

THE IMPACT OF INTERNATIONAL MOBILITY
ON UK ACADEMIC RESEARCH

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William Solesbury & Associates
Research Management Consultancy

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SUMMARY

1. This study explores the pattern of academic mobility between the UK and the rest of the world in the last decade, what is driving it, and how it impacts on academic research in the UK. It employs a variety of sources – data on the careers of UK academicians, interviews with senior representatives of some universities and learned societies, an email survey of academic migrants in the UK and abroad, a literature survey of research and reports, and an analysis of relevant policies and programmes.

2. Debate about academic mobility has continued for the last 40 years. Mostly it has focused on emigration from the UK and much of that time was founded on a belief that the UK suffered from a 'brain drain'. In recent years it has become recognised that international mobility is common in most highly skilled professions and that the UK gains from migration. Even so, current policies for academic research – both national and within institutions and disciplines – are not closely geared to this reality.

3. The key trends and patterns of recent international academic mobility are the variety of forms it takes, its steady growth in volume in the UK, the relative decline of the USA and growth of Europe as both origin and destination and, above all, that there has been a broad balance between inward and outward migration over the last decade. Mobility now characterises the careers of leading researchers in the UK and internationally, driven by a mix of personal and professional motives. A typology of career paths distinguishes what are termed Intellectual tourists, Career opportunists, Expatriates and exiles, Mature returners and International networkers.

4. Migration – both inward and outward – is concentrated in the leading UK research universities and they see themselves recruiting and retaining research staff in an international labour market; though they recognise some consequential management challenges. International mobility is found among researchers in most disciplines but there is a greater propensity in the natural and medical sciences; while learned societies are aware of this mobility they have few practices that impinge on it.

5. Overall the growing significance of international mobility poses opportunities and challenges for academic research in the UK. Among the opportunities are the recruitment of the best research staff in the world; the invigoration of research through face to face encounters between academics; the stimulation of thought by engagement with researchers with different perspectives; and the building of new international collaborations. Among the challenges are the threat to research performance and reputation when leading researchers emigrate; and the cost and burden of managing a high turnover of researchers. UK science policy, universities and learned societies need to adjust their policies and practices to these opportunities and challenges.

1. INTRODUCTION

Objectives of the study

1.1. The emigration of UK academics to posts abroad and the immigration of foreign academics to work in the UK have been long observed. High profile cases hit the headlines – certainly in the academic press and occasionally in the general press, as with the recent case of Sir Harry Kroto, reportedly continuing his scientific career in the USA following enforced retirement from his UK university post. The impact of such mobility on academic research in the UK has also been long debated and the terms ‘brain drain’ and ‘brain gain’ have come into currency. But the evidence to inform the debate has been very variable in scope and quality.

1.2. It is therefore timely to have a fresh look at what is happening. This study explores

- a. the pattern of academic mobility between the UK and the rest of the world;
- b. what is driving it; and
- c. how it impacts on academic research in the UK.

Note that the study is concerned with the international mobility of university academic staff; it does not address the mobility of researchers in the UK’s Public Sector Research Establishments or in industry¹.

Sources and methods

1.3. The study draws on a number of sources -

- A. the careers of Fellows of the Academy of Medical Sciences, the British Academy, the Royal Academy of Engineering and the Royal Society as summarised in *Who’s Who*
- B. interviews with senior representatives of a sample of universities and learned societies
- C. an email survey of academic migrants
- D. a literature survey of relevant research and reports
- E. an analysis of relevant policies and programmes.

The Appendix describes these sources and the analyses based upon them in more detail.

¹ Though the career analysis in Annex A does not distinguish researchers’ employment.

1.4. All these data have their weaknesses. In particular, there are doubts about the reliability of some data and there are many incomparable definitions; these reservations are spelled out more fully in the Annexes. This study seeks to compensate for these data weaknesses in two ways: first, by treating numbers as orders of magnitude rather than precise statistics and, secondly, by seeking whenever possible to compare evidence from two or more of the sources.

Varieties of mobility

1.5. The sources reveal 'mobility' and 'migration' as words with many different meanings. Migration is generally used when a person has spent at least one year in the country of origin or destination. In an academic research context this could imply a change of employment or a generous sabbatical. But, for shorter periods than a year, there are many other forms of mobility. From all the sources the following types of mobility emerge –

- Research visits – for exchanges of views and experiences, to discuss possible collaboration, or for training
- Visiting Professorships or Fellowships – for visits of varying frequency or length; a variant is where an academic has appointments in two institutions in different countries and divides her time between them
- Research collaborations – travelling abroad to work together with colleagues on a joint project
- Sabbaticals or research leave hosted by an institution abroad
- Time-limited appointments abroad – possibly with leave of absence from a home institution
- Permanent appointments abroad.

In the various sources used in the report it is not always apparent which of these definitions applies to the data. This reservation is flagged wherever relevant.

Structure of the report

1.6. The structure of this report, following this Introduction, is as follows -

Section 2 sketches the terms in which academic mobility has characteristically been debated and the policies and programme that relate to it;
Section 3 considers the importance of mobility in individual careers;
Section 4 considers its impact on institutions;
Section 5 considers its impact on disciplines;
Section 6 summarises the findings and reports the conclusions from the study.

1.7. The detailed analyses of the sources above are reported in a number of supplementary Annexes –

- Annex A: The careers of UK academicians
- Annex B: Interviews with HE institutions and learned societies
- Annex C: Email survey of academic migrants
- Annex D: The literature survey
- Annex E: Policies and programmes.

These can be found on the HEPI website www.hepi.ac.uk.

1.8. The work was undertaken by William Solesbury, Andy Boddington, Lesley Grayson and Becki Leeds of William Solesbury & Associates

2. THE 'BRAIN DRAIN' DEBATE

Brain drain v brain gain

2.1. A Google search suggests that the term 'brain drain' originated in the late 1950s and was probably first given prominence by the Royal Society's 1963 report *Emigration of scientists from the United Kingdom* (Royal Society, 1963).² Prompted by concern at the loss of a number of outstanding scientists in the previous five years, including nine of its Fellows, the Society surveyed over 500 heads of departments in its disciplines. From the responses it estimated an annual permanent emigration of some 60 university staff per year and that this rate had increased threefold over the previous decade; for recent PhDs the rate of permanent emigration was estimated at 140 a year (12% of the total output) or 260 (22%) if temporary migration were included. The USA and Canada were the dominant destinations. The survey did not ask about academic immigration.

2.2. In the following years the issue was addressed in a number of further inquiries and reports – by the Committee on Manpower Resources for Science and Technology (1967), the Science and Engineering Research Council (1983), and the Advisory Board for the Research Councils (1985). All these reports used the term 'brain drain' in their titles and were focused on outward migration. Only with the Royal Society's 1987 report *The migration of scientists to and from the UK* (Royal Society, 1987) was inward migration addressed. This survey of universities, research institutes and industry sought evidence for the previous 10 years. In the university sector 740 emigrants were identified, averaging 74 annually compared with 60 annually in the 1963 report. 556 academic immigrants were identified, including 140 who were British nationals. The report concluded that the brain drain was – in net terms – small scale, though still a cause for concern. A subsequent Royal Society paper *Migration of scientists and engineers 1984-1992* (Ringe, 1993) largely confirmed these findings. There has been no specific inquiry since, that is, for the last decade.

2.3. Historically, the issue has become conceptualised in progressively more complex terms. 'Brain drain' was the sole concern in the 1960s and – as the pejorative nature of the term suggests – it was regarded as a threat to UK science. Only later was the inflow of scientists and engineers and the small scale of net emigration recognised. Thence 'brain gain' came into the vocabulary. The movement of academics into industry and service sectors (in the UK and abroad) has also become recognised as part of the pattern of mobility. In the last decade analysis has shown that international mobility has become a normal and expected aspect of most highly skilled professionals' careers (Mahroum, 1999; OECD, 2002; Salt, 2003), so academics are no longer exceptional. The concept of a beneficial 'brain circulation' has come into play.

² This and subsequently referenced publications are summarised in Annexes D and E.

Mobility and research funding

2.4. Nevertheless the concept of the 'brain drain' is still used as an argument in support of other objectives. It did not feature in the 1997 Dearing Committee's analysis and proposals for Higher Education. But the 2002 report *SET for success: the supply of people with science, technology, engineering and mathematics skills* (Roberts, 2002) reported that its consultation revealed concern that HEIs were finding it difficult to recruit and retain top researchers in competition with better pay and conditions offered by universities in other countries and by UK business. In 2003 the Universities and Colleges Employers' Association also claimed recruitment and retention problems (Thewlis, 2003). In 2004 the Association of University Teachers, while noting the UK's net gain from academic mobility especially in science and engineering, argued that it was less a consequence of the attractions of UK science than a necessary response to supply shortages arising from deficiencies in higher education (AUT, 2004). Save British Science – recently renamed as Campaign for Science and Engineering in the UK – argued similarly (Save British Science, 2004).

Policies and programmes

2.5. Throughout these four decades of debate, UK science policy has not *directly* addressed academic mobility. Annex E summarises those current UK and EU policies and programmes that impinge on mobility. Importantly, in *The Science and Innovation Framework 2004-2014*, there was a stated desire to make Britain 'the most attractive location in the world for science and innovation' (H M Treasury et al, 2004: Foreword). Related to this is a commitment 'to drive up the numbers of skilled scientists and engineers' (ibid, para 1.25) and to 'support growth in its [i.e. the UK's] share of internationally mobile R&D investment and highly skilled people.' (ibid, Box 1.1). But the Framework's plans and indicators focus exclusively on increasing the quantity and quality of the home-grown scientific workforce. However, the later five year programme for DTI was a little more specific. It stated

Economic migration can also make a major contribution to our success, bringing in new entrepreneurs and investors and ensuring our businesses are not held back by being unable to find the skilled people they need. We need to make Britain a magnet for talent from all over the world. Working with the Home Office, we will therefore bring forward new policies to expand the Highly Skilled Migration Programme, retain overseas PhD students in key skills shortage areas, and give a renewed focus to UK Trade & Investment to encourage 'brain gain' – recruiting top business and entrepreneurs from around the world. (DTI, 2004: p 11)

2.6. There are a large number of schemes for international research collaboration available to UK researchers – from the Research Councils, learned societies, research charities and international organisations. Some exist within the context of science and technology agreements between the UK and other countries. The most common forms of award are for research visits; for joint, cross-national research; and for networking between already-funded researchers. But there are no UK programmes to directly encourage or support researcher emigration or immigration, other than for Visiting Professors or Fellows.

2.7. Promoting mobility is however a key element in the European Union's 'European Research Area' project. Its Marie Curie Actions are designed 'to promote the development and transfer of research competences, consolidate and broaden researchers' career prospects and promote excellence in European research.' (European Commission, 2003: p 2). To that end they offer financial and advisory support for the training and mobility of researchers at all stages of their careers, both between the countries of the Union and between the Union and the rest of the world.

3. MOBILITY AND RESEARCH CAREERS

3.1. There has been relatively little empirical analysis, but much speculation and assertion, on the motivations of and rewards for internationally mobile academic researchers. In all mobility there are both push and pull factors at work. Annex D summarises previous evidence. For academic migration from the UK it has been argued in the past that overall it has been driven by poor financial rewards, low status and recognition, and by under-investment in R & D. The reported attractions of the US as a destination have been its shared language, its intellectual opportunities, the reputation of leading research centres – acting as ‘magnets’ – and its high rewards. For immigration to the UK its attractions – especially within the EU – have been increasingly claimed to be its scientific excellence and the open research culture. Personal or family considerations have been influential on returning UK nationals.

3.2. To have a fresh look at how mobility is a factor in individual’s prospects, two analyses have been undertaken –

- an email survey of some academic migrants about their experiences – reported fully in Annex C.
- using entries in *Who’s Who* to explore the lifetime careers of Fellows of the Academy of Medical Sciences, the British Academy, the Royal Academy of Engineering and the Royal Society – reported in Annex A;

For the email survey it was possible to be fairly certain that respondents were formally employed in research while abroad and so are migrants. In the *Who’s Who* analysis, it was not clear from the abbreviated CVs whether the period spent abroad was a visit, a short term contract or a permanent post, so this analysis cover what can be termed ‘working abroad’ rather than migration.

Migrants’ experiences

3.3. The email survey of 65 migrants – including 28 UK researchers working abroad, 22 foreigners working in the UK, and 15 UK researchers who have returned from work abroad – provides insights into the motivations and rewards for migrant researchers. It produced both answers to specific questions and narratives about careers. As Table 3.1 overleaf shows, professional reasons for migrating (intellectual opportunities, research funding, career advancement) were mentioned more often than personal reasons (family, quality of life, cultural experience). Career development seems important at both postdoc and professorial levels. But from the narratives it is clear that both

personal and professional motives played a part for all three kinds of migrant. It seems that a personal willingness to migrate is a necessary precondition for it being professionally attractive. UK researchers who had migrated to the USA and Canada mentioned higher salaries as a particular benefit. Only about a third received any financial assistance with their move.

Table 3.1. Researchers' reasons for migration from and to the UK

Reason	UK nationals emigrating	Foreigners immigrating	UK researchers returning	Total
Intellectual opportunities	10	7	11	28
Research funding	7	2	7	16
Career development	18	12	11	41
Family reasons	3	0	0	3
Quality of life	7	3	5	15
Cultural experience	2	1	1	4

Note: most respondents offered more than one reason.

Source: Annex C

3.4. Most migrants believed that the move had improved their career development and future prospects. Four fifths thought them 'strongly improved', but this judgment was more dominant for UK researchers who had gone abroad than for foreigners who had come to the UK. About 40% of respondents foresaw another international move in their future careers. Of the 8 UK researchers now working abroad who expected to migrate again, four planned to move back to the UK, the other four to move elsewhere.

3.5. Respondents were asked about the effect of their migration on their academic contacts. Table 3.2 below shows that, for the 27 emigrants from the UK who responded, most stated that their migration had strengthened their international contacts and had weakened their UK contacts. But returners came with international contacts strengthened by their time abroad.

Table 3.2. Effect of emigration from UK on academic contacts

	UK contacts	International contacts
Strengthened	1	19
No difference	6	6
Weakened	20	2

Source: Annex C

Academicians' careers

3.6. Work abroad characterises the lifetime careers of many of the about 100 Fellows from each academy in the analysis. Table 3.3 shows that in the Royal Society (RS in the tables below) and the British Academy (BA) three quarters or more careers have this characteristic; less so in the careers of the Fellows of the Academy of Medical Sciences (AMS) and the Royal Academy of Engineering (RAE). For most Fellows there have been multiple appointments abroad during their careers.

Table 3.3. Fellows who have worked abroad

RS	BA	AMS	RAE (all)	RAE (academics)
85%	74%	58%	37%	61%

Source: Annex A

4.7. To analyse the locations abroad where Fellows worked the same three regions as in the HESA data were adopted viz the USA, the EU and the Rest of the World. Among those Fellows who worked abroad once or more times in their career, the USA emerges as the most common destination, most strongly with Fellows of the Royal Society (85%) but also important for BA (69%), AMS (68%) and RAE (63%) Fellows. In all four cases, the early or mid-career appointment in the USA – mostly in the 1970s and 1980s – features frequently in the *Who's Who* career details. In comparison the countries of the EU and in the Rest of the World (that includes Anglophone Canada and Australasia as well as Asia, Africa and Latin America) have accounted for between 30% and 50% of academicians' posts abroad³ Those Fellows who have worked in more than one of these regions are fewer in number. Even so, as Table 3.4 below shows, a quarter of the Fellows of the Royal Society and the Academy of Medical Sciences have had 'global' careers with appointments in all three regions; but fewer in the other academies.

Table 3.4. Number of regions for Fellows' work abroad

No of regions	RS	BA	AMS	RAE (all)	RAE (academics)
one	40%	64%	40%	64%	59%
two	35%	21%	35%	24%	32%
three	25%	15%	25%	12%	9%

Source: Annex A

³ In interpreting this bias towards the USA, bear in mind that the analysis here is of lifetime careers often stretching back over many decades.

Career paths

3.8. From these sources a typology of mobile researchers' career paths can be constructed. It distinguishes

- *Intellectual tourists* – researchers who move country several times in their working life, relishing the change of location, institution and culture
- *Career opportunists* – researchers who migrate while young to gain career advancement: typically they are UK postdocs travelling to the USA or EU researchers coming to the UK; some stay, some return home after a few years
- *Expatriates and exiles* – predominantly researchers who left the UK in the 1980s, during cuts to university and research funding, migrating to the USA and other Anglophone countries, and mostly remaining abroad; a few foreigners have migrated similarly to the UK
- *Mature returners* – researchers who have returned to the UK late in their careers, either for personal reasons and/or tempted by an attractive post
- *International networkers* – researchers who nurture extensive international contacts and engage in multiple visits and collaborations without necessarily migrating.

This typology expresses behaviours rather than personalities and an individual might combine such behaviours within a lifetime's career.

4. MOBILITY AND INSTITUTIONS

Institutions with high migration

4.1. Past studies have suggested that international academic migration is focused on 'magnet' institutions (Mahroum, 1999b; Casey et al, 2001). The HESA data on staff movements was disaggregated by HEI to explore this. Table 4.1 below shows the top 20 HEIS by the scale of international migration, including both inward and outward migrants. Together, they accounted for about 60% of total migrants in the period. Most of them are in the Russell Group. So, institutionally, international mobility is very concentrated in the dominant, research-led universities.

Table 4.1. 20 HEIS with highest total international migration 1994/95-2002/03

University of Cambridge	University of Glasgow
University of Oxford	University of Edinburgh
University College London	University of Newcastle upon Tyne
King's College London	University of Wales Cardiff
Imperial College	UMIST
University of Leeds	University of Warwick
University of Nottingham	University of Dundee
University of Liverpool	University of Leicester
University of Southampton	Queen's University of Belfast
Victoria University of Manchester	University of Birmingham

Source: WSA Analysis

4.2. To explore the impact of such mobility on institutions interviews were held with senior academic managers in five institutions – the University of Wales Cardiff, the Universities of Dundee, Manchester and Cambridge, and the London School of Economics. The interviews addressed three matters: recent trends and patterns of international mobility in the institution; any actions taken to influence mobility; and the impacts – positive and/or negative – of mobility on the institution. Annex B provides a full report of these interviews. None of these institutions monitored academic mobility systematically, even through analysis of their annual returns to HESA. (Though they do collect and analyse information about the origins of their student population.) What the interviewees had to say about recent trends and patterns was therefore impressionistic.

Trends and patterns of mobility

4.3. All were alive to the phenomenon of international staff mobility in their institutions, both inward and outward. Most believed that it had increased in the last decade and most also believed that they had been net gainers in numbers and/or in quality. In more detail they noted to varying degrees –

- The variety of forms that international mobility takes – short term visitors, Visiting Fellows or Professors, research collaborators, some shared appointments with foreign universities, contract researchers as well as tenured appointments; these arrangements were often made at faculty or departmental discretion without central guidance.
- Mobility is commonly age-related with much migration both out and in at early career stages and some return migration at later stages, often for domestic as much as career reasons – this latter cuts both ways, attracting UK nationals back but also losing foreign nationals to their home country.
- There is more turnover among foreign nationals than UK nationals – one interviewee talked of ‘CV shopping’ – with the consequence that the junior research staff are often more international, less stable than the senior staff.
- The more open and meritocratic academic culture in the UK, in comparison to some countries, is attractive to some foreign researchers who may be able to advance their careers in the UK more rapidly, thereby ‘leapfrogging’ their colleagues who stayed home.
- The trend and pattern differs between disciplines and institutions’ international reputations are often discipline-specific.
- In many disciplines the USA has a relatively diminished attraction in comparison with the EU or the other Anglophone countries.

Institutional actions

4.4. Some institutions, recognising that they are in a competitive, international market for high quality researchers and have started to focus their recruitment practices more sharply. Promoting themselves as an international brand is part of that, commonly allied with policies for foreign student recruitment. But more pro-active approaches to recruiting staff internationally are also being used, especially where – through recent investment in infrastructure or major new research funding – the institution is ‘raising its game’ in a particular field. Fellowships, either from the institution or one of the research funders, can also be a draw. The imminence of the 2008 RAE is also motivating the recruitment of foreign as well as UK research ‘stars.’

4.5. But, aside from recruitment practice, the institutions could give few examples of offering more practical assistance to new foreign recruits. Equally, action in response to the emigration of staff is undeveloped – any deals offered to dissuade them or to maintain contact or to encourage or ease their later return are left to departments. There is nothing comparable to their alumni programmes for ex-students.

Impacts

4.6. All the institutions took a positive view of the impacts of higher levels of international mobility on their institutions. “We are beneficiaries of the free market, not its victims” said one interviewee. The benefits are seen not just as securing the best people for a job but, more widely, as injecting into the institution’s research work new researchers with different perspectives and traditions. But there are sometimes disbenefits in the reluctance of immigrant researchers to do management, teaching and outreach work in departments and research centres. Strangely, while in some institutions there is often a lively debate about the balance of foreign and UK students, staffing is rarely discussed in those terms.

5. MOBILITY AND DISCIPLINES

Disciplinary differences

5.1. Earlier studies have suggested that natural scientists have a greater propensity to migrate than researchers in the social sciences and the humanities – unsurprising given the greater transferability of knowledge in their fields. The analysis of academicians' careers in Section 4 showed a higher level of 'work abroad' among fellows of the Royal Society in comparison with those in the other academies.

5.2. To explore the impact of international mobility on disciplines interviews were held with senior officers in five learned societies – the Academy of Medical Sciences, the British Psychological Society, the Development Studies Association, the Royal Society of Chemistry and the Royal Society. The interviews addressed three matters: recent trends and patterns of international mobility in the discipline; any actions taken to influence mobility; and the impacts – positive and/or negative – of mobility on the discipline. Annex B has a full report of these interviews. None of the societies monitor international mobility in their discipline. So that, as with the institutions, what the interviewees had to say about recent trends and patterns was impressionistic.

Trends and patterns of mobility

5.3. As with institutions, their impression is of increasing mobility in recent years, both inward and outward. But the picture differs between disciplines –

- In *chemistry* mobility has increased enormously in recent years in both the academic and the industrial sectors and between them; in particular, the transnational chemical and pharmaceutical companies now recruit scientists internationally as a matter of course.
- In *medical science* it was felt that the UK had become increasingly attractive to foreign researchers in recent years because of the major investments made in the science infrastructure.
- In *psychology* mobility has been influenced by the shortage of teaching staff for the big increase in undergraduate demand over the last decade. Recruitment from abroad has been necessary, but this is not just a matter of numbers for the quality of psychologists trained elsewhere in Europe is high – they compete successfully with UK candidates in open competition.
- In *development studies* there are problems in recruiting quality researchers in the UK. The competition comes not from academic posts abroad – in particular, the USA has no distinct development studies discipline – but from well-paid, non-academic employment in international agencies and consultancies.

Thus, for many of these disciplines, there is a wider international job market for researchers than among universities alone and the competitors differ between disciplines.

5.4. There were also some common features among these disciplines. In most cases it was observed that mobility – both outward and inward – is predominant in early career, though there are occasional, high profile late career moves. And, again in most cases, it was felt that in the last decade the USA had become relatively less important as an origin or destination for academic migrants and the EU and the rest of the Anglophone world relatively more important.

Learned societies' actions

5.5. Learned societies have not been very active in relation to international mobility within their disciplines. It has rarely been addressed directly, though it has sometimes been an aspect of their concern with recruitment and rewards. Most have connections with sister societies in other countries and international umbrella bodies where they exist. Some offer career counselling services but these are rarely geared to the needs of migrant researchers. A few provide financial help to mobility – for example, through bursaries for foreign visits, sponsorship of foreign participants in UK conferences, and fellowships.

Impacts

5.6. All of the learned societies interviewed took a positive view of the impacts of international mobility. One interviewee said "It is simply a matter of attracting and retaining the best to sustain the health of the discipline." Mobility is also seen as an essential ingredient for more international networking, collaboration and inter-institutional relationships; and for development studies it is a means to building academic research capacity in developing countries. But there were concerns in some societies – as in some institutions – that too much mobility, especially in turnover terms, could become "unmanageable", especially where the immigrant researchers were less interested in teaching, administration or outreach work.

6. FINDINGS AND CONCLUSIONS

Main findings

6.1. From the above analysis the following findings emerge. They are ordered in relation to the three issues that the study set out to explore.

a. the pattern of academic mobility between the UK and the rest of the world

6.2. From the diverse sources that have been analysed the following picture can be drawn -

- International academic mobility takes many forms – research visits, Visiting Professorships or Fellowships, research collaborations, sabbaticals, short term or permanent appointments abroad;
- Periods of work abroad characterise the careers of many leading UK researchers – more than half of academicians have had this experience.
- Various career paths can be identified for academic mobility characterised as Intellectual tourists, Career opportunists, Expatriates and exiles, Mature returners and International networkers.
- Historically the USA was the dominant origin and destination for mobile UK academics, but over the last decade other EU countries and other Anglophone countries have grown in relative importance. Over the 1994-2002 period as a whole about one fifth of migrants were to or from the USA, two fifths within the EU and two fifths in the Rest of the World.

- Non-UK nationals comprise the majority of migrants both to and from the UK: over the 1994-2002 period
- Emigrants from the UK strengthen their international contacts but weaken their UK contacts; but returning academics bring stronger international contacts with them.

b. what is driving international academic mobility

6.3. This growth in mobility is not unique to academic researchers but is characteristic of many highly skilled professions. As with all job-related mobility there are both push and pull factors influencing the individual migrants' decision. Some findings on what drives academic mobility are

- Academics are numerically most mobile, as migrants, in their early careers
- Motivations for migration are usually a mix of personal and professional considerations with the former a precondition for the latter.
- Only a minority of migrants receive financial assistance for their moves.
- Research funding, infrastructure and culture are important professional factors for migrants; in the past – in the 1980s and 1990s – these factors were influential in pushing UK researchers to emigrate but for recent migrants they have become positive pull factors bringing many researchers into the UK.
- Most migrants believe that their moves – whether from or to the UK – have improved their future career prospects.

c. how international mobility impacts on academic research in the UK

6.4. Academic mobility is mostly an individual choice. But it has consequences for the institutions and the disciplines in which migrants work. Indeed migration – and probably other forms of mobility – are strongly differentiated between institutions and disciplines. The findings for institutional impact are

- Migration – both from and to the UK – is concentrated in research-strong universities.
- These institutions accept high levels of mobility as a consequence of their ambition to recruit and retain the best researchers; most promote themselves internationally and some are pro-active in recruiting internationally, especially when they are making strategic investments – new posts, new infrastructure, new funding – in their disciplinary strengths.

