

# Scotland

Scotland produced 11% of UK-domiciled PhD graduates and employed 9% of the UK PhD workforce in the DLHE survey. PhD graduates from Scottish universities were more likely to start their careers overseas and less likely to be unemployed than the UK average. Close to two thirds of PhD graduates from Scottish HEIs remained in Scotland for work.

## Key statistics:

The 795<sup>1</sup> UK-domiciled PhD graduates from Scottish institutions made up 11% of the UK total.

- 52% were male and 48% female, compared to the UK average of 55% and 45%
- 21% studied part-time, higher than the UK average of 27%
- The most popular subjects were medicine, chemistry, biology and anatomy.

Of the 550 (69%) who responded to the 2004 DLHE<sup>2</sup> survey:

- 76.4% entered employment in the UK<sup>3</sup>
- 2.4% were unemployed, lower than the UK average of 3.2%
- 11.5% continued their careers overseas compared to 8.1% across the UK.

Of the 420 PhD graduates from Scottish institutions who entered employment in the UK:

- 48.2% entered the education sector, predominantly in higher education
- 17.5% were employed in manufacturing and 12.5% in the health sector
- 73% remained in Scotland and 27% moved to other regions of the UK for work.

Scotland employed 370 (9%) of the UK-domiciled PhD graduate workforce:

- 82% gained their PhD at Scottish institutions
- 18% moved to Scotland from other regions of the UK
- 52% were employed in the education sector: 54% of these as postdoctoral researchers; 32% in university teaching roles, primarily as lecturers
- 28% of all PhD graduates working in Scotland were employed as postdoctoral researchers.

Scotland was a net exporter (-23%) of UK-domiciled PhD graduates:

- Compared to the national picture, PhD graduates who left the region for work or work and study were the most likely to move outside the UK
- Scotland attracted 4.5% of the UK-domiciled PhD graduates who left their region of study for known UK locations
- PhD graduates moving to the region were most likely to come from the North West and South East and work in the education (46%) or manufacturing (18%) sector.

## Overview of Scottish higher education institutions<sup>4</sup>

In Scotland, there are 21 higher education institutions (HEIs): 13 universities, The Open University in Scotland, one university college, two colleges of higher education, two Art Schools, a conservatoire and the Scottish Agricultural College. In 2003/04 there were over 205,000 higher education students in these institutions. The largest higher education institutions in Scotland are the universities of Edinburgh, Glasgow and Strathclyde, all with around 24,000 students<sup>5</sup> in 2003/04.

In 2003/04, 4.3% of students in the region were registered for doctoral level research degrees<sup>6</sup>, predominantly at the institutions with a substantial research income<sup>7</sup>; Glasgow, Dundee, Edinburgh, Aberdeen and St Andrews (see Table One).

Higher education institution	Final year PhD numbers
The University of Edinburgh	460
The University of Glasgow	310
The University of Strathclyde	180
The University of Aberdeen	170
The University of Dundee	105
The University of St Andrews	105
Heriot-Watt University	80
The University of Stirling	55
Glasgow Caledonian University	35
Napier University	25
The Robert Gordon University	20
The University of Abertay Dundee	10
The University of Paisley	10
Edinburgh College of Art	5
Queen Margaret University College, Edinburgh	5
Total	1575

**Table One: Final year PhD researchers by HEI in the Scotland<sup>8</sup>**

The research strengths of institutions in Scotland are reflected in Figure One, derived from the results of the 2001 Research Assessment Exercise (RAE)<sup>9</sup>. Further analysis of the RAE results shows that 71.6% of submissions from the region's institutions were rated at 4 or above, which was the highest proportion for any region. Over a third (36%) scored the highest ratings of 5 and 5\*. These top rated departments were across the subject spectrum indicating the broad range of research expertise in the region.

