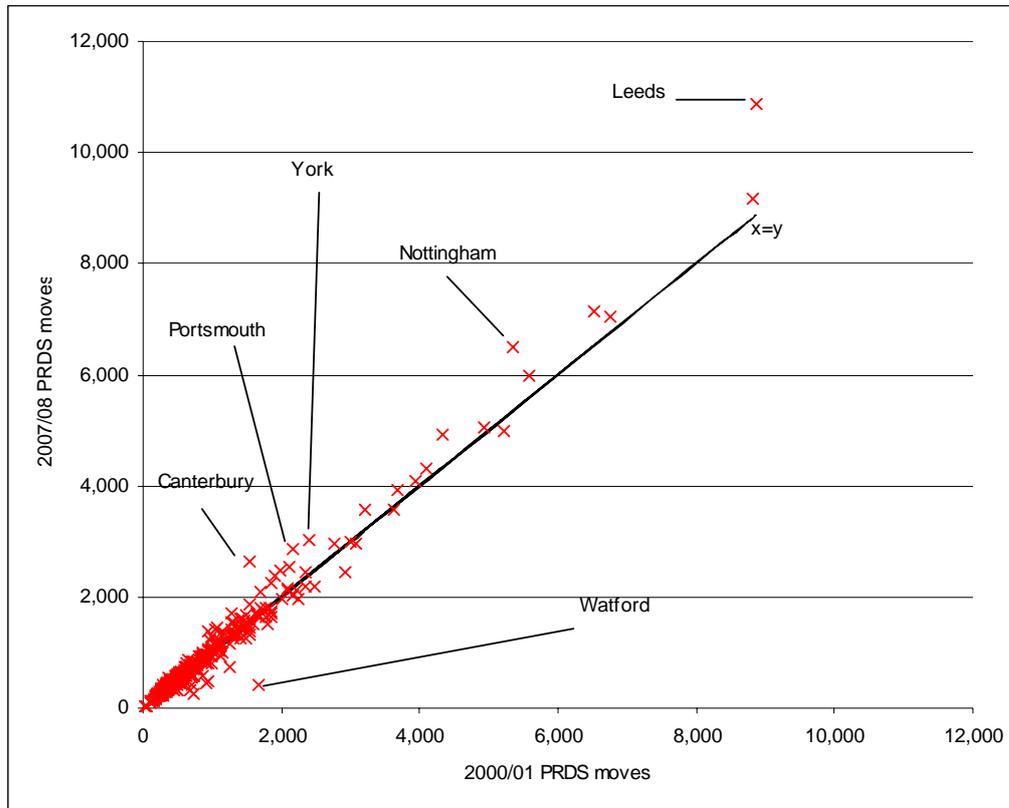

A6.4.10   A second source which can be used to validate the key assumptions is the DLHE survey. Although HESA use this survey to collect information from former students there are a number of reasons why it has not been used in the adjustment method. These reasons include:

- the survey collects information on the location of the leaver's employer rather than their residence
- although the overall response rate across the country is high (80%), the response rate for some universities can be as low as 50%
- while individuals may complete the survey, not all questions are completed. The key address of employer question is not always completed
- there is potential bias in terms of who responds: successful leavers who have found employment may be more likely to complete the survey than those who haven't

A6.4.11   DLHE data have been used to asses whether there have been changes in the number of university leavers who stay in the area they studied. It has been necessary to use local authority of employer as a proxy for the first destination residence. Figure A6.12 shows how the number of DLHE respondents remaining in the same local authority (employer's address) after leaving university differs between 2000/01 and 2006/07.