- Few provide much practical support to migrants – these matters are left to departments.
- Some institutions note a disparity between their junior research staff (research-focused, of mixed nationality, highly mobile) and their senior staff (predominantly UK nationals, less mobile) with the latter bearing responsibilities for management, teaching and outreach work.

6.5. Academic mobility also varies between disciplines. The findings are

- Migration is strongest among researchers in the natural and the medical sciences.
- The international job markets for researchers are very discipline-specific: the competing international opportunities for academic researchers may be not just in other universities but in other sectors like industry or public agencies or consultancy.
- The competitive strength of foreign candidates for academic research jobs in the UK and UK candidates for such jobs abroad also varies between disciplines; consequently migration – both outward and inward – can either strengthen or weaken the disciplines in the UK.
- The state of the disciplines in the UK – especially research funding, infrastructure, culture, student demand, intellectual leadership and national reputation generally – is an important pull and push factor on migration within disciplines.
- Learned societies' actions are directed more towards supporting international networking than other kinds of mobility.

Some conclusions

6.6. These findings reveal a picture of international academic mobility that is in some respects contrary to the views that have informed past debate of the issue in the UK. Certainly it is clear that there is no 'brain drain' – and has not been for the past decade or more. The findings also provide a richer picture of mobility than was available hitherto, especially in its variation by career stage, origins and destinations, institutions and disciplines. It is timely to return to the debate with the benefit of this firmer and broader empirical evidence.

6.7. International mobility – in all its forms – offers opportunities and challenges for academic research in the UK. Briefly stated, among the opportunities are

- recruitment of the best obtainable research staff in an international job market
- invigoration of research through face to face encounters between academics – such personal contact matters because research is a social process
- stimulation of thought by engagement with researchers with different perspectives derived from different training and work experience
- building new international research networks and collaborations.

But, among the challenges are

- the risk of reduced performance and reputation when leading researchers, and sometimes whole research teams, emigrate;
- the cost and burden of managing the turnover of researchers, many of them foreign.

6.8. Below some conclusions are drawn for UK science policy and for UK institutions and disciplines.

a. Science policy and international mobility

6.9. Science policy has never directly addressed international researcher mobility over the last 20 years. This omission seems especially strange in the context of the current *Science and Innovation Framework 2004-2014* with its ambitions to make Britain 'the best place in the world for science and innovation' and 'to drive up the numbers of skilled scientists and engineers.' Are these to be achieved exclusively through more British researchers? If not, then attention could be paid to fostering mobility in two respects –

- through strengthening the factors that influence migration in order to recruit and retain in the UK good researchers of any nationality – the recent investment in UK science, the open research culture and the intellectual leadership in some disciplines already work in the UK's favour, as do recent relaxations in entry requirements from outside the EU in the Highly Skilled Migration Programme, but low salaries by some international standards and patchy practical support for migrants remain disincentives.
- through resourcing the wider forms of mobility that enable researchers to network internationally – research visits, short-term appointments, collaborations, sabbaticals – and in a way that recognises an equal value in supporting such movements both ways, bringing foreigners to the UK and sending UK researchers abroad.

6.10. This study has not examined in detail the many programmes of support from UK research councils, the British Council, the research charities, learned societies and from international organisations that are on offer to the potentially mobile researcher. But, unsurprisingly since they are in toto the product of many separate organisations' initiatives, they appear patchy in terms of their purposes, disciplines and eligibility criteria. The EU's Marie Curie awards programme – which is, of course, available to researchers from or to the UK – is impressive in offering support for movements in different directions, for different purposes and durations, and at different career stages. UK science policy might seek to emulate its scope.

b. HEIs and international mobility

6.11. Research-strong universities seem alive to the volume of international mobility in their research staff and take a mostly positive view of its impact. But they seem not to have policies, other than their general staff recruitment, retention and development policies, that impinge on it. It is a curious contrast with their strong engagement with the question of how to manage higher proportions of overseas students and indeed with what is a healthy balance of home and overseas students for the university; as well as their efforts to maintain contact with alumni.

6.12. Universities might consider

- Improving their empirical knowledge of mobility by monitoring the movement of their researchers in and out by nationality .
- Considering whether the balance of UK and non-UK staff and, in particular, the rate of turnover among them is having an overall positive effect in their departments, not just on their research but also on their management, teaching and outreach work, and especially in those disciplines that they consider their competitive strengths.
- In those disciplines where internationalisation of research staff is considered advantageous, providing incentives and rewards both to recruit and retain leading researchers of any nationality, including returning emigrants, and to support international networking by their researchers, including continuing contact with past researchers who have emigrated.

c. Learned societies and international mobility

6.13. Learned societies are concerned with the health and reputation of their disciplines. Like the research-strong universities they seem alive to the volume of international mobility in their discipline and take a mostly positive view of its impact. But they seem to engage with mobility just as a factor in other issues of concern – like recruitment, rewards, funding – rather than an issue to be addressed directly.⁴

⁴ The Royal Society's reports in 1967, 1987 and 1993 were historical exceptions.

6.14. Learned societies might consider

- Improving their empirical knowledge of mobility by monitoring the movement of researchers in their discipline from and to the UK by nationality – the HESA data provides a starting point, though it is exclusively measuring HEI researchers; they could also track the volume and patterns of mobility among their fellowship – direct survey would yield more sophisticated results than the *Who's Who* entries used in this study.
- Considering whether the balance of researchers with UK and non-UK training and experience – both inside and outside universities – and the rate of turnover among them is having an overall positive effect on the health of the discipline.
- Developing more comprehensive services for both emigrants and immigrants in support of international mobility, including information on job and networking opportunities, career counselling, advice for migrants on practical issues, and financial support for research visits, collaborations and short term appointments.

Appendix: Sources and analyses

A. Careers of UK academicians

1. The lifetime careers of a number of current Fellows of the Royal Society (RS), the British Academy (BA), the Academy of Medical Sciences (AMS) and the Royal Academy of Engineering (RAE) were identified from their entries in the 2004 edition of *Who's Who*. The samples were 111 RS Fellows, 110 BA Fellows, 103 AMS Fellows and 110 RAE Fellows (of which 36 are academics, 74 are from industry). This included all the RAE Fellows appearing in *Who's Who* and a random sample of the larger numbers of RS, BA and AMS Fellows listed there. Two reservations must be made about *Who's Who* as a source – first, the criteria for including people is not known and not all Fellows are included; and, secondly, the career details are very abbreviated so that it is impossible to know whether an entry for an appointment abroad is a Visiting Professorship or a short term contract or a tenured post (though it is usually possible to identify and exclude honorary posts, awards and prizes). The analysis therefore covers what can be termed 'work abroad' of Fellows listed in *Who's Who*.

2. A fuller account of this source and the analyses is in Annex A.

B. Interviews with HE institutions and learned societies

3. Confidential telephone interviews were held with senior academic managers of five HEIs – the University of Wales Cardiff, the Universities of Manchester, Dundee and Cambridge, and the London School of Economics. These were chosen from among the institutions with high levels of mobility in the HESA data analysis and to also reflect different regional locations, disciplinary strengths and institutional histories. The interviews addressed three matters:

- Recent trends and patterns of international mobility in the institution
- Any actions taken to influence mobility
- The impacts – positive and/or negative – of mobility on the institution.

4. Similar interviews were held with senior representatives of five learned societies – the Royal Society of Chemistry, the British Psychological Society, the Academy of Medical Sciences, the Development Studies Association and the Royal Society. These were selected as disciplines – within the whole range of natural sciences, medical sciences, social sciences and the humanities – where *prima facie* high levels of international mobility might be expected. The interviews addressed

- Recent trends and patterns of international mobility in the discipline
- Any actions taken by the society to influence mobility
- The impacts – positive and/or negative – of mobility on the discipline.

5. A fuller account of this source and the analyses is in Annex B.

C. The email survey of academic migrants

6. 187 researchers were emailed with a questionnaire survey and 65 replied – a 35% response rate. The responses comprised three categories: 28 UK-born researchers now working abroad, 22 foreign-born researchers now working in the UK and 15 UK-born researchers who had worked abroad but had now returned to the UK. The surveyed researchers were identified from various university and other websites providing personal details of staff. The email questionnaire sought information from them about

- Reasons for migration
- Any assistance received
- Career effects
- Benefits or disbenefits
- Consequent academic contacts
- Quality of life effects
- Future career plans.

Responses from the three categories of migrant were analysed in these terms. In addition many respondents provided quite detailed career narratives.

7. A fuller account of this source, the analyses and extracts from the career histories are in Annex C.

D. The literature survey

8. There is a substantial literature from the past four decades relating to the international mobility of researchers and other highly skilled personnel. Some 30 research reports or other publications on, or relevant to, the UK were identified and summarised. They vary greatly in terms of their scope, recency, analytical methods and status. But their analysis provide some empirical evidence – on patterns of mobility, motivations and impacts – and an expression of the terms in which the question of academic mobility has been debated in the UK.

9. A fuller account of this source and the analyses is in Annex E.

E. Current polices and programmes

10. A number of websites were visited to identify current policies and programmes in the UK that may impinge on international academic mobility. These included those of the

- Academy of Medical Sciences
- British Academy
- British Council
- European Commission
- European Science Foundation
- H M Treasury
- Office of Science and Technology
- Research Councils
- Research charities
- Royal Academy of Engineering
- Royal Society
- UKRO
- UNESCO.

11. A fuller account of these sources and the analysis of their statements is in Annex E.

Annex A

The careers of UK academicians

Becki Leeds and William Solesbury

Sources and analysis

1. Fellowship of the Royal Society (RS), the British Academy (BA), the Academy of Medical Sciences (AMS) and the Royal Academy of Engineering (RAE) is conferred on researchers who are highly esteemed in their disciplines. With the exception of the RAE which has a substantial industrial membership, Fellows are mostly academics. The careers of these people are therefore a useful measure of the importance of international experience in the development of the UK's academic research elites.

2. The analysis focused only on UK-based, current Fellows as listed on the organisations' websites. It used the 2004 edition of *Who's Who* for career details. Two reservations must be made about this source – first, the criteria for including people in *Who's Who* are not known and not all Fellows are included and, secondly, the career details are very abbreviated so that is impossible to know whether an entry for an appointment abroad is a Visiting Professorship or a short term contract or a tenured post. The analysis therefore covers what can be termed 'work abroad' of Fellows listed in *Who's Who*.

3. For each of the bodies the careers of just over 100 Fellows were analysed. This included all the AMS and RAE Fellows appearing in *Who's Who* and a random sample of the larger numbers of RS and BA Fellows listed there. The randomisation was achieved by identifying every tenth name on the alphabetical Fellowship list and then supplementing this with every intervening fifth name until a rough equivalence with the AMS and RAE population sizes was reached. The resultant populations are 111 RS Fellows, 110 BA Fellows, 103 AMS and 110 RAE Fellows (of which 36 are academics, 74 are from industry).

Frequency of work abroad

4. Table 1 shows that work abroad characterises the careers of more than half of all the academic Fellows in the analysis. In the Royal Society and the British Academy three quarters or more careers have this characteristic; less so in the careers of Fellows of the Academy of Medical Sciences and the Royal Academy of Engineering.

Table 1. Fellows who worked abroad

RS	BA	AMS	RAE (all)	RAE (academics)
85%	74%	58%	37%	61%

5. For most Fellows there have been multiple appointments abroad during their careers. Table 2 shows that among Fellows of both the Royal Society and the British Academy who have worked abroad about half have held between two and four posts abroad and the same is true of the academic Fellows of the Royal Academy of Engineering. A third of Royal Society and British Academy Fellows and a quarter of Academy of Medical Sciences Fellows have held five or more posts abroad, but only a seventh of the academic RAE Fellows.

Table 2. Fellows with multiple appointments abroad

Number of appointments	RS	BA	AMS	RAE (all)	RAE (academics)
one	22%	16%	40%	51%	36%
two-four	46%	50%	35%	32%	50%
five or more	33%	33%	25%	17%	14%

Destinations

6. For the analysis of the locations abroad where Fellows worked the same three regions as in the HESA data were adopted viz the EU (defined in terms of its 2005 membership), the USA and the Rest of the World. Here the total is those Fellows in the larger sample who worked abroad at least once in their career: 93 in the Royal Society, 81 in the British Academy, 60 in the Academy of Medical Sciences and 41 in the Royal Academy of Engineering, of whom 22 were academics.

7. Their destinations were fairly evenly spread across the three regions. Table 3 shows that the USA emerges as the most common destination, usually in the 1970s-1980s – 85% of the Royal Society Fellows and 60% plus in the other academies have been there. But the EU and the Rest of the World (that includes anglophone Canada and Australasia as well as Asia, Africa and Latin America) are also important, accounting for between 30% and 50% of the posts abroad

Table 3. Regions of work abroad

Regions	RS	BA	AMS	RAE (all)	RAE (academics)
EU	51%	51%	33%	44%	41%
USA	85%	69%	68%	63%	59%
RoW	52%	49%	30%	52%	36%

Note: The percentages do not total 100% because some Fellows have worked in more than one region.

8. Those Fellow who have worked, once or more times, in more than one of these regions are fewer in number. Even so, Table 4 shows that a quarter of the Fellows of the Royal Society and of the Academy of Medical Sciences have had ‘global’ careers with appointments in all three regions. As have roughly a sixth of the Fellows of the British Academy and an eighth of the Fellows of the Royal Academy of Engineering, though fewer of the academic Fellows.

Table 4. Number of regions for work abroad

Regions	RS	BA	AMS	RAE (all)	RAE (academics)
one	40%	64%	40%	64%	59%
two	35%	21%	35%	24%	32%
three	25%	15%	25%	12%	9%

Annex B

Interviews with HE institutions and learned societies

Andy Boddington and William Solesbury

1. Mobility is a consequence of individual decisions made by academic researchers in pursuit of personal objectives. But taken together, the movement of researchers to or from the UK impacts on both the institutions that employ them and the disciplines of which they are members. The analysis of HESA data, reported in Annex A, provide quantitative measures of these impacts over the years from 1994 to 2002. But, to achieve some qualitative understanding, confidential interviews were conducted with senior representatives of both some institutions and some learned societies.

2. Each interview focused on three topics

The recent scale, trend and pattern of international staff mobility in the institution or discipline;

Any actions taken to influence mobility;

The impacts – positive and/or negative – of mobility on the institution or discipline.

Institutional experiences

2. Telephone interviews were held with senior academic managers of five HEIs – the University of Wales, Cardiff, the Universities of Manchester, Dundee, and Cambridge and the London School of Economics. These were chosen from among the institutions with high levels of mobility – in the HESA data analysis – and to also reflect different regional locations, disciplinary strengths and institutional histories.

3. None of the institutions systematically monitored the **scale, trend and pattern** of academic mobility, even through analysis of their annual returns to HESA. (Though some do collect and analyse information about the origins and destinations of their student population.) What the interviewees had to say about recent trends and patterns was therefore impressionistic. All were alive to the phenomenon of mobility in their institutions, both inward and outward. Most believed that it had increased in the last decade and most also believed that they had been net gainers, either in numbers and/or in quality.

4. In more detail they noted to varying degrees –

- The variety of forms that international mobility takes – short term visitors, Visiting Fellows or Professors, research collaborators, shared appointments with foreign universities, contract researchers as well as tenured appointments; these arrangements were often made at faculty or departmental discretion without central guidance.
- Mobility is commonly age-related: much migration both out and in at early career stages and some return migration at later stages, often for domestic as much as career reasons – this latter cuts both ways, attracting UK nationals back but also losing foreign nationals to their home country.
- There is more turnover among foreign nationals than UK nationals – one interviewee talked of ‘CV shopping’ – with the consequence that the junior research staff are often more international, less stable than the senior staff.
- The more open and meritocratic academic culture in the UK, in comparison to some countries, is attractive to some foreign researchers who may be able to advance their careers in the UK more rapidly, thereby ‘leapfrogging’ their colleagues who stayed home.
- The trend and pattern differs between disciplines and institutions’ international reputations are often discipline-specific.
- In many disciplines the USA has a relatively diminished attraction in comparison with the countries of the EU or the other anglophone countries.

5. In terms of **actions**, some institutions – recognising that they are in a competitive, international market for high quality researchers – have started to focus their recruitment practices more sharply. Promoting the university as an international brand is part of that, commonly allied with policies for foreign student recruitment. But more pro-active approaches to recruiting staff internationally are also being used, especially where – through recent investment in infrastructure or major new research funding – the institution is ‘raising its game’ in a particular field. Fellowships, either from the institution or one of the research funders, can also be a draw. The imminence of the 2008 RAE is also motivating the recruitment of foreign as well as UK research ‘stars.’ One interviewee said “we now go out of our way to court people, in a way we would not have done 10 years ago. We are not as take-it-or-leave-it as we were then.” But recruitment consultants are of limited help since they do not have good international knowledge or contacts. There is though concern in Wales and Scotland that the extra resources from student fees in England will disadvantage them in recruiting internationally.

6. Aside from recruitment practice, the institutions could give few examples of offering more practical assistance to new foreign recruits. “We give them a list of letting agents and then it’s up to them” said one interviewee, while noting that competitor universities in other countries did better, often providing accommodation for visitors. Equally, action in response to the emigration of staff is undeveloped – any deals offered to dissuade them or to maintain contact or to ease their return are left to departments.

7. All the interviewees took a positive view of the **impacts** of higher levels of international mobility on their institutions. “We are beneficiaries of the free market, not its victims” said one interviewee. The benefits are seen not just as securing the best person for a job but, more widely, as injecting into the institution’s research work new researchers with different perspectives and traditions and thereby – as one interviewee expressed it – “avoiding monoculture.” While, in some institutions, there is often a lively debate about the balance of foreign and UK students, staffing is rarely discussed in those terms. But seemingly it is often the senior UK researchers who must bear the responsibilities of management, teaching and outreach work.

Disciplinary experiences

8. Similar telephone interviews were held with senior representatives of five learned societies – the Royal Society of Chemistry, the British Psychological Society, the Academy of Medical Sciences, the Development Studies Association and the Royal Society.⁵ These were selected as disciplines – within the whole range of natural sciences, medical sciences, social sciences and the humanities – where *prima facie* high levels of international mobility might be expected.

9. None of the societies monitor the **scale, trend and pattern** of international mobility in their discipline. In all cases they knew which of their Fellows were resident abroad, but not the wider picture. As with institutions, their impression is of increasing mobility in recent years, both inward and outward. But the picture differs between disciplines –

- In *chemistry* mobility has increased enormously in recent years in both the academic and the industrial sectors and between them; in particular, the transnational chemical and pharmaceutical companies recruit internationally as a matter of course. The USA seems to have lost some of its attraction – the American Chemical Society is said to be concerned about this. But the USA is still dominant for longer term mobility, while mobility within Europe is shorter term.
- In *medical science* it was felt that the UK has become increasingly attractive to foreign researchers in recent years because of the major investments made in the science infrastructure. Movement to and from the USA remains strong. But immigration from EU countries is growing – especially from Germany where able scientists are frustrated by career rigidities – though emigration to the rest of the EU is not strong.

⁵ We had hoped to include the Royal Historical Society as a humanities discipline in our sample but it proved impossible to secure an interview.

- In *psychology* mobility has been influenced by the shortage of teaching staff for the big increase in undergraduate demand over the last decade. Recruitment from abroad has been necessary, but this is not just a matter of numbers for the quality of psychologists trained elsewhere in Europe is high – they compete successfully with UK candidates in open competition. The influx is very much in early career. Movement is increasingly within Europe, though also in the anglophone world outside.
- In *development studies* there are problems in recruiting quality researchers in the UK. Junior researchers are keen to come to the UK, especially from developing countries, but there is a lack of senior staff to manage them. The competition comes not from academic posts abroad – in particular, the USA has no distinct development studies discipline – but from well paid, non-academic employment in international agencies and consultancies. Overall there is a high level of mobility in early careers and then stabilisation.

10. **Actions** in relation to international mobility by learned societies are few. Most have connections with sister societies in other countries and international umbrella bodies where they exist. Some have career counselling services but admit that they offer little professional or practical help to migrant researchers. A few provide financial help to mobility – for example, through bursaries for foreign visits, sponsorship of foreign participants in UK conferences, and fellowships tenable abroad. While rarely addressing mobility in their discipline directly, some have found that it is an aspect of other disciplinary concerns, such as staff shortages, the range of fellowships on offer and academic remuneration.

11. All of the learned societies take a positive view of the **impacts** of international mobility. As one interviewee said “It is simply a matter of attracting and retaining the best” to sustain the health of the discipline. Mobility is also seen as an essential ingredient for more international networking, collaboration and inter-institutional relationships; and for development studies it is a means to building academic research capacity in developing countries.

12. But there were concerns in some societies that too much mobility, especially in turnover terms, could become “unmanageable” where the immigrant researchers were less interested in teaching, administration or outreach work. One interviewee accepted that mobility must extend contacts and the prospects for future collaboration, but felt that a strong cadre of home-grown talent is essential – “a real reputation is needed to nurture good contacts” – and that this is now too weak.

The impact of international mobility on UK academic research
August 2005

Annex C
The email survey of academic migrants
Andy Boddington

The Survey

1. A short email questionnaire was sent to
 - ◆ UK citizens working abroad (Abroad in the Figure and tables below): 72 sent; 28 responses
 - ◆ UK citizens who have worked abroad and have returned (Returned): 49 sent; 15 returned
 - ◆ Foreign citizens currently working in the UK (Foreign): 66 sent; 22 returned.

The respondents were chosen to capture a range of researchers at different stages of their careers, including highly cited UK researchers identified by citation analysis. They were identified from university websites and citations. The overall response rate was 35%. Not all respondents answered each questions so total responses vary.

2. The questionnaire included questions on

- Reasons for migration
- Financial assistance
- Career effects
- Benefits or disbenefits
- Consequent academic contacts
- Quality of life effects
- Future career plans.

Responses from the three categories of migrant were analysed in these terms. In addition many respondents provided quite detailed career narratives. Extracts from these are reported at the end of this Annex.

A. Analysis of responses

Reasons for Migration

3. As might be expected among researchers, the majority moved for the intellectual and research opportunities, including better equipment. Career development was also important, especially at PhD, postdoc and professorial levels. Quality of life was important to academics relocating to the USA and Canada.

Table 1. Reasons given for migration

Reason	Abroad	Returned	Foreign	All
Intellectual opportunities	10	11	7	28
Research funding	7	7	2	16
Career development	18	11	12	41
Family reasons	3	0	0	3
Quality of life	7	5	3	15
Cultural experience	2	1	1	4

Financial Assistance

4. Only about one third of migrants received financial assistance such a relocation grants.

Table 2. Financial assistance for migration

	Abroad	Returned	Foreign	All
Financial assistance	9	7	5	21
No financial assistance	17	10	17	44

Career effects

5. Overall four fifths of migrants thought that they had improved their career prospects. Nine in ten of UK academics reported that emigration had strongly improved their career development and/or future prospects; a slightly smaller, but still substantial, proportion felt the same about returning to the UK. This fell to just two in three foreign academics currently in the UK, the remaining third having experienced only moderate improvement.

Table 3. Improvement to career development & prospects

	Abroad	Returned	Foreign	All
Moderate improvement	2	3	7	12
Strong improvement	24	14	13	51

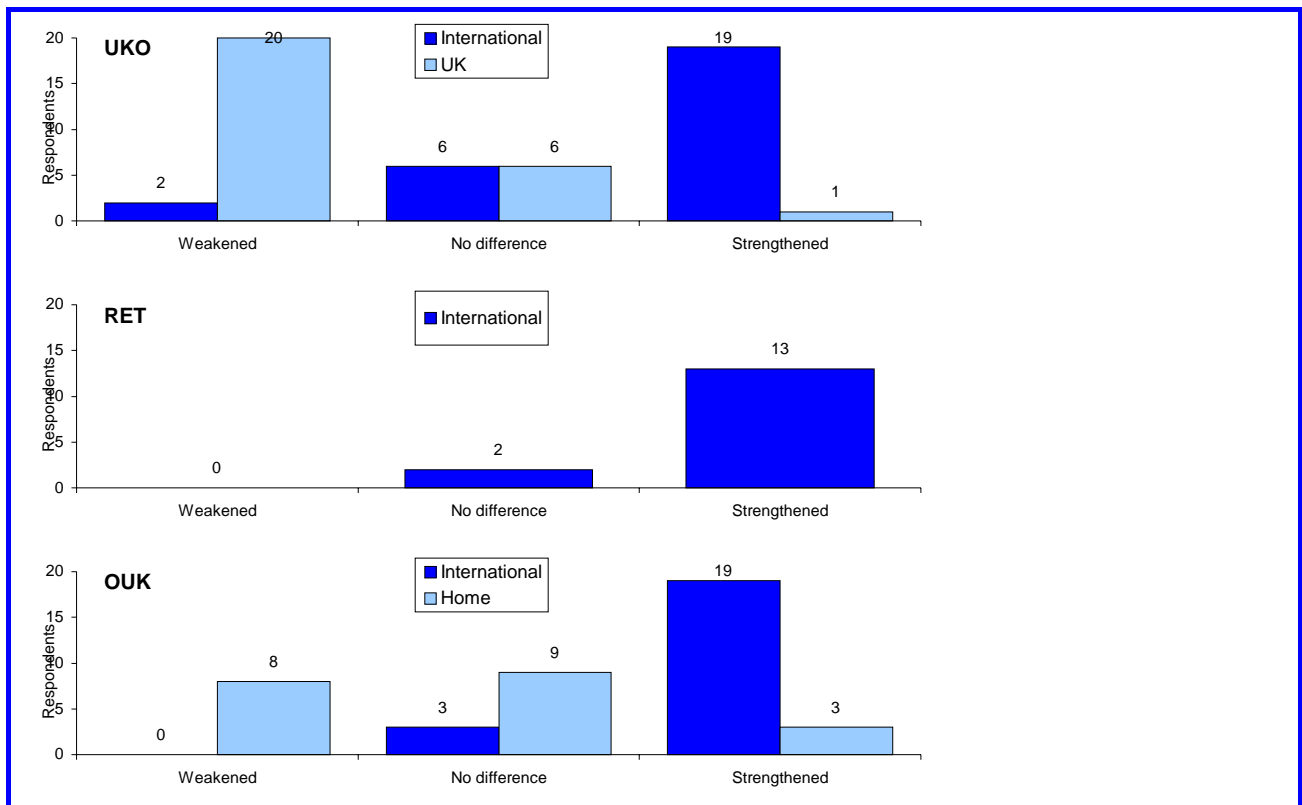
Benefits and disbenefits

6. For most academics, migration gave access to new funding and career opportunities, as well as broader research horizons. Among UK academics working in the USA and Canada, higher salaries were a key benefit, as was quality of life, including a good school environment for children. Several academics noted the funding cuts of the “Thatcher years” were a reason for moving to North America.