<sup>1</sup> All figures are rounded to the nearest five for data protection

<sup>2</sup> Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

<sup>3</sup> 70.4% were classified as 'working in the UK'; 6.0% were 'working and studying in the UK'. The data on employment throughout WDPDR includes both classifications

<sup>4</sup> Universities Scotland [www.universities-scotland.ac.uk/](http://www.universities-scotland.ac.uk/)

<sup>5</sup> 'Students in Higher Education at Scottish Institutions 2004/05' [www.scotland.gov.uk/](http://www.scotland.gov.uk/)

<sup>6</sup> 'Higher Education in Scotland: Second Update Report' [www.sfc.ac.uk/publications/pubs\\_other.htm](http://www.sfc.ac.uk/publications/pubs_other.htm)

<sup>7</sup> Figures from Phase 3 Higher Education Review: The Competitiveness of Higher Education in Scotland; [www.scotland.gov.uk/](http://www.scotland.gov.uk/)

<sup>8</sup> These figures were derived from the HESA student record data for those who were scheduled to complete their enrolment period in 2002/03. They include international PhD researchers who were not included in the DLHE survey [www.hesa.ac.uk/pi/0203/research.htm](http://www.hesa.ac.uk/pi/0203/research.htm)

<sup>9</sup> Data set available at [www.hero.ac.uk/rae/Results](http://www.hero.ac.uk/rae/Results)

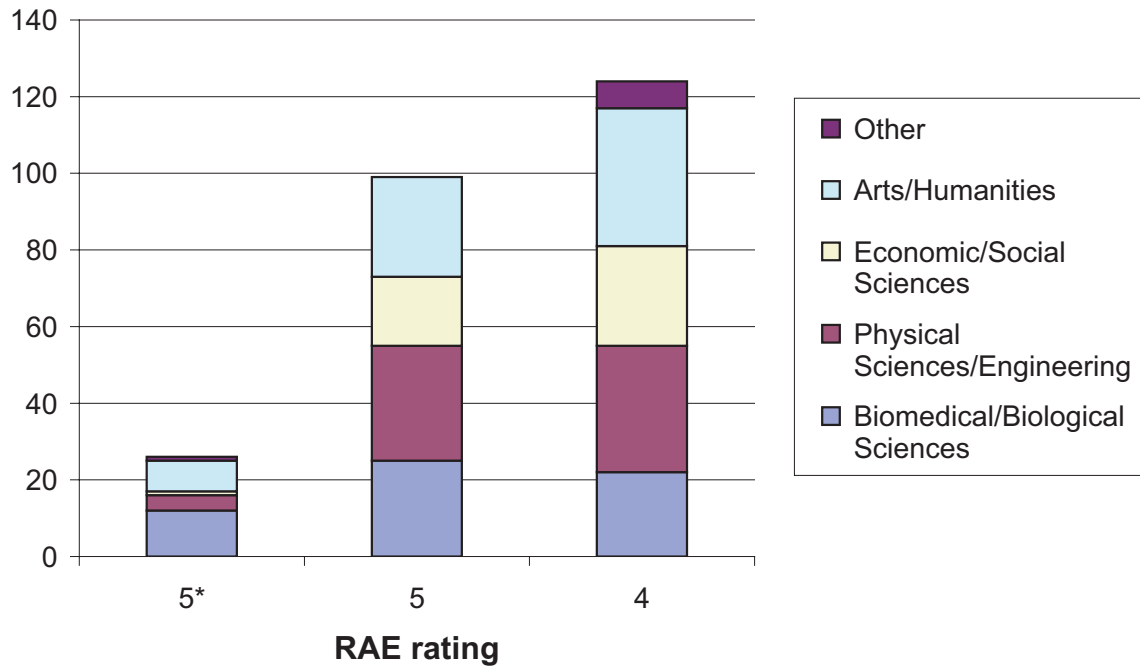


Figure One: Research subjects of top graded RAE submissions in Scotland

### Economic strengths

A recent overview produced by Scottish Enterprise<sup>10</sup> highlighted the strengths that Scotland enjoys, including the high education levels amongst its workforce. However, a declining population, low rates of business start-ups and low research and development (R&D) spend are all causes for concern. With unemployment levels higher than the UK average (at 6% in 2004)<sup>11</sup>, the focus of future economic development is on growing businesses through R&D investment. Part of the strategy is to improve links between universities and industry – to help universities promote the knowledge generated by their research to industry and to help businesses articulate their needs and to exploit the potential of academic research. The focus aims to be on both established industry sectors (e.g. financial services, energy, food and drink, and tourism) and new areas with potential high growth (e.g. creative industries, life sciences and renewable energy).