Figure A6.12 – Comparing DLHE respondents who remained in the same local authority after leaving university in 2000/01 and 2006/07
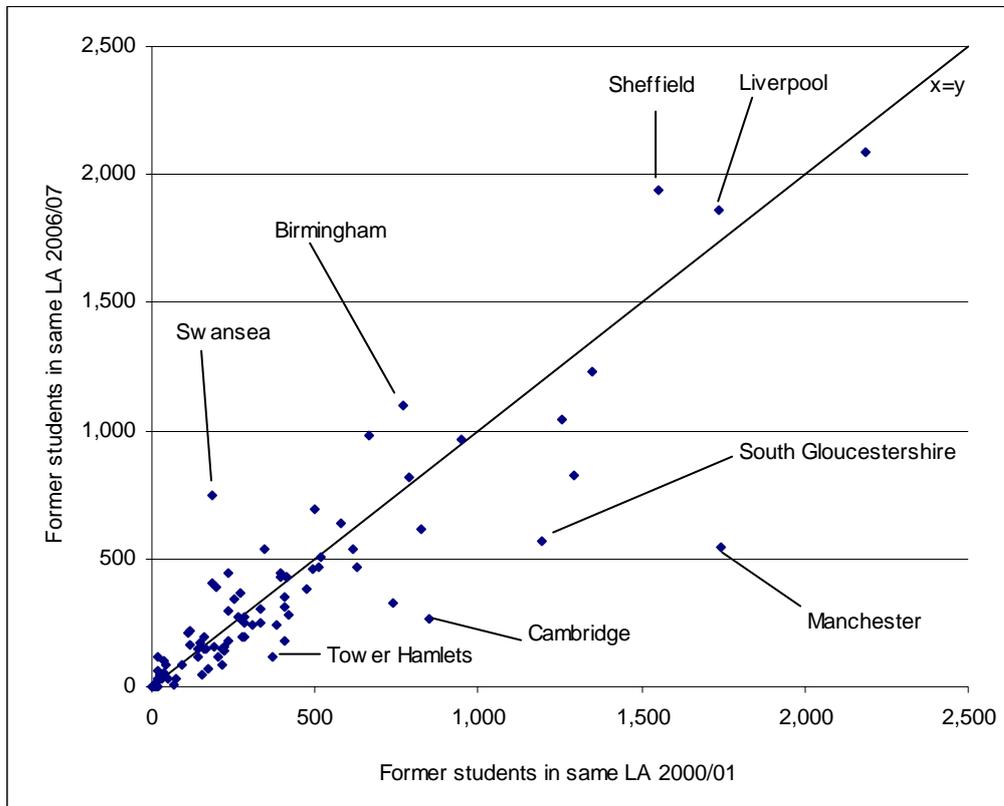
A6.4.12   The correlation between the two years shown in Figure A6.12 is high, 0.876. It is however noted that, despite the increase in the student population over the period, the number of responses in the survey is lower in 2006/07 compared with 2000/01 (31,640 against 34,412). Further issues with the data are shown by some of the outliers identified on the figure. For example an invalid postcode was given for 39% who'd lived in Manchester in 2000/01 (either because it was simply missing or incomplete), but by 2006/07 this had risen to 82%.

A6.4.13   Despite the caveats about data quality, it is of interest to consider the example of Liverpool further. During the continued contact ONS have had on this work with local authority users, Liverpool raised particular concern about plans to assume former students left the city in the same rate in 2007/08 as shown by the 2001 Census. It was suggested that economic growth in the city would have meant more former students remaining. Figure A6.12 shows that the number of DLHE respondents remaining in the city remained relatively constant between 2000/01 and 2006/07, 1,700 and 1,900 respectively.

A6.5 Summary

A6.5.1 The impact of the student adjustment relates both to the improved estimation of young adults moving to university but also improved estimation of moves made by former students at the end of their studies. It has been noted that overall the former is larger than the latter. This reflects the fact that more assumptions have been made to create the 'from study' adjustment but may also reflect a smaller number of moves of

former students, perhaps because a proportion choose stay in the city where they studied.

A6.5.2 As would be expected, the 'to study' adjustment is greatest in areas with large student populations. Additional moves of young adults have been identified as moving from almost all local authorities to go to university.

A6.5.3 Two particular features of the 'from study' adjustment have been shown. Firstly, London Boroughs tend to gain from the adjustment as the capital is a popular first destination for former students. Secondly, a large number of additional moves have been identified away from the historic university cities of Oxford, Cambridge and Durham, where there are fewer graduate employment opportunities than in other cities.

A6.5.4 The 'ageing on' of former students has been clearly identified with reference to the age distributions in the population estimates. It has been shown that the student adjustment reduces this but in some areas this is still problematic. This however may be down to high numbers of moves of non-student young adults around major cities, not addressed by the student adjustment.

A6.5.5 The validation section of this paper has concluded that it is appropriate to use 2001 Census data across the series being adjusted. Reference is made to how Census data is used in the further work section of the main student adjustment paper.