Academic contacts

7. Figure 1 shows that, unsurprisingly, overseas travel strengthened international contacts. For most UK academics who had gone abroad, their contacts with the UK were weakened. But returners came with international contacts strengthened by their time abroad.

Figure 1. Impact of migration on academic contacts



Quality of Life

8. Three quarters of respondents reported that migration had had little effect on their lifestyle; of the remaining quarter more had seen an improvement.

Table 4. Change to quality of life

	Abroad	Returned	Foreign	All
Improved lifestyle	1	5	6	12
Had little effect	24	18	11	63
Worsened lifestyle	1	3	4	8

Future career plans

9. About 40% of respondents thought it likely that they would move again in their careers. For the eight UK researchers abroad who expected to move, four planned to move back to the UK and four elsewhere.

Table 5. Future plans for migration

	Abroad	Returned	Foreign	All
Yes, likely to migrate again	8	10	7	25
No, unlikely to migrate	18	6	14	38

B. Extracts from career narratives

Under each heading the extracts are grouped together as coming from the responses of UK academics now abroad, UK academics returned to the UK or foreign academics now in the UK.

Reasons for Migrating

Love. [Lecturer in Philosophy from USA; age c. 40]

Far better research and career opportunities were available in the USA when I moved here in 1982. I think that the differences in research opportunities has levelled somewhat over time, but the financial and lifestyle benefits are still significantly better in the USA than the UK even now. The US research environment is far more adaptable and less structured, thus allowing easy development of multifaceted research efforts. The federal financial support through NASA and the NSF is still substantial. [Abroad: Fellow of Astronomy in USA; age 52]

Career development, family reasons. [Abroad: Professor of Psychiatry in USA; age 58]

I was recruited by the University of Illinois to be Chair of the Biophysics Division, with a view to increasing its scope and visibility on campus, and leading the transition to a Center for Biophysics. This seemed like an interesting challenge. In addition, they offered me a salary substantially higher (by almost 3-fold) than my Bristol salary, and the research opportunities and environment were excellent. Finally, the political scene in the UK looked unpromising in terms of support for science and the universities (and became more so with the arrival of Margaret Thatcher shortly after I left). [Abroad: Professor of Biochemistry in USA; age 60]

The main reasons for my moving to the US were: (i) the opportunity to work in the U.S. science community, (ii) work with the world authority in my field, and (iii) gain experience of life in another country. [Abroad: Research Engineer in Switzerland; age 29]

Funding. [Abroad: Research Fellow in Medicine in USA; age 31]

No work opportunities; no chance for advancement in research; hostilities in Academia.

Received superb education in UK but had nowhere to go in it when qualified. [Abroad:

Doctor of Pathology in USA; age unknown]

I moved because the opportunities for postgraduate education in the US in my chosen field (philosophy) were much better than the UK. California sunshine was also appealing.

[Abroad: Professor of Philosophy in USA; age 45]

Threefold: family reasons, career development and quality of life. [Abroad: Professor of Medicine in Canada; age c. 40]

Mostly career development and research opportunities, but I also wanted to experience life in different countries. [Abroad: Assistant Professor of Physiology and Biophysics in USA; age 43]

Mainly a mixture of career development and family reasons. [Abroad: Professor of Anthropology in USA; age c. 45]

Career opportunity, with unmatched colleagues, less teaching (from 14 contact hours/week in the UK, down to three in the US), and the intellectual freedom to attack a much wider range of scientific problems. [Abroad: Professor of Chemistry and Biochemistry in USA; age 60]

Better structure to PhD program in the USA than UK (longer program with more independence to choose thesis topic and better job prospects at the end). Also lifestyle choice of living in the San Francisco Bay Area for 6 years. [Abroad: Assistant Astronomer in USA; age 38]

Career development, lifestyle choices. [Abroad: Professor of Mathematics in Israel; age 57]

Career Development & research - In the UK it often felt like the academic game was going on somewhere else. Papers that I (and many others) had written were often duplicating existing work in the USA that I was unaware of. You feel unconnected to the main academic community. Of course it is possible to travel to the USA, but this is very expensive and most UK Universities impose severe limits on peoples' ability to do this. When here travel is both generously subsidized and less necessary because all the major researchers come by to give seminars. You feel part of the endeavour - not someone sniping from the sidelines. I was at the stage where it was better to be a little fish in a big pond than a big fish in a little one.

Lifestyle - I earn roughly triple what I earned in the UK. I can buy a new pair of trousers without worrying about the expense my children have experiences I'd never have been able to give them otherwise. I work no harder here than I did in the UK, although more is expected of me here. [Abroad: Professor of Economics in USA; age 65]

Job opportunity. Bleak outlook for British academia under the Thatcher government.

[Abroad: Professor of Genetics in USA; age c. 55]

Lack of research funding. Too much teaching/too many students. Lifestyle choices—better lifestyle in Canada. And, I just really liked the country I moved to. [Abroad: Assistant Professor of Sports Science in Canada; age 32]

Educational opportunity - at the time that I came to this country there was only one undergraduate degree course in physical education. Ultimately I became interested in exercise physiology - there were no advanced degrees in the UK at that time. [Abroad: Professor of Physical Education, Recreation & Dance in USA; age c. 65]

Two principal reasons: 1) career development (I thought, and continue to think, that an American PhD gives me more job options and a more thorough grounding in my area of study), 2) financial; although at the time when I had to decide whether to accept an American offer I had an offer from Cambridge, I would have had to wait until that August, only a month and a half before the beginning of the program to find out whether I would receive funding from the AHRB. [Abroad: Postdoc in Philosophy in USA; age 38]

The main reasons were career development and family reasons. I felt I had reached the limit of what was possible for me to achieve in the UK and sought new challenges overseas. Unlike many of my former UK colleagues, I did not spend time in the US as a postdoc because my wife and I began a family when I was in my mid-20's. Once my children completed their UK education, we decided we would enjoy some time in another country. [Abroad: Professor of Astronomy in USA; age 45]

In the early 1980s the government cut funding to UK Universities. [Abroad: Professor of Mathematics in USA; age 65]

Research opportunities and career development. I was interested in artificial intelligence, and (thanks to the Lighthill Report) there was almost no support for AI research in the UK. Several UK experts advised me to go to Stanford for my PhD. [Abroad: Professor of Computing Science in USA; age 44]

I left to pursue graduate degrees (MA and PhD). I had offers to remain in the UK and complete a PhD, but ever since I was a child I wanted to live in the United States for a period. When I had an offer from the University of Minnesota which included money I decided it was then or never. So I went. [Abroad: Professor of Geography in Canada; age 44]

We left the UK in 1985 due to the poor career and research opportunities under the Thatcher government. We returned in 1997 partly because of family reasons, partly because of the opportunity of working with first-class colleagues. [Returner: Professor of Genetics; age c. 60]

Career development. Research opportunities. Learning about cutting-edge research developments. [Returner: Professor of Business; age 59]

For example, From UK: To work in first class scientific environments and learn more about the science in the host institute and the science within. To experience international science first hand--very different systems in both the USA and Switzerland. To live in new places/societies. [Returner: Professor of Pathology; age ?]

Career development (as a postdoc). [Returner: Professor of Biological Medicine; age c. 51]
Research opportunities and money. [Returner: Professor of Psychology; age 53]

For example, Left for a good job in the USA when there were no jobs in the UK; returned when a job came up in the UK I was comfortable with, as well as for family reasons.

[Returner: Professor of Physics; age ?]

UK? For example, career development, research opportunities, family Academic opportunities, research funding and broadening experience (probably in that order) for my taking up positions in the US/Denmark/Canada. [Returner: Professor of Biochemistry returned from Canada; age 47]

Career development and lifestyle choices. [Returner: Professor of Biology; age ?]

Worked in New York for 2 years; went there for the research opportunities and for career development. Returned to UK for family reasons and for quality of life. [Returner: Professor of Biology; age ?]

I was living in the US where I did my PhD and postdoctoral research. I applied for jobs in USA, Europe, and elsewhere. I was offered a job in the UK and I took it. [Returner: Professor of Ecology; age c. 44]

Career development. Before finishing the dissertation I had an offer from the University of London and thought that it would be a much more exciting job than the ones I could get in the US at the moment. [Foreign: Economics lecturer from Spain; age 29]

Research opportunities, especially related to; national funds (EPSRC, etc); the possibility to work with internationally known researchers; the possibility to get excellent students (also international ones); quality of life in UK universities. [Foreign: Professor of Computer Science, age 39]

For career development and research opportunities, wanted to move from a research institute to an academic institute. [Foreign: Senior Lecturer in Psychology from USA; age 45]
Living and working in London (after having lived in suburban Princeton, NJ). Raising a family in a large and diverse European city. [Foreign: Senior Lecturer in History from Germany; age 40]

For example, The main reason was that I was offered a job! I had been looking in the USA for 18 months for a faculty position without success. I came over to Britain to give a research seminar and an upcoming opening was mentioned over lunch. Up to that point I had not thought about it and had intended to stay in the USA - my wife is a US citizen.

[Foreign: Senior Lecturer in Medicine from USA; age ?]

Career development for both my partner and me. [Foreign: Lecturer in Economics from Belgium; age 35]

Given an EU chair in European policy and politics which provided increased research opportunities. [Foreign: Professor of Political Science from USA; age 60]

UK has on average a good university system compared to the rest of Europe. It is open to foreigners. Hence for researchers who do not want to go to the US, UK becomes a good alternative for the career (though the salaries are not that competitive!) [Foreign: Lecturer in Finance from Italy; age ?]

Career development; lifestyle (close to Europe); good department. Not necessarily a dramatic choice, as I am a young academic getting started (so did not leave an established lecturing or research position). [Foreign: Lecturer in Psychology from Australia; age 29]
I was looking for a position that would offer a career development in Europe after the experience in the USA. My interest in coming back was linked to both lifestyle and family reasons. [Foreign: Postdoc in Genetics from Italy; age c. 38]

Career development. The UK offered for my research interests a more active and internationally integrated research environment. [Foreign: Professor of Economics from Germany; age 36]

Research opportunities, better political climate, prestige. [Foreign: Professor of Linguistics from Germany; age 55]

Financial Assistance

Four year fellowship from Princeton. [Abroad: Professor of Psychiatry in USA; age 58]

For my move to USA: I was given one return airfare from the UK to the US. For my move to Switzerland: I was given one return airfare from UK to Switzerland. [Abroad: Research Engineer in Switzerland; age 29]

Yes. Postdoctoral fellow in neuropathology. [Abroad: Doctor of Pathology in USA; age unknown]

The University of California at Los Angeles provided an initial fellowship and a promise of continued funding for my studies, including a full waiver of the fees usually charged to non-residents of California. [Abroad: Professor of Philosophy in USA; age 45]

I was assisted by a grant for relocation expenses, included as part of the package for bringing visiting scientists to the US National Institutes for Health. [Abroad: Professor of Mathematics in Israel; age 57]

My institution paid to have my house packed and shipped here and stored. They gave tuition assistance to my children to go to college. They paid airfares for my family to travel. [Abroad: Professor of Economics in USA; age 65]

I was given relocation expenses to come to the USA. [Abroad: Professor of Veterinary Science in USA; age c. 44]

I first came to the U.S. on a one year graduate study fellowship at Princeton (it was called a Jane Eliza Procter Fellowship and is intended specifically for graduates of Oxford or Cambridge who wish to study at Princeton). [Abroad: Postdoc in Philosophy in USA; age 38]

I applied for and received a SERC Studentship Tenable Overseas (I think this was funded by NATO, not sure). As it turned out, I was also offered financial aid by Stanford so the UK support was not essential. [Abroad: Professor of Computing Science in USA; age 44]

I received initially a Teaching Assistantship (in 1978 it was about US\$6,000). I later received two fellowships which gave me an incentive to stay. I received no travel money as such. [Abroad: Professor of Geography in Canada; age 44]

I was awarded a 10-year Royal Society Research Professorship; without this, I doubt I would have returned. [Returner: Professor of Genetics; age c. 60]

To the USA EMBO and MRC grants--long time ago now!! [Returner: Professor of Pathology; age ?]

NATO Fellowship arc Fellowship. [Returner: Professor of Biological Medicine; age c. 50]

SRC (now called EPSRC) Fellowship available to returners. [Ret: Professor of Physics; age ?]

Yes, I received a Fellowship (Biochemical Society) to go to Paris. [Returner: Professor of Biology; age ?]

Cardiff Professorial Research Fellowship scheme - a research only chair without teaching and low admin loads. [Returner: Professor of Medicine; age ?]

I had relocation expenses paid by the University if this counts at all. [Foreign: Professor of Computer Science, age 39]

Did pay for the move of personal and professional effects, papers, books, belongings.

[Foreign: Senior Lecturer in History from Germany; age 40]

ICM doctoral fellowship, a fellowship paid by the Belgian government that includes a stay abroad. [Foreign: Lecturer in Economics from Belgium; age 35]

Cambridge Commonwealth Trust Prince of Wales Scholarship to do PhD. [Foreign: Lecturer in Physics from New Zealand; age 35]

AS and invited scientist appointed by the Medical Research Council my travel and removal expenses were covered. [Foreign: Professor of Pharmacology from Hungary; age ?]

2-year Fellowship by the German Research Foundation (DFG) then a 1-year Fellowship by the German Thyssen Foundation. [Foreign: Professor of Medicine from Germany; age ?]

I spent some research periods in France thanks to a EU grant for mobility of researchers. In particular I spent one year as post doc in Toulouse. [Foreign: Lecturer in Finance from Italy; age ?]

Career effects, benefits and disbenefits

Strongly improved it [unknown]

Moderately improved it but difficult to judge as the parallel life is never known. [Abroad: Assistant Astronomer in USA; age 38]

A wider range of research paths were available and I joined a much larger research group that enabled me to develop new skills quickly and easily. This broadened the science that I was able to do and thus vastly improved my research view as a whole. Disadvantage: living on grants. [Abroad: Fellow of Astronomy in USA; age 52]

I left Britain just before the catastrophic Thatcher years. I had originally intended to return, but the appalling impact of that creature's regime on higher education (a disaster that continues to unfold to this day) made the prospect of return ever more unappealing. In my frequent visits back, I found demoralized colleagues forced to fight cuts year on year, and with salaries that became grotesquely inadequate to boot. Then there is the Kafkaesque system you have instituted to check on the "quality" of teaching (run by disaffected failed academics, more often than not) and the other accountability systems (like the Research Assessment Exercise) which are well intentioned, but result in institutions gaming the system and forms of hypocrisy that are hard to stomach. Increasingly, British universities resemble aspects of the old Soviet system, complete with absurd top down management and "accountability" that simply produce pathology and largely fail in their intended aims. Sclerotic bureaucracy and political interference are not the way to produce internationally competitive universities. [Abroad: Professor of Psychiatry in USA; age 58]

It is a little difficult to parse out the probabilities over the 27 years since my move. However, I have enjoyed strong research support over that time, and I continue to run a modest research group (6 graduate students, and several undergrads), at an age when I would have been retired in the UK

By working with the world authority in my field (coastal engineering), I have made the establishment, development & importantly NETWORKING in my career a lot easier (i.e. I have been headhunted several times). I also was able to observe how a different academic system works/not works, etc. [Abroad: Research Engineer in Switzerland; age 29]

Funding, although sparse everywhere is better in the US right now. Also, new investigators get better start up opportunities. [Abroad: Research Fellow in Medicine in USA; age 31]

Opportunities for advancement were abundant and research atmosphere was vibrant as opposed to the rather internecine atmosphere in the UK [Abroad: Doctor of Pathology in USA; age unknown]

With my US-based PhD I had more job options than I would have had with a UK PhD. I have also benefited directly and indirectly from several hundred thousand dollars of funding from the US National Endowment for the Humanities and the National Science Foundation, for projects that appear to have no UK equivalents. [Abroad: Professor of Philosophy in USA; age 45]

I have managed to progress quicker due to the fewer number of researchers in my field in Canada. However, the smaller number does mean there is less ability to collaborate or bounce ideas off colleagues. [Abroad: Professor of Medicine in Canada; age c. 40]

Enabled me to work with researchers in mainland Europe as well as the States and UK. I've been lucky enough to work with some very well known people in my field. I think I have been able to do things in the US I would never have done in the UK. For example I am very involved with the American Physiological Society (sit on several committees etc.) and am involved in several major meetings giving talks and chairing sessions - somehow I just don't think I could have done that so easily in the UK - it wasn't until I came to the States as a post-doc I realized how important mentoring was - I was never really exposed to that (or at least it wasn't so pro-active) in the UK or Germany. This is clichéd but I really had my eyes opened to what was possible only when I came to the US - I think it has made me a better scientist and researcher. [Abroad: Assistant Professor of Physiology and Biophysics in USA; age 43]

I have more support for research and am less encumbered by admin and bureaucracy.

[Abroad: Professor of Anthropology in USA; age c. 45]

The opportunity to run a larger research group, and the release from having to apply for innumerable small grants attached to particular initiatives and programs, were real benefits. The relative flexibility of US grant funds (across budget categories), and the chance to fund graduate students according to their scientific progress (rather than to some arbitrary timetable) were also helpful. [Abroad: Professor of Chemistry and Biochemistry in USA; age 60]

I got a wider range of research opportunities than many PhD students in the UK seem to get. My current job offers fantastic facilities and a higher pay scale than in the UK. [Abroad: Assistant Astronomer in USA; age 38]

Increased job opportunities and freedom of academic development into interdisciplinary fields. [Abroad: Professor of German in USA; age 44]

I gained international reputation in my field (biostatistics) during the 8 years that I worked at the US National Institutes for Health. Recently, I became the editor of one of the top international journals in this field (Biometrics). [Abroad: Professor of Mathematics in Israel; age 57]

The collaborations I entered into here have given my 3 top publications. I have been invited to be a founder editor of a journal. Much higher visibility in the profession. [Abroad: Professor of Economics in USA; age 65]

Substantial financial support for research via NIH and State funds. Increased salary and respect for research and academic personnel. [Abroad: Professor of Veterinary Science in USA; age c. 44]

Benefits include much better access to government research funding, a competitive system of promotion, a focus on excellence, a fantastic lifestyle, and great people. Disadvantages would only be that occasionally I miss my family because I live 5000 miles from the UK. [Abroad: Assistant Professor of Sports Science in Canada; age 32]

On two different occasions during my career I did try to relocate back to the UK. The first time was shortly after obtaining my Ph. D. degree and there were very few positions available. The second time was after I had changed career paths and had gone into administrative positions. Lack of knowledge of the UK systems probably hindered my job prospects. It is difficult to compare the opportunities presented in the 1960's with those currently available. There are many of my former British associates who probably ended up here for the same reason. Marriage and family also play a large part. I have been given many professional opportunities in this country - some I have benefited from and some resulted in going down the wrong path. [Abroad: Professor of Physical Education, Recreation & Dance in USA; age c. 65]

More research dollars, more salary dollars. [Abroad: Associate Professor of Transport in USA; age c. 40]

I have been told from a number of sources that it is hard to get a job in the U.S. with a British PhD, but that the converse is not true. Taking a PhD from a well-regarded institution in the U.S. thus makes it possible for me to be a strong candidate for academic positions on both sides of the Atlantic. Added to which the American style of PhD gives me more contact with a greater number of senior philosophers, allowing for more connections and better references. [Abroad: Postdoc in Philosophy in USA; age 38]

The main benefit has been scientific. I have enjoyed consistent and generous access to unique facilities in the US. I have begun science programs I could not have engineered in the UK. I have also learned how to function in a very different academic and national environment. This has broadened my skills considerably. The main disadvantage I perceive is that I am not as well-connected yet in the US as I was in the UK, and my reputation in the UK has somewhat been tarnished by what some senior colleagues in the UK perceive as my “defection” to the US. [Abroad: Professor of Astronomy in USA; age 45]

More research funding, better salaries, better opportunities for our children. The UK is expensive, overcrowded and dirty. I no longer wish to visit. [Abroad: Professor of Mathematics in USA; age 65]

Funding opportunities for research are much broader in the US. The US academic system is more democratic, i.e. less of the old boys school. Saying this I think the situation has changed a bit in the last 10 years. Financial benefits for academics are much better in the US than in the UK. This makes coming back to the UK very difficult as I would need to take a massive cut in my standard of living. [Abroad: Assistant Professor of Chemistry in USA; age 46]

I have been able to assume a leading role in my field, with plenty of funding, excellent students, and superb colleagues. I do not see the same levels of activity in UK universities, and there seem to be plenty of complaints about funding for computer science. (I recently estimated that EPSRC’s funding for computer science in the UK was roughly equal to the funding for CS at Berkeley.) [Abroad: Professor of Computing Science in USA; age 44]

I had a much broader graduate education in the US than I would have if I remained in the UK. It also got me into the North American job market. The prospects for a job in academia were very bleak in the UK when I graduated with my PhD (there were only four positions in UK academic Geography in 1983 when I went on the market). In contrast, I alone applied for 20 positions in North America, was interviewed at three universities, and accepted a position from the University of British Columbia where I remain. [Abroad: Professor of Geography in Canada; age 44]

My move abroad was definitely of great benefit; I was able to work in a first-rate Department in a world-class university; the outstanding quality of many of the PhD students was of particular importance. Research funding was good compared with before the move. The return was more of a move horizontally, as far as career development. The quality of my colleagues is excellent, that of PhD students definitely worse, and research funding about equal. [Returner: Professor of Genetics; age c. 60]

Going to the USA to do my MSc, PhD and postdocs was good. I got training I could never have got in the UK, and have established a unique lab using that training. [Returner: Professor of Ecology; age c. 44]

International mobility is essential for modern researchers. [Returner: anonymous]

Science is an international discipline and I found it invaluable to work in labs outside the UK and understand the differences in scientific approaches influenced by different funding schemes and academic structures. Mostly I wanted to go to the most interesting lab for me at the time, regardless of geographic/political borders which are in many ways irrelevant to the scientific community. [Returner: Professor of Pathology; age ?]

Opportunity to learn new approaches, ways of thinking. [Returner: Professor of Biological Medicine; age c. 50]

There was (this was 25 years ago) a strong feeling that exposure to US science was useful, and it made you more employable I think. I certainly was able to do cutting-edge research with the latest technology, which greatly helped by subsequent research. [Returner: Professor of Biological Medicine; age c. 51]

Benefits include better pay and better work conditions. Downside is the United States culture. [Returner: Professor of Psychology; age 53]

Built lifetime links with world-leading researchers in the USA. [Returner: Professor of Physics; age ?]

It is essential to understand both one's academic subject and the world! [Returner: Professor of Biochemistry returned from Canada; age 47]

Working abroad provides insight into the research set-up elsewhere which is invaluable. [Returner: Professor of Biology; age ?]

Australia gave me opportunities to develop, which would have been difficult in the more conservative, traditional framework in the UK. [Returner: Professor of Medicine; age c. 63]

I have not moved abroad and back to the UK since my post doc in Sweden in 1981/2. I spent 20 years as a UTO in Cambridge, and recently moved to Cardiff - internationally but not abroad! Academic Benefits have all accrued through working in the best labs on an international stage. Personal/lifestyle benefits abound from periods working abroad.

[Returner: Professor of Medicine; age ?]

Benefits accrue from experience gained and from publications generated. [Returner: Professor of Biology; age ?]

It is good for the UK if the academics at universities were not all trained in the UK.

[Returner: Professor of Ecology; age c. 44]

The research positions I held in the USA allowed me to substantially improve my publications record which stood me in good stead when applying for jobs. Also, for some reason, postdoctoral experience working in the USA seems to be held in higher esteem in the UK than 'home' experience. The negative side is that you do not have the contacts when you return and need time to establish those. [Returner: Senior Lecturer in Medicine from USA; age ?]

Benefits: 1) I am at a well-known research institution with a lot of time to do research and interesting teaching at the MA level; 2) Have received a lot of support in rewriting my dissertation and publishing; 3) Less short term pressure than the US, but very dynamic and with a lot of opportunities; 4) The UK is a bridge between the US (where I did my Ph D) and Europe (I am from Spain). Disbenefit: 1) The pay does not allow you to support a family in London. [Foreign: Economics lecturer from Spain; age 29]

The department in which I work is very well integrated into the international research community. That has been beneficial. [Foreign: Professor of Economics from Germany; age 36]

The UK research environment is vibrant and motivating. A good part of the industrial bodies are keen to work in joint research project. In general the environment also seems to be more compatible with my personality. [Foreign: Professor of Computer Science, age 39]

My previous position in a research Lab in Japan had many benefits (large well-funded lab) but it was impossible to advance my own research agenda, so the compromise I made was to have more freedom to pursue my own research at the cost of not being in as well-equipped a lab. However, in time I have obtained most of the equipment I need to pursue my research. [Foreign: Senior Lecturer in Psychology from USA; age 45]

Academic salary is lower than in United States. Living expenses are higher. [Foreign: Senior Lecturer in History from Germany; age 40]

It is a challenge for family to be disconnected. It is extremely advantageous for both mover and host to experience different cultural approaches and backgrounds. [Foreign: Professor of Astronomy from New Zealand; age ?]

There was a certain amount of resentment from my UK colleagues at the beginning due to the fact that the money for the chair came from the outside and that I was teaching courses on the EU. Stories appeared in the “pulp” press that I was a “Commission spy”. I ignored these and continued with my work. Now, EU politics and policy represent one of the main attractions of MScs at []. Foreign: Professor of Political Science from USA; age 60]

It started me off in science, which has been a great life. [Foreign: Professor of Molecular Biology from Canada; age ?]

Most of my training beyond first degree has been in the UK. [Foreign: Lecturer in Physics from New Zealand; age 35]

In the short term, I see generally better research opportunities here because 1) Italy has very poor support for research 2) I moved to human genetics which in general is more advanced and has better funding than plant research. 3) my current supervisor has a higher profile than the previous. It is however unclear what my opportunities will be in the long term. [Foreign: Postdoc of Genetics from Italy; age ?]

As Director was given full responsibility for research as well opportunity for leadership.

Cost: being an outsider carries social costs and lack of appreciation by the community.

[Foreign: Professor of Pharmacology from Hungary; age ?]

I was able to work in an outstanding, international research environment. [Foreign: Professor of Medicine from Germany; age ?]