Research in Scottish higher education is successful at securing government funding in competitive bidding. However, the levels of investment by Scottish businesses in research and development (R&D) are lower than the rest of the UK, and in 2003 it was falling<sup>12</sup>. The Business Enterprise R&D Survey conducted by the Office of National Statistics<sup>13</sup>, reported that

in 2002, the Gross domestic expenditure on R&D, as a percentage of Total Gross Value Added, was 1.9% for Scotland, close to the 2.0% reported for the UK as a whole.

### Profile of PhD graduates from Scotland

Of the 7270 UK-domiciled PhDs who graduated in the UK in 2003, 11% (795) graduated from Scottish higher education institutions. Of these UK-domiciled PhD graduates, 48% were female and 52% male – a more equitable gender balance than the UK average of 45% and 55%. Part time study was less common in Scotland than in other regions, accounting for only 21% of degrees awarded, compared to the UK average of 27%.

Figure Two shows the breakdown of PhD graduates by subject groups. More PhD graduates from Scottish institutions came from the biomedical and biological sciences (16.3% compared to 12.4%) and medical sciences (30% compared to 26.9%) than the UK as a whole. Slightly fewer came from the physical sciences (30.6% compared to 32%), the arts and humanities (12.5% compared to 13.7%) and the economic and social sciences (8.1% compared to 11.1%). The remaining 2.5% came from education and related subjects and combinations of other subjects (compared to 3.9% of the national figures).

<sup>10</sup> Scotland – competing with the world [www.scottish-enterprise.com/](http://www.scottish-enterprise.com/)

<sup>11</sup> Scottish Economic Statistics 2005 [www.scotland.gov.uk/](http://www.scotland.gov.uk/)

<sup>12</sup> 'Higher Education in Scotland: Second Update Report' [www.sfc.ac.uk/publications/pubs\\_other.htm](http://www.sfc.ac.uk/publications/pubs_other.htm)

<sup>13</sup> [www.statistics.gov.uk/](http://www.statistics.gov.uk/); also useful is 'Regional Competitiveness and State of the Regions' by Mukund Lad at [www.dtistats.net/sd/rci/](http://www.dtistats.net/sd/rci/)

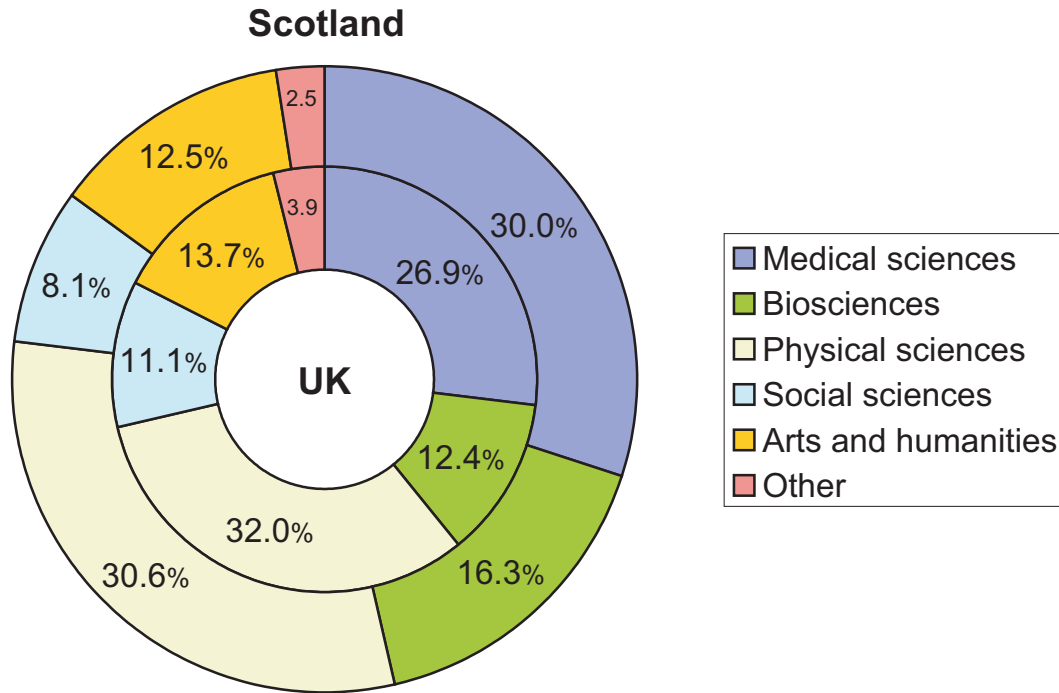


Figure Two: Subject groups of all UK-domiciled PhD graduates from Scottish HEIs (outer ring) compared to all UK HEIs (inner ring) in 2003

The list of the 'top ten' subjects for PhD graduates from the Scottish HEIs (Table Two) is headed by three of the top four subjects in the UK; clinical medicine (5.9%), chemistry (4.9%) and biology (3.8%). However, the lower proportions in each of these subjects suggests a more even distribution amongst all the subjects. Also appearing high in the table are 'other subjects allied to medicine' and anatomy, reflecting the strength of medical schools in the region. Theology also holds a stronger position in Scotland than the UK as a whole.

Subject and ranking	Scotland	Total (and position) in UK
1. Clinical Medicine	5.9%	8.2% (1)
2. Chemistry	4.9%	7.7% (2)
3. Biology	3.8%	5.2% (4)
4. Other subjects allied to medicine	3.0%	1.8% (18)
5. Anatomy	3.0%	1.8% (19)
6. Physics	2.9%	4.4% (5)
7. Molecular biology, biophysics and biochemistry	2.7%	2.5% (10)
8. Psychology	2.1%	7.6% (3)
9. Theology	1.9%	1.2% (24)
10. Pharmacology, toxicology and pharmacy	1.9%	2.9% (7)

Table Two: Top subjects studied by PhD graduates in Scottish HEIs compared to the UK figures

### What do PhD graduates from Scotland do?<sup>14</sup>

Of the 795 UK-domiciled PhD graduates from Scottish HEIs in 2003 eligible for the 2004 survey, 550 responded (69% response rate).

Just over 70% of UK-domiciled PhD graduates from Scottish institutions had entered the workplace when the survey was conducted, compared to the overall UK figure of 72.7%. A further 6% were engaged in work and study simultaneously: higher than the UK average of 8%. Significantly more PhD graduates had moved overseas (11.5%) than for the UK as a whole (8.1%). Unemployment rates for UK-domiciled PhD graduates from Scottish institutions (2.4%) were lower than the UK average of 3.2%.

<sup>14</sup> The data in this section refers to PhD graduates from Scottish HEIs who were working in all regions of the UK