I was just starting out on my career. My main support network (colleagues and ex-teachers) were not as effective outside the US. It probably wouldn't have mattered if I had more time to establish myself first. [Foreign:

Lecturer in Philosophy from USA; age c. 40]

Granting infrastructure better in UK than in other countries I would work in (US or Australia), though not as much money put in to sciences. Close to many people in my field; however, many also work in the US which is a fair way to travel. Teaching loads in UK relatively low, allowing more time for research. [Foreign: Lecturer in Psychology from Australia; age 29]

A longer contract than in the USA, overall less jobs available on the market. Thus in a way and even change. [Foreign: Postdoc in Genetics from Italy; age c. 38]

Better networks, more stimulating research, more funding possibilities. [Foreign: Professor of Linguistics from Germany; age 55]

Quality of Life effects

I was able to bring up a family in far more comfortable circumstances than would have been the case in the UK. A high quality lifestyle, a good school system for our children, and a wonderful physical environment were all major benefits [Abroad: anonymous]

The major disadvantage has been a persistent concern about continuing grant support. My salary is based entirely on federal grant support and I have to ensure a steady stream of successful proposals to maintain my salary/research. However, this does keep my research program continuously developing and prevents stagnation. [Abroad: Fellow of Astronomy in USA; age 52]

In terms of monetary reward, improved; in terms of personal relationships, initially deteriorated (my wife of that time didn't like the US, and we divorced), then improved (my present marriage has lasted 24 years, with two kids currently going through college, and many rewards). However, I still miss the cultural heritage of England. [Abroad: Professor of Biochemistry in USA; age 60]

Worsened my lifestyle e.g. relationships. [Abroad: Research Engineer in Switzerland; age 29]

Based on comparisons with friends and colleagues in the UK universities, and with my family members who are not academics, it appears to me that salaries and other funding opportunities all are greater in the US than in the UK, while cost of living is lower. Housing costs are much lower here and obtaining comparable housing in the UK would be impossible on an academic salary. My parents visit frequently (up to twice a year) and my sisters and their families somewhat less frequently, but family relationships have remained strong nonetheless. Opportunities for personal travel are high and I'm sure that my children have already travelled more (including some transatlantic trips) than they could have expected were I based in the UK. [Abroad: Professor of Philosophy in USA; age 45]

Improved hugely. [Abroad: Professor of Anthropology in USA; age c. 45]

I have a tenure-track job that pays very well and live in Honolulu! I get to see family members about once a year which is enough for all of us: family issues are less important to me than my career and lifestyle. [Abroad: Assistant Astronomer in USA; age 38]

Having eventually ended up in Israel, where being Jewish does not mean being different, I would say that overall it has improved our lifestyle. [Abroad: Professor of Mathematics in Israel; age 57]

There are some one-off costs to relocation - understanding the new way of life (driving licenses, healthcare, education, taxation & culture generally). These were difficult and hard. At the time it was very frustrating but it did feel like it made you stronger. Now we are over the hump and we are very fortunate to have wonderful lifestyle. [Abroad: Professor of Economics in USA; age 65]

Overall the move was a huge win. The cost of living, even in the SF Bay Area, is less than in England and salaries are higher. Berkeley is a very cultured environment and also has excellent weather and spectacular scenery. Drawbacks are 1) children grow up speaking American 2) schools are of dubious quality 3) distance from family in the UK. [Abroad: Professor of Computing Science in USA; age 44]

This is a hard question to answer but I think it has improved it. I had a friend who graduated before me and has become a professor of English at Birmingham University. My income is higher than his, and there is no stress of the RAE in Canada. Whereas he pulls his hair out over it whenever I see him. The only drawback is being so far away from my family, which as my parents get older is increasingly problematic. [Abroad: Professor of Geography in Canada; age 44]

It has created significant but manageable strains on family life and leisure time. [Returner: Professor of Business; age 59]

Worsened—impacted on family life especially. [Returner: Professor of Psychology; age 53]

The move to [place] has markedly improved my income and research freedom but has markedly complicated matters on the home front because my wife has found it very difficult transferring to the anti-English Welsh culture - we will always in some senses be 'foreigners' here, even though I find it affects me much less than it does her. [Returner: Professor of Medicine; age ?]

Initially, returning to the UK was very difficult for family relationships as my wife was unable to find work for the first year, having held a significant position in the US and having contributed equally to our joint income. This led to a significant drop in our standard of living. Whether it has recovered is difficult to say as we have been here now almost 10 years. [Returner: Senior Lecturer in Medicine from USA; age ?]

Improved: 1) London is a very dynamic city; 2) My wife and I are closer to Spain, our home country, something particularly important after having a baby; 3) The city has a lot of professional and personal opportunities

Worsened: 1) London is very expensive and we have some financial difficulties; 2)

Transportation and housing are not very good and are very expensive; 3) The weather is not so good for a Spaniard! [Foreign: Economics lecturer from Spain; age 29]

University incomes in the UK are very low, so finances are worse, most cultural factors are better matched to personal tastes (otherwise I wouldn't be here). [Foreign: Professor of Astronomy from New Zealand; age ?]

Financially worse off, but I like the lifestyle better. [Foreign: Professor of Molecular Biology from Canada; age ?]

Salary is slightly better (not hugely). Overall the balance is positive because I like London, but were I not married I would be very worried about the possibility of leading an independent life in London in the long term (at post-doc salaries it is impossible to buy a house). [Foreign: Postdoc of Genetics from Italy; age ?]

It is a trade off. Better in some areas, and worse in others. [Foreign: Lecturer in Philosophy from USA; age c. 40]

Consequent academic contacts

a. UK contacts

I'm sure I have fewer UK contacts than I would otherwise have had. (In fact, I'm surprised to have received this survey since most UK academics have assumed me to be American if they haven't met me, and I was not aware of being on any list of UK academics abroad.) [Abroad: Professor of Philosophy in USA; age 45]

Weakened contacts. UK academics are not yet as attuned to international collaboration as are US academics. [Abroad: Professor of German in USA; age 44]

Less direct contact with the wider UK academic community but I have maintained close contact with my active collaborators who work at roughly five different UK universities. [Abroad: Fellow of Astronomy in USA; age 52]

These have waxed and waned depending on interest rather than on distance. [Abroad: Professor of Biochemistry in USA; age 60]

Expatriates tend to be forgotten by UK colleagues. [Abroad: Doctor of Pathology in USA; age unknown]

Contacts were strengthened in the early years, and then (inevitably) weakened after a decade or so. [Abroad: Professor of Chemistry and Biochemistry in USA; age 60]

This is only because I am on a committee involved with the running of a UK telescope in Hawaii. Otherwise the answer would be that it weakened them. My main research collaborators are in the US. [Abroad: Assistant Astronomer in USA; age 38]

Although I still maintain good contacts with older British biostatisticians, I have "skipped a generation" and do not know the younger people. [Abroad: Professor of Mathematics in Israel; age 57]

Again, initially the move weakened contacts, but after I spent a year at Bristol University on leave (1989-90) contacts improved, and by the mid-1990s I was more involved with British academics than I ever had been before. [Abroad: Professor of Geography in Canada; age 44]

b. International contacts

My contacts and collaborations with colleagues in Europe continued, and I have built new collaborations in Russia and Japan. [Abroad: Professor of Biochemistry in USA; age 60]

Had I stayed in the UK I'm sure I would have had different international contacts, but I can't say that they would have been better or worse. [Abroad: Professor of Philosophy in USA; age 45]

A mixed bag – I am away from European colleagues but have made many new contacts here in US. [Abroad: Professor of Anthropology in USA; age c. 45]

It's a little hard to answer this question since I moved to do a PhD and had no pre-existing research career. I usually attend the major international conferences and a few invitation-only workshops and have contacts everywhere. (It helps that my textbook is used in over 90 countries.) I know many excellent researchers in the UK, but have observed that at international conferences the UK contingent is far outnumbered by the American, German, and Japanese contingents, who are all well funded for conference travel. [Abroad: Professor of Computing Science in USA; age 44]

At least initially my location on the west coast of Canada made it more difficult to strike up collaborations. The collaborations I made were with either people at the University of Minnesota where I was a graduate student or with people locally within the Vancouver area. Only much later (sometime in the mid 1990s) did I engage in more far flung international collaboration. [Abroad: Professor of Geography in Canada; age 44]

Made no difference except that knowing the US makes travel there easier. [Returner: Professor of Biological Medicine; age c. 51]

As evidence of maintained link, I was recently the first foreigner to be elected as President of a major US-based scientific society. [Returner: Professor of Physics; age ?]

Cambridge to Lund, Sweden in 1981 back to Cambridge 1982 was of major importance at foundation of my subsequent career. [Returner: Professor of Medicine; age ?]

Overall no difference. probably shifted networks more to European ones and loosened American ones. [Foreign: Senior Lecturer in History from Germany; age 40]

With the latest move I have changed fields from plant to human genetics research. Research collaborations have been strengthened as a result of my work being more multidisciplinary now. [Foreign: Postdoc of Genetics from Italy; age ?]

Future career plans

Probably not, but I am always looking for different opportunities. I have interviewed for a senior academic position in the UK in the past year. [Abroad: Fellow of Astronomy in USA; age 52]

Perhaps to the UK but unlikely. [Abroad: Professor of Anthropology in USA; age c. 45]

I have multiple sclerosis. I continue to work full time and travel but I need a lot of medical support. I worry that the UK cannot meet my medical needs, and in addition I am worried about obtaining disability insurance should I return. In any case, I am very happy personally and professionally living in Vancouver and working at UBC. Comments. Five of out last eight hires at my Department have not been Canadian. International mobility of researchers is firmly entrenched. [Abroad: Professor of Geography in Canada; age 44]

I don't expect to move from the US, but I'm not opposed to it and would seriously consider offers in Europe, Canada, or Australia and New Zealand. [Abroad: Professor of Philosophy in USA; age 45]

No, although I expect to visit Europe and the UK at least once a year and eventually have a sabbatical there. [Abroad: Assistant Astronomer in USA; age 38]

I intend to apply for academic jobs on both sides of the Atlantic, and it seems more likely than not that the best offer I receive will be from an American institution. [Abroad: Postdoc in Philosophy in USA; age 38]

It's possible we'll move to the UK if/when my wife sells her company. Brief history: Considered moving back to England after my PhD. Starting salaries for Lecturer in UK were *lower* than the UK-provided PhD student stipend I received at Stanford. Was first offered a UK Professorship in 1989 when I was 27 at Aston Univ. After a visit it was clear the university was barely surviving. Was offered an endowed chair at Oxford in 1999; seriously tempted but by then was married to an American and could not find a way to make it work. Even at the top of the scale, a professorial salary does not stretch to buying a decent house in or around Oxford. Turned down another such offer yesterday, but eventually we expect to work it out. [Abroad: Professor of Computing Science in USA; age 44]

Comments I think it is of great value to most of the individuals concerned, and also of course benefits the countries who acquire migrants. The downside is the drain of talent out of countries where there is a net outflow, but basically this is a reflection of the realities of the different opportunities available in different places. [Returner: Professor of Genetics; age c. 60]

I intend to move within the UK in the near future, but ultimately would like to leave the UK again as many aspects of science here are in danger of becoming 'too provincial'. [Returner: Professor of Pathology; age ?]

No, probably but not certainly. If things got difficult a move to another European country would be considered but I am now retired with a visiting appointment at Essex. [Returner: Professor of Biochemistry returned from Canada; age 47]

The plan is to split my time between Australia and UK. [Returner: Professor of Medicine; age c. 63]

Probably not - in the hope that we can resolve the family circumstances then this suits me well academically for the last 10 years to retirement. However, if the right offer was forthcoming, eg to direct a research institute, then for the same reasons I would probably be attracted. This is much more likely to come from overseas than UK. [Returner: Professor of Medicine; age ?]

I am planning to move to the US in 2 months, for an estimated 18 months. [Foreign: Postdoc of Genetics from Italy; age ?]

Perhaps, it depends where the best opportunities arise. [Foreign: Professor of Astronomy from New Zealand; age ?]

Who knows? I've no intention to move again, and no great desire to do so. But life is a funny business. [Foreign: Lecturer in Philosophy from USA; age c. 40]

General Comments

I would say that when you make a choice, you flip the dice. There's no guarantee that things will work out better. However, a move does open opportunities. [Abroad: Professor of Biochemistry in USA; age 60]

I would recommend to anyone involved in research to move to another country for at least a year. There are many enormous benefits to be gained, but with some personal sacrifices. Most important I feel, is the opportunity to spend time in a country where the government/country realise that MONEY is a very important motivating factor both in facilitating quality research, but also in rewarding researchers' personal finances in an appropriate manner. If one is to relocate to another country, sufficient time and money must be made available to allow the individual (& family) to return home at regular intervals for decent periods of time. After a short 2 year contract in the UK beginning in August, for these financial reasons, I am now seriously considering permanently relocating to another country to conduct my research. [Abroad: Research Engineer in Switzerland; age 29]

I think all junior researchers should spend 1-2 years in another country as part of their training. The research atmosphere in the US is exhilarating and vibrant and should serve as the role model. [Abroad: Doctor of Pathology in USA; age unknown]

At various times I have had the opportunity to interview UK-based candidates for jobs in the US. My impression is that junior candidates from the UK are at a disadvantage in competing for entry-level positions in the US because UK PhDs in philosophy appear rather narrow and specialized compared to US PhDs, producing candidates who are less prepared to teach a broad range of courses, or to talk to colleagues on a broad range of philosophical topics. UK-based faculty become attractive in the US at the senior level if they have established a reputation through publication. Perhaps an analysis of actual migration data would show me wrong, but my impression is that mobility is highest at two points: at the very beginning of an academic career—when entering postgraduate training—and much later, when individuals become candidates for positions at the U.S. rank of full professor.

In the reverse direction, I am aware of some recent high-level recruitment to the UK in connection with specially funded research centres at British universities (and likewise to Australia, although their program seems more deliberately aimed at repatriating Australians). I think the number of individuals involved is too small to buck the general trend—opportunities in the US still remain much higher—and I would have questions about the long-term viability of such arrangements if I were to be offered such a position. [Abroad: Professor of Philosophy in USA; age 45]

I may decide to return to the UK but this is unlikely until much later in my career. [Abroad: Professor of Medicine in Canada; age c. 40]

I can't ever see myself coming back to the UK to work. One reason is lifestyle/salary issues - I would take a big cut in salary to return and housing is so expensive I don't ever see myself obtaining an equivalent standard of housing as I have here (this I know is also an issue among my academic ex-pat UK friends and colleagues). There are academic reasons too - some of which I alluded to above - my career development in the States has been much better than I can imagine it having been in the UK or in Europe for that matter (I did an initial post-doc in Germany before coming to the US, and frankly I didn't have a clue when I finished my Ph.D. as to what was available and what I should have been looking for in a post-doc). The system here is also much less hierarchical than in the UK. The "old boy network" of science exists in this country too, but I think it has less influence and is generally less important than in the UK - I feel much more that here one is accepted more on one's merits than on one's connections. I am now much more used to the free and easy way of working and communicating here - collaborations seem so much easier to set up and maintain in this country than in Britain, even given the much greater distances involved. The other point of course is money - money for research in the US is tight but I have the impression that it is still much easier to obtain research funding here than in the UK - especially when one hears of the closing of so many science departments. I also have friends and colleagues at

Newcastle, Cambridge and UCL, all of whom paint a fairly depressing picture - one has recently taken a job abroad. I am fortunate to have a faculty position at a major research university, but I have never encountered problems in doing whatever I wanted in terms of equipment or resources. I left and did a post-doc in Germany at a Max Planck institute as soon as I finished my Ph.D. and then came to the States to do another post-doc just to see what it was like - certainly when I came here I had no intention of staying more than 2-3 years before going back to the UK - that 16 years ago!! I still think it was valuable to obtain my graduate and undergraduate education in the UK - I think the UK educational system is much better than in the States - however, I regret not having come to the US as soon as I finished my Ph.D. - in retrospect, it would have been the better move than to go to Germany. Overall, I just find it so much easier to work here than I remember it being at home. I do miss the UK but really only for personal reasons - family, friends etc., not for work - for me the ideal situation would be to work in the US and go home to Britain for evenings and weekends!! So in the meantime I guess I'm staying put! [Abroad: Assistant Professor of Physiology and Biophysics in USA; age 43]

Apart from family reasons, my main reason for moving was to get away from lack of funding in UK, very much to get away from RAE and teaching exercises which I think are excessive, and to get away from inflexible university structures. Where I am in us there is much more flexibility, more open-ness, more opportunity. [Abroad: Professor of Anthropology in USA; age c. 45]

My experience may not be very typical, or relevant, since I came to the US in the mid-1970s and have remained here ever since, while maintaining very many connections with researchers and friends in the UK. [Abroad: Professor of Chemistry and Biochemistry in USA; age 60]

I think that increased availability of funding opportunities for UK researchers to collaborate with academics from outside UK would greatly enhance the UK's research profile. Right now it seems that the funding comes from elsewhere (i.e. US). [Abroad: Professor of German in USA; age 44]

There are positive reasons for working in the U.K. universities. However as an academic Veterinary Surgeon, I found that salaries were modest and the support for research insufficient. The UK is still a very attractive place to live. [Abroad: Professor of Veterinary Science in USA; age c. 44]

Circumstances beyond my control have made it difficult to leave this country although I would have liked to end my career back in the UK. Now I am past retirement age but in this country there is no mandatory retirement and so I will continue in my present position for another year or two. [Abroad: Professor of Physical Education, Recreation & Dance in USA; age c. 65]

I think it's important not to underestimate how much the current system of funding hurts UK institutions, both because those who are willing to consider positions elsewhere in the world often receive offers from them which include guaranteed funding, and because of the process by which it is necessary to reapply each year. This wasn't the only factor in my decision to study in the U.S. but it was very important. [Abroad: Postdoc in Philosophy in USA; age 38]

Understand that research is global. Frequent international visits are essential. Longer stays abroad are often very useful. [Returner: Professor of Business; age 59]

It is very useful for people to gain experience of different systems and widen their horizons - it makes them bolder and more willing to try new things. I would still regard this as an advantage for someone applying for a position here. [Returner: Professor of Biological Medicine; age c. 51]

UK is best place to live, wonderful people. University research is tough in my field Very little funding. RAE is total waste of time. QAA even worse. Academic freedom has been eroded considerably over last 25 years. [Returner: Professor of Psychology; age 53]

There are more schemes now providing funds for international mobility and this is a great incentive. [Returner: Professor of Biology; age ?]

The UK system has no real mechanism for encouraging people to leave the UK for training or to come back. This mechanism of neglect is benign in some respects, but may result in many people who leave the UK never coming back. [Returner: Professor of Ecology; age c. 44]

It is a lot more difficult to return to the UK that people anticipate, at least for those who have spent a significant time abroad (I was there for 15 years). [Returner: Senior Lecturer in Medicine from USA; age ?]

I think the UK system is much more open to some others in Europe, particularly Italy and Spain. This is important to enrich the academic system both in teaching and research. Because of historical and cultural reasons the UK is also a fantastic bridge between Europe and the US and that makes it very attractive for researchers. However, salaries are relatively low and that may be a problem in some cities. [Foreign: Economics lecturer from Spain; age 29]

I am born and educated in the USA but before coming to the UK I had already spent 7 years in Japan. Thus, much of the loss of contact with the USA had occurred before I arrived here in the UK. Overall, being in the UK has helped me to strengthen some ties with the US.

Although I say migration has had little effect on my lifestyle I think what I am saying is that it has had some great advantages and disadvantages and in the balance it is even. It certainly does little to promote a stable lifestyle. I would like to go back to the USA someday but honestly I think that is more wishful thinking and I would guess at the soonest would be 5 years away. [Foreign: Senior Lecturer in Psychology from USA; age 45]

There is a major difference in salary considerations. The UK will have difficulty in retaining top international researchers given current salary levels. Foreign: Professor of Political Science from USA; age 60]

Although mobility is essential in any researcher's career, there is little help (both financial and not) coming from institutions, also taking into account the fact that each move entails a certain degree of disruption in one's career. [Foreign: Postdoc of Genetics from Italy; age ?] In my MRC Unit of about 40 people about two third are from abroad. In research attracting the best is a key to success. The Government's policy (illegal under EU rules) of not paying the subsistence element to EU national PhD students grants results in a major loss of talent for developing the future of this country. [Foreign: Professor of Pharmacology from Hungary; age ?]

Just before I came to the UK I was in a department in the US where there were about 8 people. One had just come from the UK. Three of us that were there then moved to the UK. Most of these moves were for personal reasons. Being part of an international "community" provided the opportunity, but not the motive. [Foreign: Lecturer in Philosophy from USA; age c. 40]

It's a pity that there are less fundings for that: EU reduced them a lot. IT helped a lot to meet other researchers in EU and to improve research and be more competitive in respect to US. [Foreign: Lecturer in Finance from Italy; age ?]

Mobility is a great opportunity to open your mind and create interesting collaboration. The only problem exists when it is a one way move. The only general drawback is the difficulty to come back to Europe after a period in the USA, both the distance and time to come for interviews are a problem - united with the lack of funding to support such invitations for most researchers. Furthermore, there are not many positions available in Europe for researchers compared with the USA job market in this field. [Foreign: Postdoc in Genetics from Italy; age c. 38]

Annex D

The literature survey

Lesley Grayson

1. There is a substantial literature from the past four decades relating to the international mobility of researchers and other highly skilled personnel. Much interest has focused on the potential impact on less developed countries of the drain of talent to the developed world, although there is also a literature on the mobility of skilled people between the developed countries – within Europe, or from Europe to North America. There seems, however, to be relatively little literature that deals in any detail with the issue as it affects the UK. In this Annex some 30 publications on, or relevant to, the UK have been identified and summarised. The summaries at the end of this Annex run in time sequence. It should be emphasised that this collection of material does *not* represent the outcome of a comprehensive, fully systematic search of the literature, an exercise that would have been impractical given the timescale of the project. Its contribution is to summarise previous empirical evidence and the terms in which the question of international academic mobility has been addressed in the UK.

Nature of the literature

2. The publications vary greatly in terms of their

- Scope – the coverage varies from individual academic disciplines to all of science and technology, or to all disciplines; to researchers working in industrial as well as academic sectors; and to the broader picture of the mobility of highly skilled people.
- Methods – many studies are based on surveys, of opinion as much as behaviour (e.g. Royal Society, 1963; Pearson and Parsons, 1983; Schuster, 1994), and often without time series analysis. Only in the last decade have annual Higher Education Statistics Agency data on academics become available for secondary analysis (Mahroum, 1999a; Turton and Walder, 2003, Association of University Teachers, 2004). The inadequacy of mainstream statistical sources is a frequent theme in studies of highly skilled migration, and both the OECD (Dumont and Lemaître, 2004) and the World Bank (Docquier and Marfouk, 2004) are working to improve the quality and comparability of data in this area.
- Status – the documents, published over the last forty years, include academic research studies, the reports of government inquiries, and papers from interested parties in the scientific and higher education communities. They range from formally peer reviewed empirical evidence to lobbying documents.

Patterns of mobility

3. Mobility between Europe and the USA has been long studied, from the UK (Schuster, 1994), European (Mahroum, 1998, Hansen and Avveduto, 2003) and US (Regets, 1999; Stephan and Levin, 2001) viewpoints. More recently there have been studies of mobility within Europe (Ackers et al, 2003, Turton and Walder, 2003) and analysis of mobility between developing countries and the UK (Findlay, 2002). This work has covered a range of highly skilled scientific talent from postgraduate students to tenured academic staff and industrial researchers.

4. Given such a varied body of evidence, it is not possible – or wise – to draw from it definitive evidence on the trends and patterns of academic mobility to and from the UK. However, some tentative conclusions can be drawn –

- Academic mobility is not exceptional or undesirable. It is part of an overall increase in the international mobility of highly skilled professionals, especially since the 1990s. Consultation responses to the 1997 report of the National Committee of Inquiry into Higher Education, headed by Sir Ron Dearing, suggested that one in six UK academics had worked at a foreign university, and the probability of having done so increased with age and experience⁶. Academic scientists will naturally wish to gravitate to where leading edge science is conducted (Mahroum, 1999b; Casey et al, 2001; Roberts, 2002) and among high-flying young researchers, becoming part of an international ‘brain circulation’ may be considered an essential part of career development. Policy initiatives – for example in the European Union – have been designed to facilitate the process and the UK is an active participant; while it undoubtedly exports talent, it also imports it to a significant degree (OECD, 2002; Roberts, 2002).
- Initial studies of academic mobility (Royal Society, 1963; Committee on Manpower Resources for Science and Technology, 1967) focused on outward migration and failed to take account of counter-balancing inward migration, and later analyses which did so (Royal Society, 1987; Ringe, 1993) suggested that the ‘brain drain’ problem was less severe than at first thought. More recent studies argue that the UK is a net beneficiary of the international movement of highly skilled people (Findlay, 2002; OECD, 2002), even following revisions to the UK’s international migration flow statistics that had the effect of reducing net migration gains (Salt, 2003). However, the lack of fine detail in the data sources on which secondary analysis of this kind is based may mean that the generally positive picture masks net losses among some categories of highly skilled people. For example, the UK may be suffering net losses of elite scientists or the brightest post-docs. Equally, some institutions or disciplines may have a positive migration balance, and others a negative balance.

⁶ Casey, B (1997) *Report five: academic staff in higher education: their experiences and expectations* London: HMSO, 1997. para 5.11. Available at: <http://www.leeds.ac.uk/educol/ncihe/>
This report is not included among the summaries as little more detail is provided.

- The USA has long been the most popular emigrant destination for UK and other European scientists (Pearson and Parsons, 1983; Schuster, 1994; Mahroum, 1998; Hansen and Avveduto, 2003) although within the USA they are now dwarfed as a group by immigrants from China and India (Regets, 1999). The USA recognises that foreign-born and foreign-educated elite scientists make a disproportionate contribution to its science base, with the UK being the most frequent country of origin of elite foreign-born life scientists according to one study (Stephan and Levin, 2001). However, there is also evidence to suggest that continental Europe is becoming a more popular destination. This was noted by Ringe (1993) in his comparison of data for 1975-85 and 1984-92. The Association of University Teachers (2004) claims that the numbers of UK academics leaving for EU destinations rose by 76% between 1995-96 and 2001-02, with the EU as the main overseas destination in the latter year.
- The UK appears to be a significant importer of scientific and technological talent and is the main overseas destination within Europe for some disciplines (Casey et al, 2001). In higher education as a whole, some 9% of the workforce comes from Europe, compared with less than 2% in general employment (Turton and Walder, 2003). The AUT analysis (Association of University Teachers, 2004) shows that the EU was the main source of incoming academics in 1995-96 and 2001-02, and that between these years the numbers rose by 21%.
- Migration may be temporary or permanent. Stay rates vary by discipline, and there is some evidence to suggest that UK-born postgraduates, including recipients of US doctorates, have a higher stay rate in the USA than those from other European countries (Mahroum, 1998; Regets, 1999). A brief report on a bibliometric analysis of scientists awarded a doctoral degree in the UK in 1988 also suggests that those who choose, and stay in, a US destination may be of higher quality than those who remain in the UK or emigrate to other destinations. A possible counterbalancing trend to this loss of talent is provided by a very large expansion of overseas students in the UK. The numbers have trebled since the start of the 1980s, primarily because of EU exchange programmes, and many stay on (Findlay, 2002).

Motivations

5. There has been relatively little empirical analysis, but much speculation and assertion, on the reasons behind scientific mobility. In all migration decisions there are both push and pull factors, and for scientists the latter may be dominated by the attractions of working at the leading edge of their discipline, wherever that may be geographically located. Other, generally subsidiary, pull factors may include higher material rewards, the potential benefits to be gained from experiencing another culture, and possession of a common language.

6. Debate in the UK has tended to focus on push factors, and it has been persistently argued that emigration is driven by poor financial rewards, low status and recognition for academic researchers, and lack of opportunity caused by under investment in R&D (Pearson and Parsons, 1983; Schuster, 1994; Association of University Teachers, 2004; Save British Science, 2004). In some cases these claims are made not on the basis of actual emigration decisions but on 'propensities' to emigrate (Schuster, 1994), and should perhaps be considered within the context of the wider UK debate about academic salaries, employment conditions and investment in the science base (Roberts, 2002; Thewlis, 2003).

7. While motives for outward migration are dominated by career development, those for return migration seem largely personal. There is evidence from Europe that the majority of young researchers who emigrate do plan to return at some point, and stay rates for non-UK, European-born doctorate students are lower than those for their UK-born colleagues. However, loss of contact with their home institutions and broader scientific systems may lead some to be 'locked out', while those who do return may be subject to brain waste because they have fallen off the ladder of domestic career development (Casey et al, 2001; Ackers et al, 2003). Measures to ease the return of expatriate scientists are an important element of any policy to boost beneficial brain circulation (OECD, 2002) and while particularly important in those European countries with 'closed' academic systems, such as Italy (Ackers et al, 2003), may also need consideration in the UK.

8. Among established, elite scientists migration may be more likely to be permanent. Hansen and Avveduto's (2003) findings on EU-born members of the American Association for the Advancement of Science show that 70% were working outside their country of origin, over 80% in the USA. Only 13% planned to return home, including 60% of those with children.

Concepts and policies

9. Initial policy thinking in the 1950s and 1960s saw the 'brain drain' as a damaging phenomenon, as the pejorative nature of the term suggests. It was perceived as a threat to UK economic success. Later consideration of compensating inflows of skilled immigrants brought 'brain gain' into the vocabulary. The most recent formulation speaks of 'brain circulation' within a global scientific community. Encouraging young scientists and engineers to boost their skills and experience with work abroad is as important a policy objective as luring overseas talent to the UK. The latter strategy – if broadly defined to include more than just 'star' scientists – potentially has dual benefits: not only attracting scientists from overseas, but also creating the conditions in which fewer UK researchers feel the need to emigrate for good.

10. This thinking seems to be coalescing around the notion of ‘magnet’ disciplines and research institutions. Ringe (1993) associated increased immigration rates with the government’s policy of greater research selectivity and the focusing of investment on centres of excellence. Later, Mahroum (1998) emphasised the geographical clustering of European migrants to the USA in a few centres of excellence (in California, New York State and Massachusetts) but noted that ‘magnetism’ is not simply generated by good science. Additional factors such as flexible and open career structures, high rewards, a strong entrepreneurial culture and a good quality of life are also key elements in the reputation of a magnet (Mahroum, 1999b). Evidence from Italian immigrants to the UK confirms the importance of magnets, with their mix of scientific and ‘cultural’ attractions (Ackers et al, 2003).

11. The magnet concept confirms that domestic science and innovation policies are a vital element in fostering scientific immigration. However, the broad cultural element of magnetism indicates that factors other than these are significant, and possibly in a less positive way. Pearson and Morell’s (2002) study of knowledge migrants to the UK noted the standard of public services and high living, especially housing, costs as deterrent factors or sources of disquiet once in the country. The latter factor is also a significant obstacle to internal brain circulation, with 37.3% of UK higher education institutions citing cost of living as an adverse influence on recruitment and retention (Thewliss, 2003).

12. In addition to purely domestic policies, programmes to ease or assist immigration are also thought to be influential. Mahroum (1999b) argues that countries with special legislation to attract highly skilled migrants are the best placed to benefit from the global talent pool, with measures to ease the entry and boost the post-training employment and entrepreneurial opportunities of overseas students being particularly significant. Recent studies (McLaughlan and Salt, 2002; Pearson and Morrell, 2002) suggest that the UK is particularly well placed in this respect.

Impacts and implications

13. From this body of literature, some tentative conclusions on the impact of academic mobility on the UK can be drawn:

- In overall terms the UK seems to be a net beneficiary of ‘brain circulation’, with some highly rated ‘magnets’ that draw in overseas immigrants because of a combination of scientific excellence and broader, cultural attractions. Specialised immigration schemes, research policies designed to concentrate investment on disciplines and centres of excellence, and systems that provide markers of quality (such as the Research Assessment Exercise), are seen to be positive influences in this respect. However, a broader range of policies may need to be considered to address the wider dimensions of magnetic attraction such as the environment, housing costs and the state of the public infrastructure.

- The UK exports significant amounts of scientific talent, and this may be seen as a positive contribution to the beneficial process of brain circulation. However, there is some concern that too much of this talent is permanently lost (especially to the USA) because of a mix of factors that adversely affect recruitment and retention in higher education. This aspect of the 'brain drain' debate is closely entwined with the much broader debates over academic status, pay, terms and conditions, and the funding and management of the science base. The overseas brain drain may be employed by stakeholders in these debates as a useful headline issue to draw attention to circumstances that are more significant in a purely domestic sense, for example in leading to an internal brain drain (out of academia, or research altogether) or 'brain waste' (of talented young people who are ill-served by the science and technology education and research system).
- Particular concern focuses on the loss of elite scientists, both first class young postgraduates and 'star' researchers who, if they leave the UK, may be more likely to stay away. Individuals of this kind are essential to build up the reputation of UK 'magnets' which will, in turn, attract overseas talent. Policy initiatives to address problems of domestic academic recruitment and retention should help to replace a damaging overseas drain with a beneficial circulation. However, specific measures to ease the return of expatriate scientists, and ensure that they can capitalise on their new knowledge and skills, may also be needed. There seems to have been no analysis of whether the loss of UK-born elite scientists is matched by an influx of foreign-born replacements and, ultimately, the nationality of UK-domiciled elite scientists may be of little concern. What matters is to create a system that simultaneously provides a launch pad for talented scientists to enter the global brain circulation, a communications system to keep them in touch with base, and touch down facilities that welcome both domestic returnees and newcomers from other lands.

ANNEX: the literature summaries

The summaries are presented by author, in chronological order of publication. In some cases, related references are included for further information.

Royal Society (1963) *Emigration of scientists from the United Kingdom: report of a Committee appointed by the Council of the Royal Society* London: Royal Society. 32pp

This report was prompted by the Royal Society's concern at the loss of 'a number of outstanding scientists' in the previous five years including nine of its own fellows. The analysis covered the emigration of scientists qualified at PhD level or above for the period from May 1952 to 1962, in the following disciplines: anatomy; bacteriology; microbiology; biochemistry; biophysics; botany; chemistry; engineering (all types); genetics; geology and geophysics; mathematics; metallurgy; pharmacology; physics; physiology; and zoology.

Data source

Questionnaires to 563 professors or other heads of departments (96% response rate)

Some key findings

- The scale of permanent emigration of recent PhDs is estimated to be at least 140 a year (12% of the total output) and has increased by a factor of three over the study period. If temporary migration is included, the figure is estimated at least 260 (22% of the total).
- Of these individuals some 60 went to the USA, 20 to Canada, 35 to other Commonwealth countries and 25 to other countries.
- The annual rate of permanent emigration of university staff is estimated at some 60 a year (about 1% of the total) and has also increased by a factor of three over the study period.
- Of these individuals some 25 went to the USA, 25 to Commonwealth countries and 10 to other countries

The study did not cover counter-balancing scientific immigration, and was particularly concerned about the loss of talent to the USA and its implications for UK science. It notes that while there may be a compensating flow from Commonwealth countries, 'permanent immigration from the United States is negligible'.

Committee on Manpower Resources for Science and Technology (1967)

The brain drain: report of the Working Group on Migration London: HMSO, 124pp (Cmnd 3417)

This report (unseen) was one of a series of studies on scientific manpower conducted by the Committee which was established by the British Advisory Council on Science Policy in the 1950s and pioneered the collection of statistics on UK scientific and engineering manpower. The remit of the Working Group was 'to study the international migration of qualified engineers, technologists and scientists as it affects

the United Kingdom; to identify both the advantages and disadvantages; and to make recommendations’.

The Working Group used a range of its own statistical sources, concluding that there was a major brain drain of research and teaching talent, which was a serious threat to the country. The principal destination was the USA, with its higher levels of R&D expenditure, higher salaries, better career opportunities and ‘overall different attitudes’. The report also considered the benefits of the UK brain drain in respect of the assistance it provided to developing countries.

Over 20 recommendations were made, including the need for a high and sustained level of industrial investment and investment in R&D, specific financial incentives to keep talent in the country, and stronger links between higher education and industry.

Further reference

This report, as well as earlier analyses of scientific and technical manpower by the Committee, was later heavily criticised for statistical shortcomings. For example, in studies of the brain drain no distinction was made between temporary and permanent employment abroad, and compensating inflows of scientific talent were ignored. For a Canadian paper that examines the historical development of S&T manpower statistics in OECD countries, including the UK, see:

Godin, B (2002?) *Highly qualified personnel: should we really believe in shortages?* Institut Nationale de la Recherche Scientifique, Centre Urbanisation, Culture et Soci  t  : Montreal and Quebec, 33pp (Project on the History and Sociology of S&T Statistics Working Paper 15)

<http://www.inrs-ucs.quebec.ca/inc/CV/godin/shortages.pdf>

Pearson, R and Parsons, D (1983) *The biotechnology brain drain: a report prepared for the Biotechnology Directorate of the Science and Engineering Research Council by the Institute of Manpower Studies* Swindon: the Directorate, 46pp

This analysis was carried out in the context of considerable anecdotal concern within the biotechnology field about the loss of UK talent abroad, and the part played in this by the alleged lack of government support for R&D in this sector. Part of its purpose was to test the desirability and feasibility of a register of UK biotechnologists working overseas to act as an aid to their future return.

Data sources

Detailed interviews with 54 companies, higher education institutions and other research organisations

Written evidence submitted by 20 organisations

Questionnaires submitted to 133 biotechnology emigrants (68% response rate)

Some key findings

- A total of 141 UK nationals working abroad were identified, 46% in the USA, 16% in Switzerland and the rest spread across another 11 countries. A 'very rough estimate' is given of a brain drain of 250 biotechnologists since the mid-1970s (15% of the total number employed in the UK) although this includes postdoctoral researchers on short term contracts.
 - The main losers from the brain drain were higher education institutions (42%) and the main gainers were businesses (53%).
 - Virtually all the 91 emigrants surveyed by questionnaire were qualified at PhD level or above and nearly a third were in 'senior' jobs (departmental head or above).
 - The main motivation for emigration was the non-availability of 'suitable' opportunities in the UK, although the attraction of new opportunities abroad was also an important factor.
 - The majority of emigrants did not expect to return to the UK, the main barriers being the perceived lack of suitable opportunities and attendant loss of income.
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Royal Society (1987) *The migration of scientists and engineers to and from the UK: a study by the Science and Engineering Policy Studies Unit of the Royal Society and the Fellowship of Engineering* London: Royal Society, 75pp

This study focused on migration in biochemistry, chemistry, earth sciences, electrical engineering and physics, covering both emigration and immigration for the period 1975-85. Unlike the survey of more than 20 years earlier, it also covered inflows of scientists and engineers to the UK. It concluded that the brain drain was a relatively small scale phenomenon, but one that was a legitimate cause of policy concern.

Data source

Questionnaire survey of universities, research institutes and industry

Some key findings

- From the university sector 740 UK emigrants between 1975 and 1985 were identified, and 556 immigrants (including 140 who were British nationals).
- The emigration rate for postdoctoral research assistants and more senior researchers averaged about 2% of the total population annually. The figure for established university staff was much lower (0.5%) and for recent PhD graduates much higher (9%, later revised upwards to 13.5%).
- The immigration rate to university research groups (excluding those studying for a higher degree) was some 2.9% of the total UK population per year. At more senior levels immigration to university departments was 0.4% or less.
- Emigrants tended to move to long term appointments (three or more years), while immigrants tended to move to shorter term appointments (under three years).
- The motives for emigration from the UK were dominated by professional factors such as enhanced career opportunities, better pay and access to better

equipment and facilities. Non-Britons coming into the UK moved for the same reasons.

- The motives for return to the UK were dominated by personal or family factors.
 - Both emigrants and immigrants were assessed to be of ‘relatively high quality’.
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Ringe, M (1993) *Migration of scientists and engineers 1984-1992* London: Royal Society, and Royal Academy of Engineering, xii, 75pp (SEPSU Policy Study 8)

This study was closely modelled on the analysis of 1975-85 data published by the Royal Society in 1987, and covered the same subject areas of biochemistry, chemistry, earth sciences, electrical engineering and physics. However, it was confined solely to universities on the grounds that the industrial representatives interviewed for the previous study expressed little concern about the brain drain. It found a slight rise in immigration compared with 1975-85, but no change in emigration. Overall, it concludes that ‘there has not, in numerical terms, been a major exodus (or brain drain) from UK universities to other countries’, although it notes continuing worries in the scientific community that UK academia is a less attractive place to work than the private sector or overseas universities.

Data sources

Questionnaire survey of 218 heads of department and 325 research group leaders (response rate just under 70%)

Universities Statistical Record data

Interviews with ‘a range’ of academics and other relevant staff

Some key findings

- The questionnaire responses named 447 scientists and engineers who had left the UK between 1984 and 1992, of whom 228 were ‘experienced’ and 219 newly qualified PhDs.
 - Over the same period 462 scientists and engineers entered from abroad, of whom 318 were foreign-born and 144 UK returnees.
 - The average emigration rate was 2.1% for postdoctoral research assistants and more senior researchers, 13.5% for new PhDs, and 0.3% for senior staff. These figures were not statistically different from those in 1975-85.
 - The average immigration rate to university research groups was 4% (compared with 2.9% in 1975-85) and to university departments 0.5% (virtually identical to the 1975-85 figure). The UK government’s research selectivity policy and the greater concentration of funding on centres of excellence are thought to be partly instrumental in boosting scientific immigration.
 - European countries had increased in popularity as destinations for UK emigrants since the 1975-85 survey.
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Schuster, J (1994) Emigration, internationalization and 'brain drain': propensities among British academics *Higher Education* 28(4) pp437-52

Schuster re-analysed unpublished data from the 1989 Survey Among Academic Staff, which was directed by Professor A H Halsey of Nuffield College, Oxford. This was the third in a series of surveys and, for the first time, included a question on whether respondents had seriously considered applying for, or accepting, a permanent post abroad. It also asked which country or countries they had considered. Schuster recognises that the survey may have been used as 'a no-risk opportunity to "send a message" [to policy makers] under cover of anonymity', and that serious consideration of a post abroad does not amount to actual emigration. Nonetheless, his analysis, together with Halsey's broader findings, indicated widespread discontent in UK academia at this time over issues such as low salaries and declining status within society.

Data source

Questionnaire survey of 7,665 university and polytechnic staff (54.2% response rate)

Some key findings

- 40% of university and 28.7% of polytechnic staff had seriously considered a permanent move abroad. For Oxbridge academics the figure was 46.7%.
- The USA was by far the most popular destination, selected by 69.9% of university staff (including 86.4% of those from Oxbridge) and 49.6% of polytechnic staff. Australia/New Zealand was less popular with the university group (41.6%) than the polytechnics (51.2%), while Canada and Europe each appeared on about 25% of responses. 'Other' regions (including Asia, Indian sub-continent, Africa, Middle East, South America) were chosen by only 14.4% of university staff, but 32.1% of polytechnic staff.
- Roughly twice as many staff whose prime self-reported interest was research were emigration-prone as those whose primary interest was teaching.
- The proportion of academics (universities and polytechnics combined) considering emigration did not vary greatly between broad disciplinary groups. Social studies (40.9%) was followed by humanities (39.7%), biosciences (38.4%), physical and mathematical sciences (35.7%), creative arts (36.6%), health services (30.2%) and 'other professional' (30.2%).
- Interest in emigration was more pronounced at more senior tenured staff levels. For example, 50.2% of university professors had seriously considered a permanent post abroad, as against 36.5% of lecturers.
- Interest in emigration was also high among the lowest ranked, least well established 'researchers' in universities (46.7%), a finding that Schuster (a visiting American) describes as 'curious'

Further reference

For Halsey's analysis of the full 1989 Survey Among Academic Staff, see:

Halsey, A H (1992) *Decline of donnish dominion: the British academic professions in the twentieth century*. Oxford: Clarendon Press, 344pp

Mahroum, S (1998) Europe and the challenge of the brain drain *IPTS Report (29)*
6pp

<http://www.jrc.es/home/report/english/articles/vol29/SAT1E296.htm>

Mahroum considers the emigration of highly skilled individuals from Europe, particularly to the USA. He emphasises the magnetic attractions of the latter which not only encourage talented Europeans to study in the USA but ensure that many of them stay there. Rather than a mutually beneficial brain exchange between the two continents, there is a danger of a one-way brain drain. Mahroum has used the concept of magnetic attraction to study the pulling power of the UK for overseas scientists and engineers (see Mahroum, 1999).

Data sources

None; a general review article.

Some key findings

- The UK and Ireland dominate highly skilled emigration from the EU to the USA.
- A very high proportion (81%) of emigrants are in executive and managerial occupations, often entering the USA as temporary intra-corporate transfers that later become permanent. Engineering, science and medicine together account for the remaining 19% (source of data not given).
- About 50% of Europeans completing a PhD in the USA stay on, many of them permanently. In contrast, only about 8% of Japanese recipients of US doctorates remain.
- UK-born graduates have the highest stay rate of EU citizens. Only some 30% of UK PhD graduates return home compared with 70% of Germans.
- There are variations by discipline: 73% of UK engineering PhD graduates stay, compared with 65% in the life sciences and 60% in the physical sciences.
- Highly skilled European migrants to the USA are heavily concentrated in a few centres of excellence, notably in California, New York State and Massachusetts.
- It is the presence of many more such centres of excellence that is the key difference between the USA and Europe. Although European research units may perform better research in some areas, 'they lack the magnet power that can transform them into pivotal points in their fields'. This power encompasses not just scientific excellence but flexible and open career structures, a strong entrepreneurial culture, high living standards and a good quality of life.

Further reference

Regular analyses of the stay rates of foreign born recipients of US doctorates in science and engineering have been carried out by the Oak Ridge Institute for Science and Education. For the latest analysis, which appears to show a declining stay rate for UK-born PhDs, see:

Finn, M (2003) *Stay rates of foreign doctorate recipients from US universities, 2001*
Oak Ridge, TN: Oak Ridge Institute for Science and Education, 17pp

<http://www.ornl.gov/orise/pubs.htm>

Mahroum, S (1999a) Global magnets: science and technology disciplines and departments in the United Kingdom *Minerva* 37(4) pp379-90

Mahroum examines the geographical flows of overseas scientists into the UK, focusing on 'magnet disciplines' (those which have attracted 10% or more of total overseas recruits) and the five 'magnet institutions' (leading recruiters) in each discipline. The disciplines covered are clinical medicine; biosciences; chemistry; electrical and electronic engineering; physics; nursing and paramedical; IT and systems sciences; mechanical and aero engineering; and mathematics. The analysis provides insights into the factors which attract foreign scientists to particular institutions in the UK (and, conversely, may encourage indigenous scientists to stay).

Data source

Higher Education Statistics Agency data on turnover of foreign staff, 1994-97

Some key findings

- UK higher education institutions had a turnover of 11,314 foreign staff between 1994 and 1997.
- Reputation is a key factor in attracting overseas scientists, and in the UK this is signalled by Research Assessment Exercise scores of 5 or 5*.
- For the most successful institutions 'mobility and excellence are reciprocally constitutive'. Highly talented scientists flow to sites which have a reputation for excellence and, in turn, reinforce that reputation.
- Location is a secondary, but still important, aspect of magnet status. The attractions of an institution's scientific reputation are reinforced by those of working and living in a 'world city' with its attendant social, cultural and other benefits (Oxford and Cambridge count as 'world cities' in scientific terms).
- In some cases (for example, Dundee in the biosciences) scientific attractions may be sufficient to overcome the apparent lack of 'world city' status.

Further references

For another version of this paper, and for a more general paper on scientific mobility and the formation of magnets, or 'gravity centres', see:

Mahroum, S (1999) Patterns of academic inflow into the higher education system of the United Kingdom *Higher Education in Europe* 24(1) pp119-29

Mahroum, S (2000) Scientific mobility: an agent of scientific expansion and institutional empowerment *Science Communication* 21(4) pp367-78

Mahroum, S (1999b) *Highly skilled globetrotters: the international migration of human capital* Paris: OECD, 18pp (DSTI/STP/TIP(99)2/FINAL)
<http://www.oecd.org/dataoecd/35/6/2100652.pdf>

Mahroum draws on earlier studies and his own empirical investigations to identify influences on the mobility of the highly skilled. He emphasises the significant variation in push/pull factors and migration channels for different categories of highly skilled worker, and the need to tailor policy interventions to address the very different 'organisational and cognitive structures' of:

- 'accidental tourists' (managers and executives)
- 'economy class passengers' (engineers and technicians)
- 'pilgrims' (academics and scientists)
- 'explorers' (entrepreneurs)
- 'passengers' (students)

Some key findings

In respect of academics and scientists:

- International mobility is a normal and expected part of professional life.
- Bottom-up developments in science are the most influential push factor in mobility: scientists will naturally wish to gravitate towards places where leading edge work is being conducted.
- For scientists working in industry, a reputation for scientific 'openness' (freedom to publish) in the employing organisation is an important pull factor.
- For those working in academia the most important pull factors are the attraction of a country in a particular discipline, and the prestige of an individual institution. The presence of 'star' scientists such as Nobel laureates within an institution is a key marker of reputation.
- Scientists tend to more or less consciously seek out colleagues of like mind and status: 'a top scientist from Harvard will go only to another top organisation abroad that is operating in the same field'.
- Despite the significant differences between academics and other types of highly skilled migrants, immigration policies remain the most significant policy intervention. Countries that introduce special legislation to attract highly skilled migrants are the best placed to benefit from the growing global pool of talent.
- Higher education is the 'major backdoor for international mobility'. The easing of immigration rules on overseas students (and their families), and the provision of good 'after-training' opportunities (for example, venture capital and a business-friendly climate) are among the effective methods of ensuring that the host country continues to benefit from their skills.

Further reference

For a journal version of this paper, see:

Mahroum, S (2000) *Highly skilled globetrotters: mapping the international migration of human capital* *R&D Management* 30(1) pp23-32

Regets, M (1999) *Foreign science & technology personnel in the United States: an overview of available data and basic characteristics* Paris: OECD, 10pp
(DSTI/STP/TIP(99)2/FINAL)
<http://www.oecd.org/dataoecd/35/58/2102002.pdf>

This National Science Foundation paper outlines US statistical sources on foreign-born or non-citizen scientists and engineers, and presents data for the mid-1990s. A little data relating specifically to the UK is provided, and this paper is a useful short guide to US statistical sources that can provide information on UK scientific emigration. Public use versions of the NSF's SESTAT data, which provide some insight into the foreign-born science and engineering workforce, are available via <http://srsstats.sbe.nsf.gov> together with relevant workforce chapters from *Science and engineering indicators 2002* and *2004*.

Data sources

Immigration and Naturalization Service Admissions
NSF Survey of Earned Doctorates
NSF Survey of Graduate Students and Postdocs
NSF SESTAT Workforce Data

Some key findings

- In 1993 more than a quarter (135,000) of the US resident population of science and engineering PhDs were foreign-born, including some 10,000 from the UK. This is a significantly higher figure than for any other European country, but dwarfed by China and India which each provide some 21,000.
- Of foreign-born recipients of US doctorates in 1990-91, 142 were from the UK. While this is a modest number and lower than for the two other European countries cited – Greece with 240 and Germany with 177 – the stay rate of Britons in the USA is higher: 59% of this group were still working in the USA in 1995 compared with 35% of Germans and 41% of Greeks.
- Later data from *Science and engineering indicators 2004* show that in 1999 the UK contributed 5% of US foreign-born residents with the highest science and engineering degrees. It is on a par with Germany, Canada, Taiwan and the Philippines, but significantly less important than India (14%) or China (10%). In an analysis of foreign-born residents with S&E doctorates, the UK comes third with 7% after India (16%) and China (20%).

Further references

For related papers from Regets, see:

Johnson, J and Regets, M (1998) *International mobility of scientists and engineers to the United States: brain drain or brain circulation?* Washington, DC: National Science Foundation, 4pp (Issue Brief 98-316)
<http://www.nsf.gov/sbe/srs/issuebrf/sib98316.pdf>
Regets, M (2001) *Research and policy issues in high-skilled international migration: a perspective with data from the United States* Paris: OECD, 23pp
<http://www.oecd.org/dataoecd/34/26/2097008.pdf>

Pierson, A S and Cotgreave, P (2000) Citation figures suggest that the UK brain drain is a serious problem *Nature* 7 Sep 407(6800) p13

This brief report, in the form of a letter, presents the results from a bibliometric study of a stratified sample of 770 people awarded a doctoral degree in a science subject from a UK university in 1988. It was carried out for the pressure group Save British Science, recently renamed the Campaign for Science and Engineering in the UK. Although the findings are 'not, of course, proof of a brain drain', the letter claims that many of the 'rising stars of British science' emigrate to the USA and that more thorough analysis is needed.

Data sources

Not stated, but assumed to be citation data from Institute for Scientific Information.

Some key findings

- 252 were identified as still publishing scientific papers in 1999 or 2000. Of these, 157 had a UK address, 43 had a US address and 52 were elsewhere in the world.
- The UK-domiciled researchers had published an average of 2.4 articles during 1985-89; the US-domiciled an average of 2.07 during the same period (when they were still in the UK). This difference is not felt to be statistically significant. Those domiciled elsewhere had published an average of 1.15 papers.
- Papers published by the US-domiciled researchers in 1985-89 subsequently gleaned significantly more citations than those who had remained in the UK or gone to other locations.