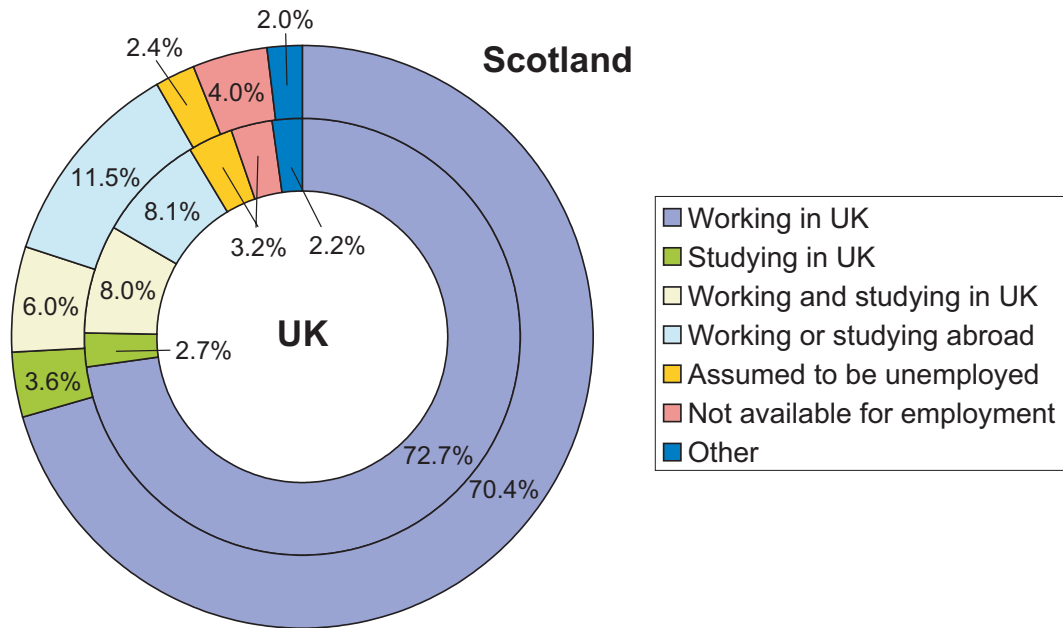


Figure Three: First destinations of UK-domiciled PhD graduates for all subjects from Scottish HEIs (outer ring) compared to all UK HEIs (inner ring) from 2004 DLHE survey responses

### Employment sectors

The 76.4% of PhD graduates from Scottish HEIs working or working and studying in the UK were employed in a range of sectors across the UK. Consistent with the UK average (47.8%), the education sector was the dominant destination, employing 48.2%, predominantly in higher education.

The balance (51.8%) were employed in a range of occupations across all sectors, as shown in Figure Four, where small differences with the UK picture emerge.

Manufacturing industries employed 17.5% of PhD graduates from Scottish HEIs, compared to 16.3% across the UK as a whole. 75% of these in this broad sector are employed in the chemical and pharmaceutical industries: i.e. 13% of all Scottish PhD graduates, compared to a national figure of 11%.

The health sector employed slightly fewer PhD graduates from Scottish HEIs (12.5%) compared to 15.5% across the UK, which is perhaps surprising given that medicine and related subjects are such popular PhD disciplines in the region. The other employment sectors, consisting of business, finance, IT, public administration and 'other' sectors, employed very similar proportions of PhD graduates from Scotland as they did of all UK-domiciled PhD graduates.

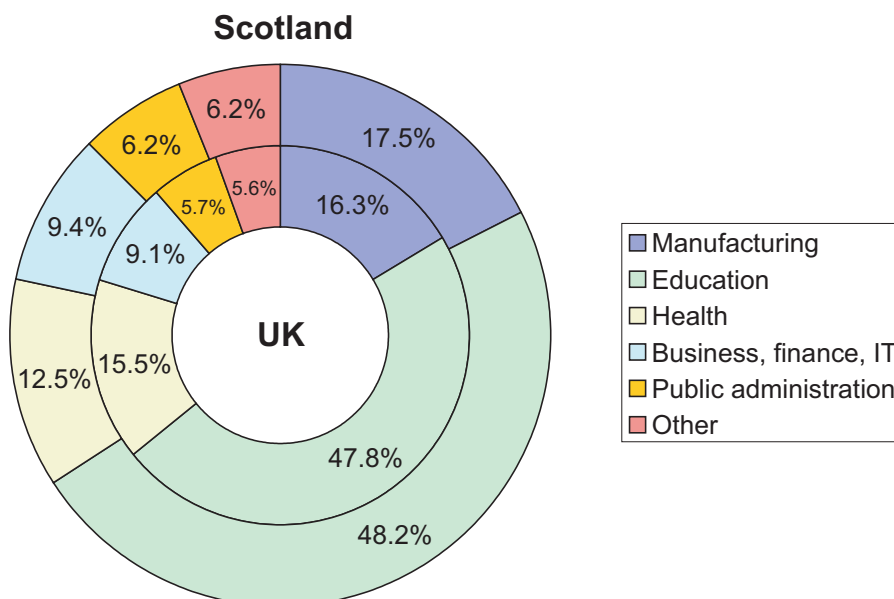


Figure Four: Employment sectors entered by UK-domiciled PhD graduates from Scottish HEIs (outer ring) compared to all UK HEIs (inner ring), based on Standard Industrial Classifications returned in 2004 DLHE survey