Further reference

This small scale analysis seems to have been partly instrumental in encouraging further study of the potential of bibliometrics as a fine-grained tool for exploring the brain drain of elite scientists. For a study that summarises the strengths and weaknesses of attempts at studying the issue, and claims to be the first systematic attempt to use bibliometric methods and confirm their value in this area, see:

Laudel, G (2003) Studying the brain drain: can bibliometric methods help?
Scientometrics 57(2) pp215-37

Casey, T; Mahroum, S; Ducatel, K and Barré, R (eds) (2001) *The mobility of academic researchers: academic careers and recruitment in ICT and biotechnology* Seville: Joint Research Centre, Institute for Prospective Technological Studies, 62pp (EUR 19905)

<http://www.jrc.es/home/publications/publication.cfm?pub=728>

This study was commissioned by the European Parliament's Committee on Industry, External Trade, Research and Energy, and aims 'to identify features of emerging best practice to encourage a free and even circulation of scientific talent around the European Union and beyond'. Specifically, it focuses on the factors that condition the return of young researchers in ICT and biotechnology after a period spent abroad.

The final report is a synthesis of experience in which individual variations between countries are used to illustrate points.

Data source

Structured interviews with a research director and two returning researchers in each of 24 universities, university research institutes or national research centres. These were evenly divided between ICT and biotechnology, and located in Austria, Belgium, Finland, France, Germany, Greece, Italy, Ireland, Spain and the UK. A total of 80 researchers were interviewed.

Some key findings

- A period spent abroad is increasingly seen as an expected part of a successful researcher's career development, and access to funding for this purpose is not a significant constraint on outward mobility.
- The bulk of the researchers interviewed had spent time in the USA, but the main overseas destination within Europe is the UK. Key attractors are scientific excellence, early research autonomy and the openness of research institutions.
- The majority of researchers wish to return home, but there can be significant difficulties unless a secure pathway is planned. A large part of the brain drain may result from institutional rigidities, the loss of local contacts, and other factors that lead to researchers becoming 'locked out' of their home countries or 'locked in' to their overseas hosts.
- Those researchers who do return may be subject to 'brain waste' within their own countries because of the same mix of factors. Financial support for return is not enough if returnees are prevented from establishing autonomous research programmes or otherwise capitalising on their overseas experience.
- Promoting balanced flows of scientific personnel into, out of and within Europe depend on 'attractive institutions rather than attracting individuals'. Mobility schemes that are oriented only towards individual researchers or research projects may exacerbate the problems of brain drain and brain waste.

Stephan, P and Levin, S (2001) Exceptional contributions to US science by the foreign-born and foreign-educated *Population Research and Policy Review* 20(1/2) pp59-79

This paper is claimed to be one of the few analyses of the international mobility of elite scientists. It emphasises the heavy inflow of overseas scientists to the USA, especially since the 1970s, and notes that in 1990 25% of postdoctoral scientific researchers in the country were born abroad. The aim of the analysis is to explore whether these scientists make a disproportionate contribution to US science, comparing data for 1980 and 1990. It concludes that foreign-born and educated scientists are making exceptional contributions to US science and that 'the United States has benefited from the educational investment made by other countries, presumably to their detriment'.

Data sources

Individuals elected to the National Academy of Sciences and/or National Academy of Engineering

ISI data on authors of 'citation classics'

ISI data on authors of 'hot papers'

ISI data on the 250 most cited authors

Authors of highly cited patents

Scientists who have played a key role in launching biotechnology companies

Some key findings

- Birth and educational origins for 89.3% of the more than 4,500 individuals in the study group were identified.
- 23.8% of those who had been elected to the National Academy of Sciences (1990 data) were foreign-born, and 11.5% had received doctorates or medical degrees abroad.
- 19.2% of those who had been elected to the National Academy of Engineering (1990 data) were foreign-born, and 10.7% had received their baccalaureates abroad.
- For physical scientists, those born abroad were disproportionately represented on all the other indicators in both 1980 and 1990.
- For life scientists, those born abroad were disproportionately represented on all the other indicators in both years except in the case of 'hot papers' where the proportion was the same as in the underlying population.
- The most frequent country of origin of elite foreign-born scientists in the life sciences was the United Kingdom, followed by Germany. The reverse was true in the case of the physical sciences.

Further reference

For another study that throws some light on why the USA is so successful in attracting and retaining foreign-born life scientists, see:

Cheney, C C and Diaz-Briquets, S (2003) Foreign scientists at the National Institutes of Health: ramifications of US immigration and labor policies *International Migration Review* 37(2) pp421-43

Findlay, A (2002) *From brain exchange to brain gain: policy implications for the UK of recent trends in skilled migration from developing countries* Geneva: International Labour Office, International Migration Branch, 54pp

<http://www.ilo.org/public/english/protection/migrant/download/imp/imp43.pdf>

Professor Findlay's report is part of a series conducted by the ILO's International Migration Branch in response to a commission from the Department for International Development, and in the light of concern about the implications for developing countries of increasing skilled emigration to the UK. The study covers 'professional and managerial' occupations and students, documenting trends in migration for these broad categories during the 1990s. It also evaluates secondary sources of data on

migration to the UK, and looks at ways in which the information base could be improved.

Data sources

International Passenger Survey

Labour Force Survey

Work Permit Statistics

Asylum and Settlement Statistics

Some key findings

- During the 1990s the UK moved from a position in which the flows of skilled migrants into and out of the country were almost in balance to a position of significant net gains each year. The overall net gain in 1995-98 was 136,700, compared with 60,600 in 1991-94.
- The growth in skilled immigration has increased following changes to the Work Permit system in September 2000.
- Data on the return of skilled migrants to their countries of origin are relatively sparse, but indicate that levels of return migration in the 1990s were both low and falling. Between 1995 and 1998 it is estimated that only one skilled New Commonwealth migrant left the UK for every four that arrived.
- The number of foreign students studying in the UK has trebled since the beginning of the 1980s, primarily because of EU student exchange programmes. Policy changes in 1999 have led to an increase in Britain's global share of non-EU foreign students, and have also created conditions in which more are likely to remain after completion of their studies.
- The number of potential skilled migrants into the UK is expected to continue to rise as enrolment in tertiary education increases in developing countries. In sectors such as IT this may have significant benefits for donor countries, but there may be cause for concern about the implications for these countries in health care (medical students, doctors, nurses) and education (teachers).

McLaughlan, G and Salt, J (2002) *Migration policies towards highly skilled foreign workers: report to the Home Office* London: Migration Research Unit, Geography Department, University College London, 155pp

http://www.geog.ucl.ac.uk/mru/docs/highly_skilled.pdf

This report looks in considerable detail at recently developed schemes to facilitate the entry of migrants at the higher end of the skill spectrum, and to enable foreign-born students switch into employment. The data gathering exercise included visits to selected countries, and interviews with overseas representatives in the UK, to acquire more detailed information. The countries covered are Australia, Canada, Denmark, France, Germany, Ireland, the Netherlands, Norway, the UK and the USA.

Some key findings

Mechanisms and policies used to attract foreign skilled labour can be classified into five main groups:

- Comprehensive schemes (e.g. the German ‘Green Card’ and the USA H 1B visa) which are specifically aimed at attracting highly skilled migrants.
- Minor changes to existing work permit systems to enable quicker access for the highly skilled to the labour market, for example fast-track visas for IT specialists in the Netherlands. Such schemes are specifically targeted at sectoral labour shortages.
- Exemptions from, or relaxation of, work permit regulations, for example the Irish scheme to exempt intra-company transfers from such regulations.
- Tax incentives to reduce the tax burden for highly skilled and high earning foreign workers. This approach is common, and long-standing, in the Nordic countries.
- Policies to encourage the return migration of highly skilled workers, notably in Ireland.

Among the general findings:

- In terms of the range of specific schemes to attract the highly skilled, the UK ‘moved faster and further’ than most countries, and Work Permits UK provides a faster response rate than anywhere else.
- There is a ‘strong sense’ that such schemes are employer-driven, and that the scale of skills shortages has sometimes been over-estimated.
- Measures to help foreign students transfer to the labour market are not yet widespread, but several countries are in the process of examining possibilities. Where schemes do exist, they tend to be sector-specific.
- Only in the USA, Germany and Australia have there been systematic attempts to collect the necessary data for full scale evaluation of schemes. Evaluation frameworks are still at the development stage in many countries.

Organisation for Economic Cooperation and Development (2002) *International mobility of the highly skilled* Paris: OECD, 352pp
<http://www.oecd.org/dataoecd/9/20/1950028.pdf> (summary)

The OECD seminar on the International Mobility of Highly Skilled Workers: from Statistical Analysis to Policy Formulation, held in Paris in 2001, examined evidence on the magnitude and drivers behind the increase in the international migration of highly skilled labour during the 1990s. It includes a chapter (pp327-39) by N Rollason on ‘International mobility of highly skilled workers: the UK perspective’, which focuses on migration policy developments.

Some key points

- Flows of highly skilled labour increased substantially during the 1990s, and remain dominated by movements from developing to developed countries.
- There is growing intra-regional migration of highly skilled people in Europe, the Americas and Asia, partly driven by the growth in intra-company transfers between multinationals. The UK is among the more important sources of skilled migrants to the USA, and these include postdoctoral students and researchers.

- A significant element of intra-regional migration is temporary, suggesting ‘brain circulation’ rather than brain drain. While the UK is exporting high level skills, it is also importing them to a significant degree.
- Policy responses to brain circulation require coordinated action on migration and on science and innovation. The former includes initiatives to target particular types of highly skilled migrant, for example by introducing fast track procedures for work permits, or easing the entry of foreign students to the labour market at the end of their courses.
- Science and innovation policies conducive to attracting highly skilled migrants from abroad also help prevent permanent skilled losses, thus promoting beneficial brain circulation. They include developing research centres of excellence, ensuring a business climate that is innovation-friendly, and introducing measures to encourage expatriate highly skilled workers to remain in contact with their home countries, and ease their return.

Further references

For further data and analysis of highly skilled migration from OECD sources, see:

Salt, J (1997) *International movements of the highly skilled* Paris: OECD, 44pp
<http://www.oecd.org/dataoecd/24/32/2383909.pdf>

OECD (2003) *OECD science, technology and industry outlook 2002* Paris: OECD
 (Ch. 8, pp229-46)

OECD (2003) *OECD science, technology and industry scoreboard 2003* Paris: OECD
 (pp50-61)

OECD (2005) *OECD science, technology and industry outlook 2004* Paris: OECD
 (Ch. 5, pp144-66)

Pearson, R and Morrell, J (2002) *Knowledge migrants: the motivation and experience of professionals in the UK on work permits: final report* London: Department of Trade and Industry, 69pp (URN 02/1291)
<http://www.dti.gov.uk/migrantworkers/km1.pdf>

This study focuses on four professional groups: information technology, electronics and communications; financial services; hospital consultants; and biotechnologists. Some individuals from some of these groups may be working in academic research environments, and the general findings on the motivations of highly skilled migrants may also apply to those with a research destination. Although motivations and intentions vary by occupation, source country and individual circumstances, there are some common factors that apply to all or most knowledge migrants.

Data sources

Review of available statistical data, literature and policy development

Survey of over 300 migrants entering the UK from outside the European Economic Area on a work permit in 2000-01

Some key findings

- Knowledge migrants tend to have settled and relatively prosperous lives in their source countries. Although some faced barriers to advancement at home, for the majority of those surveyed 'pull' factors were more important than 'push' factors in the decision to migrate.
- Career advancement through access to global centres of excellence is the prime motivation for migration, and is shared by all knowledge migrants.
- Many also attach value to the personal development resulting from travel and exposure to a different culture.
- Improved earnings and economic advancement are important to some migrants from developing countries, but are not a dominant motivation for knowledge migrants as a whole. Migrants are readily prepared to sacrifice the chance of higher earnings in order to take advantage of a more interesting challenge, or to be 'at the centre of things'.
- Just over 40% of the surveyed sample had only considered the UK as a destination, the driving factors being familiarity with the language and/or a work opportunity having been made available. In cases where migrants had considered alternative destinations, the UK sometimes gained an edge on cultural grounds including its 'style of working'.
- Factors that may deter migration to the UK include the climate, distance from family and friends, standard of public services and difficulty of getting work permits. These responses were given by migrants already working in the UK, suggesting that none are of overriding importance. Few seemed to have major problems with work permits, and the most serious problems faced after entry to the UK involved high living, especially housing, costs.
- A relatively high proportion of the sample were planning to stay on, either by extending their work permits (30%) or applying for settlement (14%). Of the latter group who were concentrated in the health sector, 57% intended to apply for British citizenship.

Roberts, G (2002) *SET for success: the supply of people with science, technology, engineering and mathematics skills* London: HM Treasury, 2002. 218pp
http://www.hm-treasury.gov.uk/Documents/Enterprise_and_Productivity/Research_and_Enterprise/ent_res_roberts.cfm

The review led by Sir Gareth Roberts examined the supply of science, engineering and technology (SET) skills across the public and private sectors following an extensive consultation exercise. In respect of academia it found 'widespread concern that HEIs are increasingly finding it difficult to recruit and retain their top academic researchers, with universities in other countries and businesses both in the UK and

abroad offering better pay and conditions'. However, this problem is not evenly spread across disciplines.

Some key findings

- Existing evidence in support of an external brain drain associated with recruitment/retention difficulties is often at the 'micro level'.
- Although there is some evidence to support the view that increasing numbers of top scientists and engineers are leaving the UK compared with earlier decades, this is not surprising given the general increase in labour mobility. First destination data from the Higher Education Statistics Agency also show that SET graduates are more likely to move abroad for employment than those in other disciplines, but this is consistent with the international recruitment practices of R&D employers.
- Data from the International Passenger Survey suggest that the inflow of scientists and engineers to the UK from abroad more than matches the outflow of UK personnel. The country may, as a result, be enjoying a brain gain rather than suffering a brain drain.
- Data from the Higher Education Statistics Agency also show that the UK attracts larger numbers of overseas students in science and engineering (undergraduate and postgraduate) than in any other subject. The Review notes that the OECD considers countries receiving large numbers of such students to be best placed to exploit their talents in the workplace.
- Overall, there is insufficient evidence to support the existence of a damaging brain drain from the UK.

Despite the Review's conclusion on the overseas brain drain, it remained concerned about an internal brain drain and 'brain waste'. It argued that both higher education and businesses 'must do more to recruit and retain the UK's best scientists and engineers', for example through improvements in academic pay and conditions, PhD stipends, career development and other measures. In addition, it included many recommendations to improve the quality of science and mathematics teaching and encourage more school leavers to opt for science, engineering and technology subjects at university level.

Ackers, H L et al (2003?) *Mobility and excellence in labour markets: the question of balanced growth (MOBEX)* Leeds: University of Leeds, 11pp
<http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/index.aspx> (report can be accessed by searching on Mobex)

The MOBEX project is funded by the Economic and Social Research Council's Science in Society programme and this 'end of award' report presents 'indicative' findings from a twelve-month empirical pilot study that focused on the flows of scientists between Italy and the UK. As such, it throws light on the reasons why the UK may be an attractive destination for overseas scientists.

Data sources

Policy and legal analysis

Email questionnaires

Eight qualitative interviews with 'key informants'

52 qualitative interviews with Italian scientists in the UK, and returnees

Some key findings

- Inward migration of scientific talent is important to receiving countries both in the context of skills shortages, and as a mechanism for fostering an 'international culture' in which science thrives and knowledge is transferred.
- The UK is looked upon very positively by Italian scientists because of its association with scientific excellence and the perception of an open, transparent and meritocratic science labour market. The contrasting perception of the Italian scientific labour market as relatively closed is a key factor in encouraging migration to the UK.
- Higher and more diverse levels of funding in UK R&D, better salaries and a more established post-doctoral system are further attractions (although many respondents expressed frustration at the difficulty of securing permanent academic appointments).
- The UK is not necessarily perceived as a stepping-stone to the USA. A significant proportion of Italian scientists prefer the UK for cultural reasons.
- Return moves to Italy are 'very limited' because of the relatively closed nature of the scientific labour market and the difficulties associated with re-integration. (This suggests that the UK may derive long term benefit from at least some individuals in this particular group of scientific immigrants)
- UK and EU policy in support of the development of scientific clusters or centres of excellence is both encouraging scientists to move, and generating magnets for the most talented. The UK's 'golden triangle' is, for example, highly regarded by Italian scientists.
- The pilot project emphasises the complex nature of scientific mobility as highly dependent on political, legal and economic contexts.

A follow-up project – MOBEX 2 – on 'The impact of enlargement on scientific labour markets' began in October 2004 and will focus on flows of scientists from Poland and Bulgaria to the UK and Germany. Details are available at <http://www.sci-soc.net/SciSoc/Projects/Economics/The+Impact+of+enlargement+on+scientific+labor+markets.htm>

Hansen, W and Avveduto, S (2003) *Executive summary and conclusions* Brussels: European Commission, 23pp

http://europa.eu.int/comm/research/era/pdf/indicators/merit_exsum.pdf

This paper summarises the findings of a feasibility study for the European Commission, led by the Dutch-based research centre, MERIT. The study was entitled 'Brain drain study: emigration flows for qualified scientists' but was never published in full. The research was prompted by the difficulties of identifying good quality data on the international mobility of scientists and engineers, and looks at the current

mobility situation and at the challenges of developing more effective methods of measurement. The coverage extends to EU candidate countries, and includes analysis of European flows to the USA, Canada, Australia and New Zealand.

Data sources

Existing national data sets

Results of pilots of three surveys to consider the 'push' and 'pull' factors affecting mobility: a questionnaire survey of foreign researchers in Italy; an e-survey of EU- and non-EU-born members of the American Association for the Advancement of Science (AAAS); and a survey of the relationship between foreign direct investment and the entry of foreign-born scientists and engineers to Hungary.

Some key findings

- In 2000 257,640 skilled workers were admitted to the USA under H1-B visas, of whom 7,937 were from the UK. The UK group (many in 'hot' occupations such as IT) also reported the highest median incomes of the top 15 supplying countries.
- In 2000 1,493 EU-born individuals gained doctorates in the USA, of whom two-thirds came from Germany, the UK, France and Italy. Some 55% of UK doctorates were in science or engineering, as against 73% for Germans. Data on EU-born doctorate recipients from 1991 to 2001 show that 70% planned to stay in the USA.
- In 2002 the EU supplied 28% of the 16,422 temporary workers in the natural or applied sciences who were admitted to Canada. The UK is the leading source country for temporary immigrants from the EU.
- Data from the survey of AAAS members shows that 70% of the EU-born were working outside their home country, over 80% in the USA. The magnetic attraction of the USA is further confirmed by the fact that only 13% of the EU-born planned to return home, including nearly 60% of those with children. A third of the EU-born and domiciled planned to move abroad, including 36% of those with children and 31% of those aged 55-64.
- The minority of EU-born AAAS members who choose to stay in, or return to, the EU do so largely for family and quality of life reasons. The majority of the EU-born who move or stay abroad do so primarily because of better career advancement opportunities, broader scope of activities, better access to funding and leading technologies, and better job opportunities. Higher salaries are an important, but not deciding, factor in decisions to move or stay abroad.

Salt, J (2003)

International migration and the United Kingdom: report of the United Kingdom SOPEMI correspondent to the OECD, 2003 London: University College London, Department of Geography, Migration Research Unit, 85pp
http://www.geog.ucl.ac.uk/mru/docs/uk_sopemi_03.pdf

This report follows revisions to the UK's international migration flow statistics (backdated to 1992) in 2003, which have reduced net migration gains compared with the previous method of calculation. Data from the Labour Force Survey 2003 are also not comparable with earlier analyses because of changes in the standard

classification by socio-economic group which has led to a marked increase in the numbers allocated to the professional, employer and managerial category.

Data sources

International Passenger Survey

Labour Force Survey

Work permit data

Unpublished data from various sources

Some key findings

- Professional and managerial workers account for most of the gainfully employed among immigrants to and emigrants from the UK, although net gains fluctuate from year to year. Overall, net gains of labour from non-British people more than compensate for net losses of British workers, especially among the more highly skilled.
- Labour Force Survey data for 2003 show that the UK's immigrant workforce is generally more skilled than the domestic: 49.4% of immigrants were classed as highly skilled compared with 39.5% of the domestic labour force. Among immigrant UK citizens 65.6% were classed as highly skilled, a finding that is consistent with the notion of 'brain circulation'.
- Work permit and 'first permission' data show a rise in the number of natural scientists granted permits from 51 in 2000 to 128 in 2002. Other categories which may include some working in academia and/or in research occupations include Engineers and technologists, which rose from 6,687 to 9,587 over the same period. Health professionals and Teaching professionals also rose substantially, although this is likely to be largely as a result of teachers and doctors entering the country.
- Between 1 February 2002 and 31 July 2003 some 175 individuals were admitted to the UK under the 'Science, academia and research' category of the Highly Skilled Migrants Programme.

Further reference

For an earlier, more detailed analysis under the previous calculation method, see:

Dobson, J; Koser, K; McLaughlan, G and Salt, J (2001) *International migration and the United Kingdom: recent patterns and trends: final report to the Home Office* London: Home Office, 278pp (RDS Occasional Paper 75)

<http://www.homeoffice.gov.uk/rds/adhocpubs.html>

Thewlis, M (2003) *Recruitment and retention of staff in higher education* London: Universities and Colleges Employers' Association, 73pp

http://www.ucea.ac.uk/report_recruitment_retention_staff_he2003.pdf

The Universities and Colleges Employers' Association published an independent review of pay and conditions in 1999 (the Bett Report) and has commissioned regular surveys of recruitment and retention in UK academia since 1998. The latest country-wide evidence relates to 2002, and covers all types of staff.

Data source

Two questionnaire surveys of HE institutions (overall response rate 'around' 75%)

Some key findings

- 22.9% of institutions reported a worsening of academic recruitment problems between 1998 and 2002. For 19.8% the situation had eased, and for 57.3% it was much the same.
- 28.6% of institutions reported recruitment difficulties in science subjects, and 12.7% had difficulties in retaining staff. For engineering the figures were 27.7% and 13.5%. Both were dwarfed by business-related subjects (69.8% and 51.6%).
- 29.4% experienced problems in recruiting young academics, and nearly 25% reported retention difficulties with this group.
- Higher private sector pay levels were seen as a major cause of recruitment and retention difficulties, especially for business-related subjects. Better pay in some other parts of the public sector (e.g. the NHS and schools) were also an issue for some groups.
- Workloads affected academic recruitment for 19% of institutions, but were a more important factor in retention problems (33.3%).
- Location was an adverse influence on recruitment for 34.1% of institutions, with cost of living cited by 37.3% as a problem factor. (A subsequent survey focusing on the London area was published in 2004)
- 24.6% reported that the need to use fixed term contracts hampered academic recruitment, with 27.8% reporting an adverse effect on retention.

Further references

Bett Committee (1999) *Independent review of higher education pay and conditions: report of a committee* London: Stationery Office. Summary of recommendations at:

<http://www.archive.official-documents.co.uk/document/irhec/irhec.htm>

Thewlis, M (2002) *Recruitment and retention of staff in UK higher education: a survey and case studies 2001* London: Universities and Colleges Employers' Association, 89pp

<http://www.ucea.ac.uk/rrresearchreportfinal.pdf>

Incomes Data Services (2004) *London pay, recruitment and retention in higher education* London: Universities and Colleges Employers' Association, 72pp

http://www.ucea.ac.uk/london_pay_recruitment&retention_in_he_august_2004.pdf

Turton, I and Walder, A (2003) *A comparative study of migration of academic workers to Britain from the EU* Leeds: University of Leeds Centre for Computational Geography, 16pp

<http://www.leeds.ac.uk/law/cslpe/phare/>

This paper was given at the Symposium on Science Policy, Mobility and Brain Drain in the EU and Candidate Countries, Centre for the Study of Law and Policy in Europe, University of Leeds, July 27-28 2003. This was held in connection with the MOBEX project on mobility and excellence in labour markets, and further papers on

academic migration to and from other European countries are available via the above web address. This analysis covers academic staff and postgraduate research students.

Data sources

Higher Education Statistics Agency Staff Record 2002
Higher Education Statistics Agency Student Record 2002

Eurostat's Labour Force Survey results for 2001, included in the 2002 edition of European social statistics

Some key findings: staff

- 9.12% of those employed in higher education in the UK come from Europe, compared with less than 2% in general employment.
- Countries of origin are led by Germany (21%) followed by France (16%), the Irish Republic (15%), Italy (12%), Greece (11%), Spain (9%), the Netherlands (5%) and 'other' (11%, each providing 1-2%).
- 44% of European employees in UK higher education are women, compared with 37% of UK employees in the sector.
- The main areas of employment for Europeans lie in the biological sciences, physical sciences and languages. There are proportionally more European than UK women employed in all three disciplines.
- 66.81% of European employees in UK higher education are employed on temporary contracts (fixed term or hourly), compared with 39.72% of UK employees in the sector.

Some key findings: students

- Countries of origin are led by Greece (25.3%), followed by Germany (17%), Italy (13%), France (11%), the Irish Republic (9%), Spain (7%), Portugal (6%) and 'other' (17%, each providing 1-3%). The predominance of Greece may be related to avoidance of conscription and relatively low spending on tertiary education.
- Levels of study, subjects of study and gender balances are broadly the same for UK and European students. More European students, as expected, are studying full time.
- The main areas of study are the physical sciences, engineering and biological sciences. Far more European than UK students study engineering, although the data on UK higher education employment in this discipline suggest that many of these return home or leave academia.

Association of University Teachers (2004) *UK higher education: brain drain or brain gain?* London: Association of University Teachers, 7pp
<http://www.aut.org.uk/media/html/brainrainbraingain.html>

This analysis compares the years 1995-96 and 2001-02 and claims that, in overall terms, higher education in the UK gains more academic staff from abroad than it loses. Its interpretation of the figures are, however, rather different from those of

some other analysts. The AUT suggest that the net importation of academic staff, especially in the sciences and engineering, is less a tribute to the attractions of UK science than a necessary response to supply shortages engendered by deficiencies within the UK higher education system. For example, the closure of undergraduate science departments is leading to shortfalls in the domestic supply of researchers, while poor levels of pay are producing an outflow of potential academics into the private sector.

Data source

Higher Education Statistics Agency data, with percentage calculations by AUT

Some key findings

- In 1995-96 the UK made a net gain of 1,645 academics. In 2001-02 the figure was 1,750.
- The European Union was the main source of incoming academics in both years. The numbers arriving in 2001-02 (1,360) were 21% higher than in 1995-96, while the numbers from the USA (505) were 16% lower.
- The numbers of professors or those of equivalent academic rank coming into UK higher education from abroad fell by 23% between 1995-96 and 2001-02 (from 125 to 95). The reasons are unclear but may include unfavourable pay levels for senior staff compared with the USA.
- The numbers of UK staff leaving for overseas posts rose by 50% between the two years, from 960 in 1995-96 to 1,435 in 2001-02. For professors or those of equivalent rank, the rise was 100%, from 30 to 60.
- The numbers leaving for European destinations rose by 76% between 1995-96 and 2001-02, compared with a rise of 29% for US destinations. The European Union was the main destination for academics leaving the EU in 2001-02.
- In both years the 'great majority' of UK academic cost centres showed a net brain gain. The highest overall levels in 2001-02 were seen in clinical medicine, while other disciplines with significant gains included the biosciences; chemistry; physics; electrical, electronic and computing engineering; mathematics; computer software engineering; and mechanical, aero and production engineering.