### Career occupations

We examined the specific occupations entered by PhD graduates from Scottish HEIs. A similar picture to the UK average emerges, as shown in Figure Five. The biggest variations in occupations of Scottish PhD graduates are in 'other professions' (the category that includes postdoctoral researchers), which was higher than the national figure at 34.8% compared to 29.8%, and 'teaching' (predominantly university lecturing staff), which was slightly lower at 18.7% compared to 22.2%. Slightly more were employed in the scientific research category, but fewer in engineering and business and finance occupations compared to the UK average. However, compared to the UK average, these differences are small and generally speaking, the occupations entered by PhD graduates from Scottish HEIs were very similar to the UK national picture.

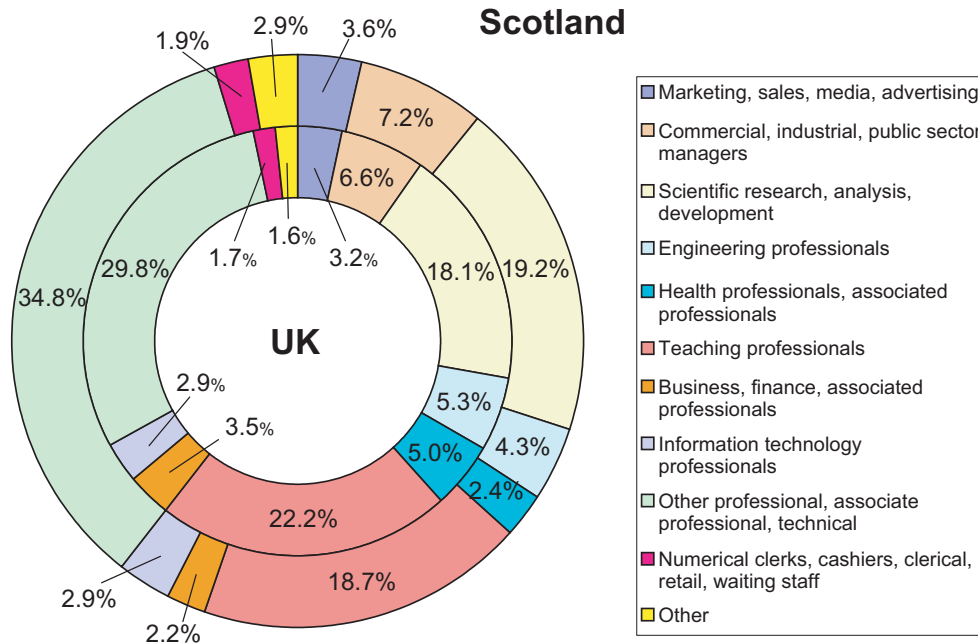


Figure Five: Types of work entered by UK-domiciled PhD graduates from Scottish HEIs (outer ring) compared to all UK HEIs (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

### Migration

We examined the migration patterns of UK-domiciled PhD graduates from Scottish HEIs who were in employment at the time of the survey, shown in Figure Six. In common with most regions, Scotland saw a net loss of PhD graduates with 23% fewer starting work in the region than the total number of PhD graduates from the region<sup>15</sup>.

Of the 480 PhD graduates from Scottish HEIs in employment, 115 PhD graduates (24% of total employed) left the region for work or work and study in other regions of the UK. This proportion is considerably lower than the 38% average figure for all UK regions. PhD graduates from Scotland moved throughout the UK: London and the South East being the most popular, each attracting 4%. Other popular regions were the North West, South West and the East<sup>16</sup>.

Uniquely in the UK, a higher percentage of PhD graduates from Scotland moved overseas than to any one region in the UK. 65 PhD graduates (13% of total employed) left Scotland for work or work and study abroad (higher than the national proportion of 9%).

<sup>15</sup> The net migration figures should be treated with care. 2.5% of the total DLHE respondents did not identify a specific region of employment. If these respondents were skewed to one region this will impact significantly on the net migration figures

<sup>16</sup> Data protection prohibits a full analysis of region to region migration

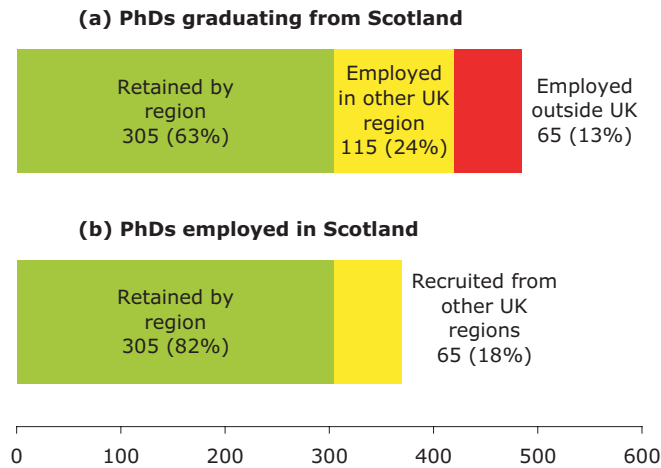


Figure Six: Mobility of Scottish PhD graduates in employment (a) and origin (region of study) of PhD graduates working in Scotland (b)

### What do PhD graduates employed in Scotland do?<sup>17</sup>

305 PhD graduates from Scottish HEIs were working in Scotland at the time of the survey, representing 82% of the total PhDs working in the region. These were joined by 65 UK-domiciled PhD graduates from other regions in the UK, who gained employment in Scotland. Within this cohort, small numbers came from each of the other UK regions, but only the North West and South East supplied more than a handful (4% and 3% of those employed in Scotland). In total, 5% of UK-domiciled PhD graduates who left their regions of study for known UK locations moved to Scotland. Amongst the regions, only Wales, the North East and Northern Ireland attracted smaller numbers of PhD graduates.

### Employment Sectors

The employment sectors for PhD graduates employed in Scotland are compared to the national picture in Figure Seven. Overall, the pattern of employment sectors for Scotland is very close to the UK picture. The education sector employed 52% of PhD graduates in the region (compared to 47.8% across the UK), predominantly in higher education. Manufacturing accounted for a lower proportion of PhD graduates in Scotland (15.6% compared to 16.3%), as did the health sector (12.7% compared to 15.5%). The proportions employed in the business, finance and IT (9.2%) and public administration (5.7%) sectors closely matched the UK averages.

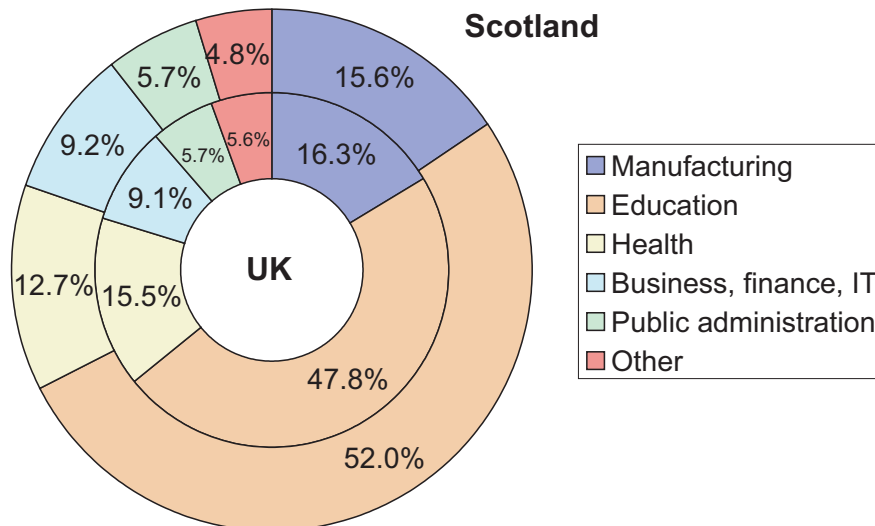


Figure Seven: Employment sectors entered by UK-domiciled PhD graduates employed in the Scotland (outer ring) compared to all UK regions (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