Burelli, J (2004) *Emigration of US-born S&E doctorate recipients* Washington, DC: National Science Foundation, 4pp (InfoBrief 04-327)

<http://www.nsf.gov/sbe/srs/infbrief/nsf04327/nsf04327.pdf>

This briefing reflects concern at the reluctance of young US researchers to venture outside their homeland, in contrast to the large numbers of overseas researchers who flock to – and often stay in – the USA. In 2002 over 24,500 people earned research doctorates in science and engineering in the USA, but since the mid-1960s the number of US-born with definite plans to work or study abroad has rarely exceeded 400 per year.

Data source

National Science Foundation Survey of Earned Doctorates

Some key findings

- 3.1% of US native born science and engineering doctorate recipients (1998-2002) had definite plans to work or study abroad. This amounted to 289 individuals. The figure for non-US PhDs on temporary visas was higher (24.7%) but the magnetic pull of the USA is clearly evident in the fact that 75% of these foreign-born young researchers intended to stay in the USA.
- For those US-born doctorate recipients who did plan to go abroad, the top seven destinations (in this order) were Canada, the UK, Germany, France, Japan, Switzerland and Australia. The top three accounted for 38%, with the UK and Canada each taking about 13.5%.
- The three largest fields of those who planned to go abroad were the biological sciences (27%), physical sciences (25%) and social sciences (22%). The UK tended to be favoured by those with doctorates in the biological sciences.
- 71% of those planning to go abroad were intending to engage in further study (postdoctoral fellowship, research associateship etc). About 26% had plans for employment, with 60% planning to work in an academic institution.

Docquier, F and Marfouk, A (2004) *Measuring the international mobility of skilled workers (1990-2000): release 1.0* Washington, DC: World Bank Development Research Group, 37pp (World Bank Policy Research Working Paper 3381)
http://econ.worldbank.org/files/38017_wps3381.pdf

This paper builds on an influential 1998 study by Carrington and Detragiache, and provides estimates of skilled workers' emigration rates for some 190 countries in 2000, and 170 countries in 1990. The aim 'is to build an exhaustive international database on the brain drain' for all developed and developing countries, to act as a foundation for systematic empirical assessment of its economic effects. This, it is argued, has been impossible hitherto because of the lack of harmonised international data on migration by country of origin.

The brain drain is defined for the purposes of the study as 'the proportion of working age individuals (25 and over) with at least tertiary educational attainment, born in a given country but living in another country, taking into account neither their occupation, nor where education took place, nor when they arrived.'

Data sources

Census data on immigration

Survey data from 12 European countries for which Census data is not available in the required format

Some key findings

- The USA is the major destination for skilled workers, and its attractions are increasing. The proportion of OECD-educated migrants living in the USA increased from 48% in 1990 to 53% in 2000.
- The European Union is the second most popular destination, attracting 15.2% of the educated in 1990 and 16.3% in 2000 (these figures include intra-EU migration). Europe is also among the largest sources of highly skilled immigrants (in absolute terms)
- Skilled emigration rates are highest among developing countries, but the figures are also relatively high in the UK where the migration rate for those with tertiary education is calculated at 16.7% in 2000. However, this is lower than the 18.8% figure calculated for 1990 and represents a 2.2% decline in the brain drain over the decade.

Further reference

Carrington, W and Detragiache, E (1998) *How big is the brain drain?* Washington, DC: International Monetary Fund, Research Department, 27pp
<http://www.imf.org/external/pubs/ft/wp/wp98012.pdf>

Dumont, J-C and Lemaître, G (2004) *Counting immigrants and expatriates in OECD countries: a new perspective* Paris: OECD Directorate for Employment, Labour and Social Affairs, 34pp
<http://www.oecd.org/dataoecd/27/5/33868740.pdf>

This paper presents preliminary findings from a data collection exercise launched in July 2003 in collaboration with the national statistical offices of OECD member states, with the aim of gathering information on the foreign-born population of each OECD country by country of birth and educational attainment. This resource has been developed specifically in response to the need for better data on highly skilled migration and the processes of brain drain/brain exchange. The source data cover place of birth, nationality and level of educational attainment only. They do not discriminate between different kinds of qualification (science and technology, for example) or provide information on employment (e.g. in universities or industry).

The paper also includes an overview of OECD member state policies to encourage highly skilled immigration.

Data source

Census data from the 2000 round

Additional for countries where Census data was insufficient

Some key findings

- The UK has an expatriate community over the age of 15 of 3,229,676, of whom 1,265,863 (41.2%) possess tertiary level qualifications. This percentage

is higher than in any other European country, but exceeded by Korea (44.2%), New Zealand (44.6%), Australia (45.9%), Japan (49.7%) and the USA (49.9%).

- Only the USA, Australia, Canada, Switzerland, Spain, Sweden, Luxembourg and Norway are net beneficiaries of highly skilled migration from other OECD countries. The UK has 700,000 more highly skilled expatriates living in OECD countries than it has highly skilled immigrants from these countries.
- More than 10% of the highly skilled born in the UK are living in other OECD countries, but when inflows from all countries (not just the OECD) are taken into account, the UK is a modest net beneficiary of highly skilled migration.

Further reference

For background to the development of the new data collection, see:

Åkerblom, M (1999) *Mobility of highly qualified manpower: a feasibility study on the possibilities to construct internationally comparable indicators* Paris: OECD, 1999. 40pp

<http://www.oecd.org/dataoecd/34/62/2098912.pdf>

Save British Science (2004) *Attracting the best: report of a Save British Science Symposium on recruiting and retaining world class researchers in the UK's universities* London: SBS, 16pp

<http://www.savebritishscience.org.uk/texts/documents/2004/SBS0407.pdf>

Save British Science (recently renamed the Campaign for Science and Engineering in the UK) is a lobby group of behalf of the UK science base, and the brain drain evidence it provides is generally anecdotal and often indirect. However, this symposium report reflects a widespread perception within UK universities that pay, terms and conditions of employment and other factors are contributing to difficulties in academic recruitment and retention.

Some key points

- UK universities routinely face difficulties in recruiting and retaining world class science and engineering researchers.
- The market for top class researchers is complex and driven by factors such as pay, availability of project funding, availability and standard of equipment and facilities, freedom to pursue individual research interests, level and nature of teaching commitments, and amount of bureaucracy and administration.
- The brain drain may be internal (e.g. to research posts in UK industry, or to non-scientific careers) or external to research posts in other countries.
- Pay is an important, although not the only, factor in recruitment and retention. The report plots the 'average trajectory' of research salaries, identifying 'crunch points' at which the competition for scientific talent is likely to be particularly strong. These are the point of entry to the system, the point at which a researcher has 'proved' him/herself and the point at which a researcher begins to take on a leadership role.

Proposals costing some £250m a year are presented to alleviate pressure at crunch points. A substantial increase in the variance of salaries is advocated to allow researchers in shortage areas to be paid substantially more than the average.

The impact of international mobility on UK academic research
August 2005

Annex E
Current policies and programmes
William Solesbury

1. This note summarises the national and international policies and programmes that impinge on the mobility of UK academics. The information is drawn from the publications and websites of inter alia

Academy of Medical Sciences
British Academy
British Council
European Commission
European Science Foundation
H M Treasury
Office of Science and Technology
Research Councils
Research foundations
Royal Academy of Engineering
Royal Society
UKRO
UNESCO.

A. UK policies

2. There are a number of UK policies relevant to international academic mobility and they are sketched below.

The Science and Innovation Framework 2004-2014 (July 2004)

3. In this document the Government stated its desire for Britain to be

‘the most attractive location in the world for science and innovation.’

And, in pursuit of that, it set out plans

‘to drive up the numbers of skilled scientists and engineers; to put the science base on a sound financial footing through better management and investment in infrastructure; to support business R&D and to make the best of research across Government, especially in medical research.’ (H M Treasury et al, 2004: Foreword)

In relation to the development of skills,

‘its overall ambitions are to achieve a step change in
the quality of science teachers and lecturers in every school, college
and university;
the results for students studying science at GCSE level;
the numbers choosing SET subjects in post-16 education and in higher
education;
and the proportion of better qualified students pursuing R&D careers.’
(ibid, para 1.25)

Then in Annex B of the document it provided indicators by which it will measure progress towards these objectives in future annual stocktakes.

4. The Framework says little on the question of the international mobility of scientists. It refers to ambitions ‘to support growth in its [ie the UK’s] share of internationally mobile R&D investment and highly skilled people.’ (ibid, Box 1.1) And ‘to foster a strong, vibrant research base which attracts both talented individuals and corporate investment into the UK.’ (ibid, para 1.19) But its plans and indicators, noted above, focus exclusively on increasing the quantity and quality of the home-grown scientific workforce.

DTI’s five year programme (November 2004)

5. However, the later five year programme for DTI was a little more specific. It stated

Economic migration can also make a major contribution to our success, bringing in new entrepreneurs and investors and ensuring our businesses are not held back by being unable to find the skilled people they need. We need to make Britain a magnet for talent from all over the world. Working with the Home Office, we will therefore bring forward new policies to expand the Highly Skilled Migration Programme, retain overseas PhD students in key skills shortage areas, and give a renewed focus to UK Trade & Investment to encourage ‘brain gain’ – recruiting top business and entrepreneurs from around the world. (DTI, 2004: p 11)

The Highly Skilled Migrant programme

6. Under this programme highly skilled people from outside the EU can enter the UK to look for work or self-employment – unlike the general work permit scheme that requires a prior job offer. Applicants are assessed on a points score that covers educational qualifications, work experience, past earnings, achievement in the applicant’s field and any spouse or partner’s achievements. A stay of up to a year to search for work is allowed with a longer stay once economically active. Related to this is a policy that permits both newly qualified, non-EU MBAs and science and engineering postgraduates to stay on for a year. (Home Office, 2005)

B. Programmes supporting international mobility

7. There is a rich mix of funding programmes that can support the international mobility of academic researchers. The British Council's SISTER website (www.sism-uk.com) provides a portal leading to about 150 schemes available to 'UK researchers, postgraduates and international students who are seeking funding for international collaboration in science and technology.' These schemes vary in a number of ways, notably –

a. what activity is funded?

Here there is a wide range of offers with increasing degrees of commitment expected of the participants. The range extends from support for international workshops, through research visits, to short term posts and longer term fellowships, but usually time-limited and with an expectation that the holder will return. For example,

- The COST (Co-operation in Science and Technology) programme supports networking between researchers already active in a field of shared interest.
- The Royal Society provides funding for short visits (between one week and three months), for networking through meetings or workshops, and for joint projects between UK and overseas researchers.
- The Daiwa Anglo-Japanese Foundation offers both small grants to individuals and larger awards to institutionally-based applicants.

b. what disciplines are eligible?

Here there are distinctions based on the overall remit of the funders – they may have a commitment to particular disciplines or they may have adopted research priorities. For example,

- The UNESCO Man and the Biosphere (MAB) programme, launched in 1971, promotes international co-operation in research, training and information concerning the development and management of terrestrial ecosystems; UNESCO has similar programmes in oceanography, geology and hydrology.
- The individual UK Research Councils support international collaboration within their fields. To illustrate, the BBSRC funds an international scientific exchange scheme, an international fellowship scheme and international workshops as well as research programmes that allow or encourage international collaboration.
- Other funders, like the Leverhulme Trust's research interchange scheme or the British Council's visit scheme, support most disciplines.

c. at what career stage?

Most programmes are clear about the career stage at which they are targeted and, as such, are informed by a view of the benefits to the researcher of the mobility supported.

For example,

- The European Science Foundation's Young Investigator Awards (EURYI) scheme is designed to attract outstanding young scientists, with between 2 and 10 years postdoctoral experience, from anywhere in the world to create their own research teams at a European research centre.
- The European Community Framework Programme's Marie Curie awards provide support for intra-European and international mobility at all career stages, through advice and funding for training, visits, networks, events, fellowships and chairs.

d. for outward or inward mobility?

Most schemes available in the UK are designed to provide opportunities for outward mobility; but there are exceptions in schemes to support visits or appointments in the UK or schemes to foster mobility in any direction. Examples of the latter two cases are

- The Leverhulme Trust's Visiting Professorships that enable a UK university to host an internationally distinguished foreign academic for between 3 and 10 months; the Royal Society and the British Academy offer similar Visiting Fellowships and Professorships.
- Among the Marie Curie awards are both Incoming and Outgoing Fellowships with, in both cases, support for the reintegration of the holder in their country of origin on their conclusion; there are also grants for any European researchers who have worked outside Europe for more than five years and wish to return.
- While not exclusively targeted at inwardly mobile researchers, the general fellowships or professorships offered by research funders or institutions may provide an attractive return route for UK academics after a period working abroad.

e. how restricted geographically?

Many schemes that fund mobility are restricted to participants moving to or from specific countries; few are global in their scope. Some are restricted to particular groupings, for example,

- The Association of Commonwealth Universities provides Scholarships and Fellowships to increase mobility between Commonwealth countries (and the USA).
- The NATO Science Programme has initiated a Science for Peace and Prosperity programme focused on its new partner countries in central and eastern Europe to assist their transition to market economies and democratic governance.

Other schemes are bilateral, for example,

- Schemes run by the Anglo-German Foundation or the Daiwa Anglo- Japanese Foundation and the many joint schemes that the British Academy and Royal Society run jointly with foreign academies.

C. Overview

8. Taken together, the policies summarised in section A above have two important characteristics. First, none of them are *specifically* concerned with *academic* mobility beyond the postgraduate level – fostering international mobility is seemingly a missing dimension to science policy. Secondly, they are all concerned exclusively with *inward* migration – encouraging outward flows or circulation seems not to be on the policy agenda.

9. Regarding the programmes summarised in section B, it is impossible to estimate what is the annual take-up by UK academics of the offers in them. It is probably fairly slight - most of the UK schemes are only offering small numbers of awards annually and the international schemes are obviously open to non-UK competition. Evenso, three general observations can be made –

- many organisations funding research in the UK and the EU attach importance to mobility, clearly regarding it as a valuable investment in their research communities;
- they take a broad view of mobility and are keen to support its many forms, both short and long-term; and
- inward mobility is valued as well as outward mobility and, in a few cases, the return of the mobile researcher is offered support.

In these respects the programmes take a broader view of mobility than is explicit in the policies summarised above.

References

Department for Trade and Industry (2004), Creating Wealth from Knowledge: the DTI Five Year Plan, DTI, London, available at www.dti.gov.uk/fiveyearprogramme.html

European Commission (2003), A rough guide to the Marie Curie Actions, Brussels

H M Treasury and Department for Trade and Industry, Department for Education and Skills (2004), Science & innovation investment framework 2004-2014, , HMSO

Home Office, Working in the UK, Information about the Highly Skilled Migrant Programme – on www.workingintheuk.gov.uk

Annex A

The careers of UK academicians

Becki Leeds and William Solesbury

Sources and analysis

1. Fellowship of the Royal Society (RS), the British Academy (BA), the Academy of Medical Sciences (AMS) and the Royal Academy of Engineering (RAE) is conferred on researchers who are highly esteemed in their disciplines. With the exception of the RAE which has a substantial industrial membership, Fellows are mostly academics. The careers of these people are therefore a useful measure of the importance of international experience in the development of the UK's academic research elites.

2. The analysis focused only on UK-based, current Fellows as listed on the organisations' websites. It used the 2004 edition of *Who's Who* for career details. Two reservations must be made about this source – first, the criteria for including people in *Who's Who* are not known and not all Fellows are included and, secondly, the career details are very abbreviated so that is impossible to know whether an entry for an appointment abroad is a Visiting Professorship or a short term contract or a tenured post. The analysis therefore covers what can be termed 'work abroad' of Fellows listed in *Who's Who*.

3. For each of the bodies the careers of just over 100 Fellows were analysed. This included all the AMS and RAE Fellows appearing in *Who's Who* and a random sample of the larger numbers of RS and BA Fellows listed there. The randomisation was achieved by identifying every tenth name on the alphabetical Fellowship list and then supplementing this with every intervening fifth name until a rough equivalence with the AMS and RAE population sizes was reached. The resultant populations are 111 RS Fellows, 110 BA Fellows, 103 AMS and 110 RAE Fellows (of which 36 are academics, 74 are from industry).

Frequency of work abroad

4. Table 1 shows that work abroad characterises the careers of more than half of all the academic Fellows in the analysis. In the Royal Society and the British Academy three quarters or more careers have this characteristic; less so in the careers of Fellows of the Academy of Medical Sciences and the Royal Academy of Engineering.

Table 1. Fellows who worked abroad

RS	BA	AMS	RAE (all)	RAE (academics)
85%	74%	58%	37%	61%

5. For most Fellows there have been multiple appointments abroad during their careers. Table 2 shows that among Fellows of both the Royal Society and the British Academy who have worked abroad about half have held between two and four posts abroad and the same is true of the academic Fellows of the Royal Academy of Engineering. A third of Royal Society and British Academy Fellows and a quarter of Academy of Medical Sciences Fellows have held five or more posts abroad, but only a seventh of the academic RAE Fellows.

Table 2. Fellows with multiple appointments abroad

Number of appointments	RS	BA	AMS	RAE (all)	RAE (academics)
one	22%	16%	40%	51%	36%
two-four	46%	50%	35%	32%	50%
five or more	33%	33%	25%	17%	14%

Destinations

6. For the analysis of the locations abroad where Fellows worked the same three regions as in the HESA data were adopted viz the EU (defined in terms of its 2005 membership), the USA and the Rest of the World. Here the total is those Fellows in the larger sample who worked abroad at least once in their career: 93 in the Royal Society, 81 in the British Academy, 60 in the Academy of Medical Sciences and 41 in the Royal Academy of Engineering, of whom 22 were academics.

7. Their destinations were fairly evenly spread across the three regions. Table 3 shows that the USA emerges as the most common destination, usually in the 1970s-1980s – 85% of the Royal Society Fellows and 60% plus in the other academies have been there. But the EU and the Rest of the World (that includes anglophone Canada and Australasia as well as Asia, Africa and Latin America) are also important, accounting for between 30% and 50% of the posts abroad

Table 3. Regions of work abroad

Regions	RS	BA	AMS	RAE (all)	RAE (academics)
EU	51%	51%	33%	44%	41%
USA	85%	69%	68%	63%	59%
RoW	52%	49%	30%	52%	36%

Note: The percentages do not total 100% because some Fellows have worked in more than one region.

8. Those Fellow who have worked, once or more times, in more than one of these regions are fewer in number. Even so, Table 4 shows that a quarter of the Fellows of the Royal Society and of the Academy of Medical Sciences have had ‘global’ careers with appointments in all three regions. As have roughly a sixth of the Fellows of the British Academy and an eighth of the Fellows of the Royal Academy of Engineering, though fewer of the academic Fellows.

Table 4. Number of regions for work abroad

Regions	RS	BA	AMS	RAE (all)	RAE (academics)
one	40%	64%	40%	64%	59%
two	35%	21%	35%	24%	32%
three	25%	15%	25%	12%	9%

The impact of international mobility on UK academic research
August 2005

Annex B

Interviews with HE institutions and learned societies

Andy Boddington and William Solesbury

1. Mobility is a consequence of individual decisions made by academic researchers in pursuit of personal objectives. But taken together, the movement of researchers to or from the UK impacts on both the institutions that employ them and the disciplines of which they are members. The analysis of HESA data provides quantitative measures of these impacts over the years from 1994 to 2002. But, to achieve some qualitative understanding, confidential interviews were conducted with senior representatives of both some institutions and some learned societies.

2. Each interview focused on three topics

The recent scale, trend and pattern of international staff mobility in the institution or discipline;

Any actions taken to influence mobility;

The impacts – positive and/or negative – of mobility on the institution or discipline.

Institutional experiences

2. Telephone interviews were held with senior academic managers of five HEIs – the University of Wales, Cardiff, the Universities of Manchester, Dundee, and Cambridge and the London School of Economics. These were chosen from among the institutions with high levels of mobility and to also reflect different regional locations, disciplinary strengths and institutional histories.

3. None of the institutions systematically monitored the **scale, trend and pattern** of academic mobility, even through analysis of their annual returns to HESA. (Though some do collect and analyse information about the origins and destinations of their student population.) What the interviewees had to say about recent trends and patterns was therefore impressionistic. All were alive to the phenomenon of mobility in their institutions, both inward and outward. Most believed that it had increased in the last decade and most also believed that they had been net gainers, either in numbers and/or in quality.

4. In more detail they noted to varying degrees –

- The variety of forms that international mobility takes – short term visitors, Visiting Fellows or Professors, research collaborators, shared appointments with foreign universities, contract researchers as well as tenured appointments; these arrangements were often made at faculty or departmental discretion without central guidance.
- Mobility is commonly age-related: much migration both out and in at early career stages and some return migration at later stages, often for domestic as much as career reasons – this latter cuts both ways, attracting UK nationals back but also losing foreign nationals to their home country.
- There is more turnover among foreign nationals than UK nationals – one interviewee talked of ‘CV shopping’ – with the consequence that the junior research staff are often more international, less stable than the senior staff.
- The more open and meritocratic academic culture in the UK, in comparison to some countries, is attractive to some foreign researchers who may be able to advance their careers in the UK more rapidly, thereby ‘leapfrogging’ their colleagues who stayed home.
- The trend and pattern differs between disciplines and institutions’ international reputations are often discipline-specific.
- In many disciplines the USA has a relatively diminished attraction in comparison with the countries of the EU or the other anglophone countries.

5. In terms of **actions**, some institutions – recognising that they are in a competitive, international market for high quality researchers – have started to focus their recruitment practices more sharply. Promoting the university as an international brand is part of that, commonly allied with policies for foreign student recruitment. But more pro-active approaches to recruiting staff internationally are also being used, especially where – through recent investment in infrastructure or major new research funding – the institution is ‘raising its game’ in a particular field. Fellowships, either from the institution or one of the research funders, can also be a draw. The imminence of the 2008 RAE is also motivating the recruitment of foreign as well as UK research ‘stars.’ One interviewee said “we now go out of our way to court people, in a way we would not have done 10 years ago. We are not as take-it-or-leave-it as we were then.” But recruitment consultants are of limited help since they do not have good international knowledge or contacts. There is though concern in Wales and Scotland that the extra resources from student fees in England will disadvantage them in recruiting internationally.

6. Aside from recruitment practice, the institutions could give few examples of offering more practical assistance to new foreign recruits. “We give them a list of letting agents and then it’s up to them” said one interviewee, while noting that competitor universities in other countries did better, often providing accommodation for visitors. Equally, action in response to the emigration of staff is undeveloped – any deals offered to dissuade them or to maintain contact or to ease their return are left to departments.

7. All the interviewees took a positive view of the **impacts** of higher levels of international mobility on their institutions. “We are beneficiaries of the free market, not its victims” said one interviewee. The benefits are seen not just as securing the best person for a job but, more widely, as injecting into the institution’s research work new researchers with different perspectives and traditions and thereby – as one interviewee expressed it – “avoiding monoculture.” While, in some institutions, there is often a lively debate about the balance of foreign and UK students, staffing is rarely discussed in those terms. But seemingly it is often the senior UK researchers who must bear the responsibilities of management, teaching and outreach work.

Disciplinary experiences

8. Similar telephone interviews were held with senior representatives of five learned societies – the Royal Society of Chemistry, the British Psychological Society, the Academy of Medical Sciences, the Development Studies Association and the Royal Society.⁷ These were selected as disciplines – within the whole range of natural sciences, medical sciences, social sciences and the humanities – where *prima facie* high levels of international mobility might be expected.

9. None of the societies monitor the **scale, trend and pattern** of international mobility in their discipline. In all cases they knew which of their Fellows were resident abroad, but not the wider picture. As with institutions, their impression is of increasing mobility in recent years, both inward and outward. But the picture differs between disciplines –

- In *chemistry* mobility has increased enormously in recent years in both the academic and the industrial sectors and between them; in particular, the transnational chemical and pharmaceutical companies recruit internationally as a matter of course. The USA seems to have lost some of its attraction – the American Chemical Society is said to be concerned about this. But the USA is still dominant for longer term mobility, while mobility within Europe is shorter term.
- In *medical science* it was felt that the UK has become increasingly attractive to foreign researchers in recent years because of the major investments made in the science infrastructure. Movement to and from the USA remains strong. But immigration from EU countries is growing – especially from Germany where able scientists are frustrated by career rigidities – though emigration to the rest of the EU is not strong.

⁷ We had hoped to include the Royal Historical Society as a humanities discipline in our sample but it proved impossible to secure an interview.

- In *psychology* mobility has been influenced by the shortage of teaching staff for the big increase in undergraduate demand over the last decade. Recruitment from abroad has been necessary, but this is not just a matter of numbers for the quality of psychologists trained elsewhere in Europe is high – they compete successfully with UK candidates in open competition. The influx is very much in early career. Movement is increasingly within Europe, though also in the anglophone world outside.
- In *development studies* there are problems in recruiting quality researchers in the UK. Junior researchers are keen to come to the UK, especially from developing countries, but there is a lack of senior staff to manage them. The competition comes not from academic posts abroad – in particular, the USA has no distinct development studies discipline – but from well paid, non-academic employment in international agencies and consultancies. Overall there is a high level of mobility in early careers and then stabilisation.

10. **Actions** in relation to international mobility by learned societies are few. Most have connections with sister societies in other countries and international umbrella bodies where they exist. Some have career counselling services but admit that they offer little professional or practical help to migrant researchers. A few provide financial help to mobility – for example, through bursaries for foreign visits, sponsorship of foreign participants in UK conferences, and fellowships tenable abroad. While rarely addressing mobility in their discipline directly, some have found that it is an aspect of other disciplinary concerns, such as staff shortages, the range of fellowships on offer and academic remuneration.

11. All of the learned societies take a positive view of the **impacts** of international mobility. As one interviewee said “It is simply a matter of attracting and retaining the best” to sustain the health of the discipline. Mobility is also seen as an essential ingredient for more international networking, collaboration and inter-institutional relationships; and for development studies it is a means to building academic research capacity in developing countries.

12. But there were concerns in some societies that too much mobility, especially in turnover terms, could become “unmanageable” where the immigrant researchers were less interested in teaching, administration or outreach work. One interviewee accepted that mobility must extend contacts and the prospects for future collaboration, but felt that a strong cadre of home-grown talent is essential – “a real reputation is needed to nurture good contacts” – and that this is now too weak.