<sup>17</sup> The data in this section refers to PhD graduates from all regions of the UK who were working in Scotland

The main sector employing the 65 PhD graduates moving into Scotland was education (primarily universities) employing 46%. This is a smaller proportion than many other regions. Of those who moved to Scotland's HEIs, 52% were employed as postdoctoral researchers, 32% were employed as lecturers, and the remainder in a range of administrative and supporting roles. Other popular employment sectors were manufacturing, business, finance and IT and the health sector employing 18%, 12% and 12%, respectively, of those moving to Scotland for work.

### Career occupations

We examined the specific occupations entered by PhD graduates employed in Scotland. The picture is different to the UK as a whole, as outlined in Figure Eight. The largest difference occurs in the 'other professionals' category (36.4% compared to 29.8% across the UK), which includes most postdoctoral researchers and reflects the dominance of the higher education sector as an employer of PhD graduates in the region. Overall, 28% of all the PhD graduates working in Scotland are identifiable as postdoctoral researchers<sup>18</sup>, significantly higher than the UK average of 22%.

Scotland employed a lower proportion of PhD graduates in teaching (18.6% compared to 22.2% across the UK), health (3% compared to 5%) and scientific research (16.7% compared to 18.1%), but similar proportions in all the other occupation types.

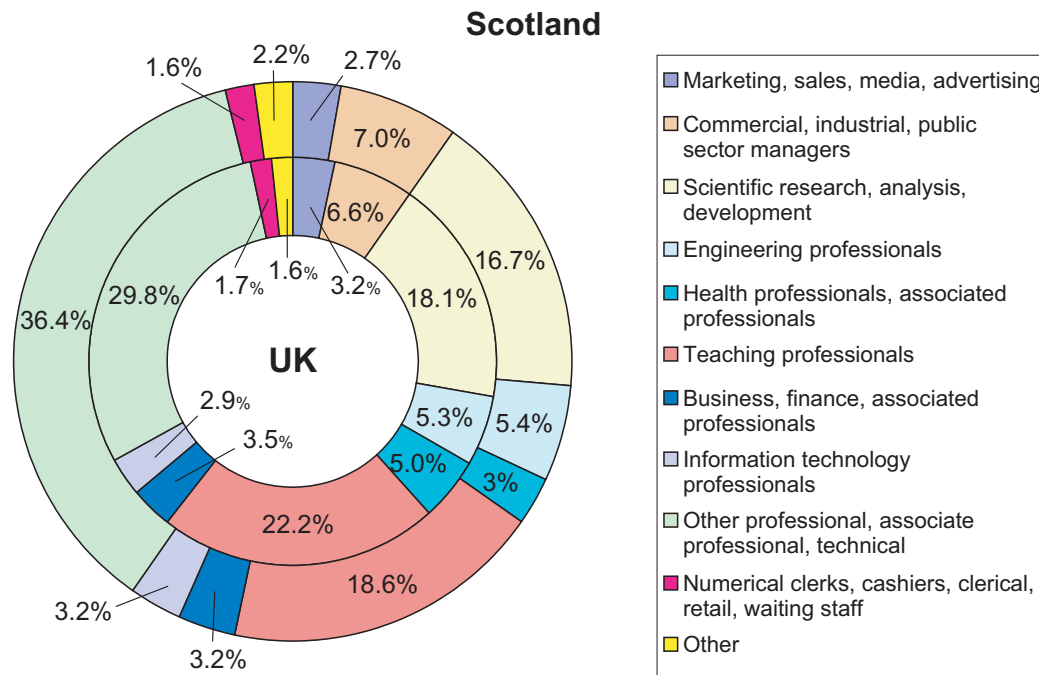


Figure Eight: Types of work entered by UK-domiciled PhD graduates employed in Scotland (outer ring) compared to all UK regions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

<sup>18</sup> 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities [www.grad.ac.uk/wdppd](http://www.grad.ac.uk/wdppd)