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Annex C
The email survey of academic migrants
Andy Boddington

The Survey

1. A short email questionnaire was sent to

- ◆ UK citizens working abroad (Abroad in the Figure and tables below): 72 sent; 28 responses
- ◆ UK citizens who have worked abroad and have returned (Returned): 49 sent; 15 returned
- ◆ Foreign citizens currently working in the UK (Foreign): 66 sent; 22 returned.

The respondents were chosen to capture a range of researchers at different stages of their careers, including highly cited UK researchers identified by citation analysis. They were identified from university websites and citations. The overall response rate was 35%. Not all respondents answered each questions so total responses vary.

2. The questionnaire included questions on

- Reasons for migration
- Financial assistance
- Career effects
- Benefits or disbenefits
- Consequent academic contacts
- Quality of life effects
- Future career plans.

Responses from the three categories of migrant were analysed in these terms. In addition many respondents provided quite detailed career narratives. Extracts from these are reported at the end of this Annex.

A. Analysis of responses

Reasons for Migration

3. As might be expected among researchers, the majority moved for the intellectual and research opportunities, including better equipment. Career development was also important, especially at PhD, postdoc and professorial levels. Quality of life was important to academics relocating to the USA and Canada.

Table 6. Reasons given for migration

Reason	Abroad	Returned	Foreign	All
Intellectual opportunities	10	11	7	28
Research funding	7	7	2	16
Career development	18	11	12	41
Family reasons	3	0	0	3
Quality of life	7	5	3	15
Cultural experience	2	1	1	4

Financial Assistance

4. Only about one third of migrants received financial assistance such a relocation grants.

Table 7. Financial assistance for migration

	Abroad	Returned	Foreign	All
Financial assistance	9	7	5	21
No financial assistance	17	10	17	44

Career effects

5. Overall four fifths of migrants thought that they had improved their career prospects. Nine in ten of UK academics reported that emigration had strongly improved their career development and/or future prospects; a slightly smaller, but still substantial, proportion felt the same about returning to the UK. This fell to just two in three foreign academics currently in the UK, the remaining third having experienced only moderate improvement.

Table 8. Improvement to career development & prospects

	Abroad	Returned	Foreign	All
Moderate improvement	2	3	7	12
Strong improvement	24	14	13	51

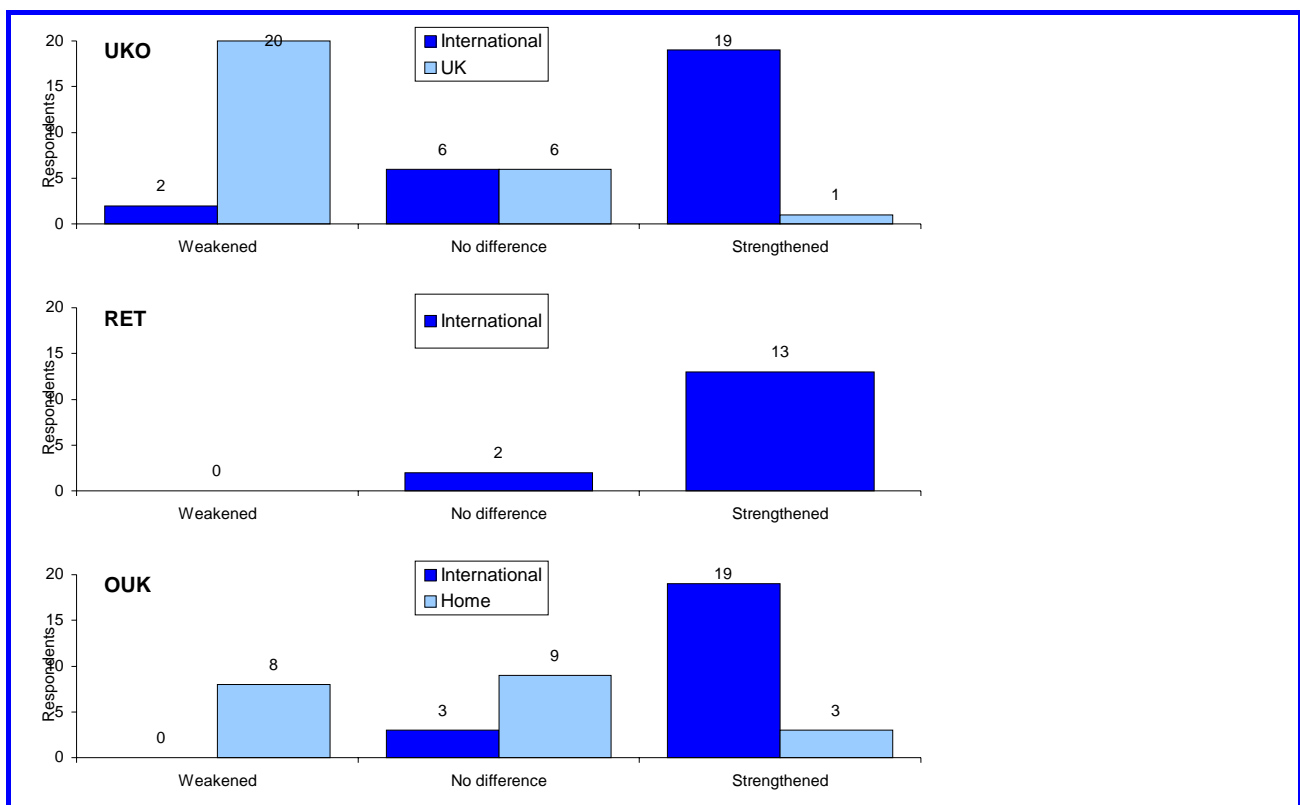
Benefits and disbenefits

6. For most academics, migration gave access to new funding and career opportunities, as well as broader research horizons. Among UK academics working in the USA and Canada, higher salaries were a key benefit, as was quality of life, including a good school environment for children. Several academics noted the funding cuts of the “Thatcher years” were a reason for moving to North America.

Academic contacts

7. Figure 1 shows that, unsurprisingly, overseas travel strengthened international contacts. For most UK academics who had gone abroad, their contacts with the UK were weakened. But returners came with international contacts strengthened by their time abroad.

Figure 2. Impact of migration on academic contacts



Quality of Life

8. Three quarters of respondents reported that migration had had little effect on their lifestyle; of the remaining quarter more had seen an improvement.

Table 9. Change to quality of life

	Abroad	Returned	Foreign	All
Improved lifestyle	1	5	6	12
Had little effect	24	18	11	63
Worsened lifestyle	1	3	4	8

Future career plans

9. About 40% of respondents thought it likely that they would move again in their careers. For the eight UK researchers abroad who expected to move, four planned to move back to the UK and four elsewhere.

Table 10. Future plans for migration

	Abroad	Returned	Foreign	All
Yes, likely to migrate again	8	10	7	25
No, unlikely to migrate	18	6	14	38

B. Extracts from career narratives

Under each heading the extracts are grouped together as coming from the responses of UK academics now abroad, UK academics returned to the UK or foreign academics now in the UK.

Reasons for Migrating

Love. [Lecturer in Philosophy from USA; age c. 40]

Far better research and career opportunities were available in the USA when I moved here in 1982. I think that the differences in research opportunities has levelled somewhat over time, but the financial and lifestyle benefits are still significantly better in the USA than the UK even now. The US research environment is far more adaptable and less structured, thus allowing easy development of multifaceted research efforts. The federal financial support through NASA and the NSF is still substantial. [Abroad: Fellow of Astronomy in USA; age 52]

Career development, family reasons. [Abroad: Professor of Psychiatry in USA; age 58]

I was recruited by the University of Illinois to be Chair of the Biophysics Division, with a view to increasing its scope and visibility on campus, and leading the transition to a Center for Biophysics. This seemed like an interesting challenge. In addition, they offered me a salary substantially higher (by almost 3-fold) than my Bristol salary, and the research opportunities and environment were excellent. Finally, the political scene in the UK looked unpromising in terms of support for science and the universities (and became more so with the arrival of Margaret Thatcher shortly after I left). [Abroad: Professor of Biochemistry in USA; age 60]

The main reasons for my moving to the US were: (i) the opportunity to work in the U.S. science community, (ii) work with the world authority in my field, and (iii) gain experience of life in another country. [Abroad: Research Engineer in Switzerland; age 29]

Funding. [Abroad: Research Fellow in Medicine in USA; age 31]

No work opportunities; no chance for advancement in research; hostilities in Academia.

Received superb education in UK but had nowhere to go in it when qualified. [Abroad:

Doctor of Pathology in USA; age unknown]

I moved because the opportunities for postgraduate education in the US in my chosen field (philosophy) were much better than the UK. California sunshine was also appealing.

[Abroad: Professor of Philosophy in USA; age 45]

Threefold: family reasons, career development and quality of life. [Abroad: Professor of Medicine in Canada; age c. 40]

Mostly career development and research opportunities, but I also wanted to experience life in different countries. [Abroad: Assistant Professor of Physiology and Biophysics in USA; age 43]

Mainly a mixture of career development and family reasons. [Abroad: Professor of Anthropology in USA; age c. 45]

Career opportunity, with unmatched colleagues, less teaching (from 14 contact hours/week in the UK, down to three in the US), and the intellectual freedom to attack a much wider range of scientific problems. [Abroad: Professor of Chemistry and Biochemistry in USA; age 60]

Better structure to PhD program in the USA than UK (longer program with more independence to choose thesis topic and better job prospects at the end). Also lifestyle choice of living in the San Francisco Bay Area for 6 years. [Abroad: Assistant Astronomer in USA; age 38]

Career development, lifestyle choices. [Abroad: Professor of Mathematics in Israel; age 57]

Career Development & research - In the UK it often felt like the academic game was going on somewhere else. Papers that I (and many others) had written were often duplicating existing work in the USA that I was unaware of. You feel unconnected to the main academic community. Of course it is possible to travel to the USA, but this is very expensive and most UK Universities impose severe limits on peoples' ability to do this. When here travel is both generously subsidized and less necessary because all the major researchers come by to give seminars. You feel part of the endeavour - not someone sniping from the sidelines. I was at the stage where it was better to be a little fish in a big pond than a big fish in a little one.

Lifestyle - I earn roughly triple what I earned in the UK. I can buy a new pair of trousers without worrying about the expense my children have experiences I'd never have been able to give them otherwise. I work no harder here than I did in the UK, although more is expected of me here. [Abroad: Professor of Economics in USA; age 65]

Job opportunity. Bleak outlook for British academia under the Thatcher government.

[Abroad: Professor of Genetics in USA; age c. 55]

Lack of research funding. Too much teaching/too many students. Lifestyle choices—better lifestyle in Canada. And, I just really liked the country I moved to. [Abroad: Assistant Professor of Sports Science in Canada; age 32]

Educational opportunity - at the time that I came to this country there was only one undergraduate degree course in physical education. Ultimately I became interested in exercise physiology - there were no advanced degrees in the UK at that time. [Abroad: Professor of Physical Education, Recreation & Dance in USA; age c. 65]

Two principal reasons: 1) career development (I thought, and continue to think, that an American PhD gives me more job options and a more thorough grounding in my area of study), 2) financial; although at the time when I had to decide whether to accept an American offer I had an offer from Cambridge, I would have had to wait until that August, only a month and a half before the beginning of the program to find out whether I would receive funding from the AHRB. [Abroad: Postdoc in Philosophy in USA; age 38]

The main reasons were career development and family reasons. I felt I had reached the limit of what was possible for me to achieve in the UK and sought new challenges overseas. Unlike many of my former UK colleagues, I did not spend time in the US as a postdoc because my wife and I began a family when I was in my mid-20's. Once my children completed their UK education, we decided we would enjoy some time in another country. [Abroad: Professor of Astronomy in USA; age 45]

In the early 1980s the government cut funding to UK Universities. [Abroad: Professor of Mathematics in USA; age 65]

Research opportunities and career development. I was interested in artificial intelligence, and (thanks to the Lighthill Report) there was almost no support for AI research in the UK. Several UK experts advised me to go to Stanford for my PhD. [Abroad: Professor of Computing Science in USA; age 44]

I left to pursue graduate degrees (MA and PhD). I had offers to remain in the UK and complete a PhD, but ever since I was a child I wanted to live in the United States for a period. When I had an offer from the University of Minnesota which included money I decided it was then or never. So I went. [Abroad: Professor of Geography in Canada; age 44]

We left the UK in 1985 due to the poor career and research opportunities under the Thatcher government. We returned in 1997 partly because of family reasons, partly because of the opportunity of working with first-class colleagues. [Returner: Professor of Genetics; age c. 60]

Career development. Research opportunities. Learning about cutting-edge research developments. [Returner: Professor of Business; age 59]

For example, From UK: To work in first class scientific environments and learn more about the science in the host institute and the science within. To experience international science first hand--very different systems in both the USA and Switzerland. To live in new places/societies. [Returner: Professor of Pathology; age ?]

Career development (as a postdoc). [Returner: Professor of Biological Medicine; age c. 51]
Research opportunities and money. [Returner: Professor of Psychology; age 53]

For example, Left for a good job in the USA when there were no jobs in the UK; returned when a job came up in the UK I was comfortable with, as well as for family reasons.

[Returner: Professor of Physics; age ?]

UK? For example, career development, research opportunities, family Academic opportunities, research funding and broadening experience (probably in that order) for my taking up positions in the US/Denmark/Canada. [Returner: Professor of Biochemistry returned from Canada; age 47]

Career development and lifestyle choices. [Returner: Professor of Biology; age ?]

Worked in New York for 2 years; went there for the research opportunities and for career development. Returned to UK for family reasons and for quality of life. [Returner: Professor of Biology; age ?]

I was living in the US where I did my PhD and postdoctoral research. I applied for jobs in USA, Europe, and elsewhere. I was offered a job in the UK and I took it. [Returner: Professor of Ecology; age c. 44]

Career development. Before finishing the dissertation I had an offer from the University of London and thought that it would be a much more exciting job than the ones I could get in the US at the moment. [Foreign: Economics lecturer from Spain; age 29]

Research opportunities, especially related to; national funds (EPSRC, etc); the possibility to work with internationally known researchers; the possibility to get excellent students (also international ones); quality of life in UK universities. [Foreign: Professor of Computer Science, age 39]

For career development and research opportunities, wanted to move from a research institute to an academic institute. [Foreign: Senior Lecturer in Psychology from USA; age 45]
Living and working in London (after having lived in suburban Princeton, NJ). Raising a family in a large and diverse European city. [Foreign: Senior Lecturer in History from Germany; age 40]

For example, The main reason was that I was offered a job! I had been looking in the USA for 18 months for a faculty position without success. I came over to Britain to give a research seminar and an upcoming opening was mentioned over lunch. Up to that point I had not thought about it and had intended to stay in the USA - my wife is a US citizen.

[Foreign: Senior Lecturer in Medicine from USA; age ?]

Career development for both my partner and me. [Foreign: Lecturer in Economics from Belgium; age 35]

Given an EU chair in European policy and politics which provided increased research opportunities. [Foreign: Professor of Political Science from USA; age 60]

UK has on average a good university system compared to the rest of Europe. It is open to foreigners. Hence for researchers who do not want to go to the US, UK becomes a good alternative for the career (though the salaries are not that competitive!) [Foreign: Lecturer in Finance from Italy; age ?]

Career development; lifestyle (close to Europe); good department. Not necessarily a dramatic choice, as I am a young academic getting started (so did not leave an established lecturing or research position). [Foreign: Lecturer in Psychology from Australia; age 29]
I was looking for a position that would offer a career development in Europe after the experience in the USA. My interest in coming back was linked to both lifestyle and family reasons. [Foreign: Postdoc in Genetics from Italy; age c. 38]

Career development. The UK offered for my research interests a more active and internationally integrated research environment. [Foreign: Professor of Economics from Germany; age 36]

Research opportunities, better political climate, prestige. [Foreign: Professor of Linguistics from Germany; age 55]

Financial Assistance

Four year fellowship from Princeton. [Abroad: Professor of Psychiatry in USA; age 58]

For my move to USA: I was given one return airfare from the UK to the US. For my move to Switzerland: I was given one return airfare from UK to Switzerland. [Abroad: Research Engineer in Switzerland; age 29]

Yes. Postdoctoral fellow in neuropathology. [Abroad: Doctor of Pathology in USA; age unknown]

The University of California at Los Angeles provided an initial fellowship and a promise of continued funding for my studies, including a full waiver of the fees usually charged to non-residents of California. [Abroad: Professor of Philosophy in USA; age 45]

I was assisted by a grant for relocation expenses, included as part of the package for bringing visiting scientists to the US National Institutes for Health. [Abroad: Professor of Mathematics in Israel; age 57]

My institution paid to have my house packed and shipped here and stored. They gave tuition assistance to my children to go to college. They paid airfares for my family to travel. [Abroad: Professor of Economics in USA; age 65]

I was given relocation expenses to come to the USA. [Abroad: Professor of Veterinary Science in USA; age c. 44]

I first came to the U.S. on a one year graduate study fellowship at Princeton (it was called a Jane Eliza Procter Fellowship and is intended specifically for graduates of Oxford or Cambridge who wish to study at Princeton). [Abroad: Postdoc in Philosophy in USA; age 38]

I applied for and received a SERC Studentship Tenable Overseas (I think this was funded by NATO, not sure). As it turned out, I was also offered financial aid by Stanford so the UK support was not essential. [Abroad: Professor of Computing Science in USA; age 44]

I received initially a Teaching Assistantship (in 1978 it was about US\$6,000). I later received two fellowships which gave me an incentive to stay. I received no travel money as such. [Abroad: Professor of Geography in Canada; age 44]

I was awarded a 10-year Royal Society Research Professorship; without this, I doubt I would have returned. [Returner: Professor of Genetics; age c. 60]

To the USA EMBO and MRC grants--long time ago now!! [Returner: Professor of Pathology; age ?]

NATO Fellowship arc Fellowship. [Returner: Professor of Biological Medicine; age c. 50]

SRC (now called EPSRC) Fellowship available to returners. [Ret: Professor of Physics; age ?]

Yes, I received a Fellowship (Biochemical Society) to go to Paris. [Returner: Professor of Biology; age ?]

Cardiff Professorial Research Fellowship scheme - a research only chair without teaching and low admin loads. [Returner: Professor of Medicine; age ?]

I had relocation expenses paid by the University if this counts at all. [Foreign: Professor of Computer Science, age 39]

Did pay for the move of personal and professional effects, papers, books, belongings.

[Foreign: Senior Lecturer in History from Germany; age 40]

ICM doctoral fellowship, a fellowship paid by the Belgian government that includes a stay abroad. [Foreign: Lecturer in Economics from Belgium; age 35]

Cambridge Commonwealth Trust Prince of Wales Scholarship to do PhD. [Foreign: Lecturer in Physics from New Zealand; age 35]

AS and invited scientist appointed by the Medical Research Council my travel and removal expenses were covered. [Foreign: Professor of Pharmacology from Hungary; age ?]

2-year Fellowship by the German Research Foundation (DFG) then a 1-year Fellowship by the German Thyssen Foundation. [Foreign: Professor of Medicine from Germany; age ?]

I spent some research periods in France thanks to a EU grant for mobility of researchers. In particular I spent one year as post doc in Toulouse. [Foreign: Lecturer in Finance from Italy; age ?]

Career effects, benefits and disbenefits

Strongly improved it [unknown]

Moderately improved it but difficult to judge as the parallel life is never known. [Abroad: Assistant Astronomer in USA; age 38]

A wider range of research paths were available and I joined a much larger research group that enabled me to develop new skills quickly and easily. This broadened the science that I was able to do and thus vastly improved my research view as a whole. Disadvantage: living on grants. [Abroad: Fellow of Astronomy in USA; age 52]

I left Britain just before the catastrophic Thatcher years. I had originally intended to return, but the appalling impact of that creature's regime on higher education (a disaster that continues to unfold to this day) made the prospect of return ever more unappealing. In my frequent visits back, I found demoralized colleagues forced to fight cuts year on year, and with salaries that became grotesquely inadequate to boot. Then there is the Kafkaesque system you have instituted to check on the "quality" of teaching (run by disaffected failed academics, more often than not) and the other accountability systems (like the Research Assessment Exercise) which are well intentioned, but result in institutions gaming the system and forms of hypocrisy that are hard to stomach. Increasingly, British universities resemble aspects of the old Soviet system, complete with absurd top down management and "accountability" that simply produce pathology and largely fail in their intended aims. Sclerotic bureaucracy and political interference are not the way to produce internationally competitive universities. [Abroad: Professor of Psychiatry in USA; age 58]

It is a little difficult to parse out the probabilities over the 27 years since my move. However, I have enjoyed strong research support over that time, and I continue to run a modest research group (6 graduate students, and several undergrads), at an age when I would have been retired in the UK

By working with the world authority in my field (coastal engineering), I have made the establishment, development & importantly NETWORKING in my career a lot easier (i.e. I have been headhunted several times). I also was able to observe how a different academic system works/not works, etc. [Abroad: Research Engineer in Switzerland; age 29]

Funding, although sparse everywhere is better in the US right now. Also, new investigators get better start up opportunities. [Abroad: Research Fellow in Medicine in USA; age 31]

Opportunities for advancement were abundant and research atmosphere was vibrant as opposed to the rather internecine atmosphere in the UK [Abroad: Doctor of Pathology in USA; age unknown]

With my US-based PhD I had more job options than I would have had with a UK PhD. I have also benefited directly and indirectly from several hundred thousand dollars of funding from the US National Endowment for the Humanities and the National Science Foundation, for projects that appear to have no UK equivalents. [Abroad: Professor of Philosophy in USA; age 45]

I have managed to progress quicker due to the fewer number of researchers in my field in Canada. However, the smaller number does mean there is less ability to collaborate or bounce ideas off colleagues. [Abroad: Professor of Medicine in Canada; age c. 40]

Enabled me to work with researchers in mainland Europe as well as the States and UK. I've been lucky enough to work with some very well known people in my field. I think I have been able to do things in the US I would never have done in the UK. For example I am very involved with the American Physiological Society (sit on several committees etc.) and am involved in several major meetings giving talks and chairing sessions - somehow I just don't think I could have done that so easily in the UK - it wasn't until I came to the States as a post-doc I realized how important mentoring was - I was never really exposed to that (or at least it wasn't so pro-active) in the UK or Germany. This is clichéd but I really had my eyes opened to what was possible only when I came to the US - I think it has made me a better scientist and researcher. [Abroad: Assistant Professor of Physiology and Biophysics in USA; age 43]

I have more support for research and am less encumbered by admin and bureaucracy.

[Abroad: Professor of Anthropology in USA; age c. 45]

The opportunity to run a larger research group, and the release from having to apply for innumerable small grants attached to particular initiatives and programs, were real benefits. The relative flexibility of US grant funds (across budget categories), and the chance to fund graduate students according to their scientific progress (rather than to some arbitrary timetable) were also helpful. [Abroad: Professor of Chemistry and Biochemistry in USA; age 60]

I got a wider range of research opportunities than many PhD students in the UK seem to get. My current job offers fantastic facilities and a higher pay scale than in the UK. [Abroad: Assistant Astronomer in USA; age 38]

Increased job opportunities and freedom of academic development into interdisciplinary fields. [Abroad: Professor of German in USA; age 44]

I gained international reputation in my field (biostatistics) during the 8 years that I worked at the US National Institutes for Health. Recently, I became the editor of one of the top international journals in this field (Biometrics). [Abroad: Professor of Mathematics in Israel; age 57]

The collaborations I entered into here have given my 3 top publications. I have been invited to be a founder editor of a journal. Much higher visibility in the profession. [Abroad: Professor of Economics in USA; age 65]

Substantial financial support for research via NIH and State funds. Increased salary and respect for research and academic personnel. [Abroad: Professor of Veterinary Science in USA; age c. 44]

Benefits include much better access to government research funding, a competitive system of promotion, a focus on excellence, a fantastic lifestyle, and great people. Disadvantages would only be that occasionally I miss my family because I live 5000 miles from the UK. [Abroad: Assistant Professor of Sports Science in Canada; age 32]

On two different occasions during my career I did try to relocate back to the UK. The first time was shortly after obtaining my Ph. D. degree and there were very few positions available. The second time was after I had changed career paths and had gone into administrative positions. Lack of knowledge of the UK systems probably hindered my job prospects. It is difficult to compare the opportunities presented in the 1960's with those currently available. There are many of my former British associates who probably ended up here for the same reason. Marriage and family also play a large part. I have been given many professional opportunities in this country - some I have benefited from and some resulted in going down the wrong path. [Abroad: Professor of Physical Education, Recreation & Dance in USA; age c. 65]

More research dollars, more salary dollars. [Abroad: Associate Professor of Transport in USA; age c. 40]

I have been told from a number of sources that it is hard to get a job in the U.S. with a British PhD, but that the converse is not true. Taking a PhD from a well-regarded institution in the U.S. thus makes it possible for me to be a strong candidate for academic positions on both sides of the Atlantic. Added to which the American style of PhD gives me more contact with a greater number of senior philosophers, allowing for more connections and better references. [Abroad: Postdoc in Philosophy in USA; age 38]

The main benefit has been scientific. I have enjoyed consistent and generous access to unique facilities in the US. I have begun science programs I could not have engineered in the UK. I have also learned how to function in a very different academic and national environment. This has broadened my skills considerably. The main disadvantage I perceive is that I am not as well-connected yet in the US as I was in the UK, and my reputation in the UK has somewhat been tarnished by what some senior colleagues in the UK perceive as my “defection” to the US. [Abroad: Professor of Astronomy in USA; age 45]

More research funding, better salaries, better opportunities for our children. The UK is expensive, overcrowded and dirty. I no longer wish to visit. [Abroad: Professor of Mathematics in USA; age 65]

Funding opportunities for research are much broader in the US. The US academic system is more democratic, i.e. less of the old boys school. Saying this I think the situation has changed a bit in the last 10 years. Financial benefits for academics are much better in the US than in the UK. This makes coming back to the UK very difficult as I would need to take a massive cut in my standard of living. [Abroad: Assistant Professor of Chemistry in USA; age 46]

I have been able to assume a leading role in my field, with plenty of funding, excellent students, and superb colleagues. I do not see the same levels of activity in UK universities, and there seem to be plenty of complaints about funding for computer science. (I recently estimated that EPSRC’s funding for computer science in the UK was roughly equal to the funding for CS at Berkeley.) [Abroad: Professor of Computing Science in USA; age 44]

I had a much broader graduate education in the US than I would have if I remained in the UK. It also got me into the North American job market. The prospects for a job in academia were very bleak in the UK when I graduated with my PhD (there were only four positions in UK academic Geography in 1983 when I went on the market). In contrast, I alone applied for 20 positions in North America, was interviewed at three universities, and accepted a position from the University of British Columbia where I remain. [Abroad: Professor of Geography in Canada; age 44]

My move abroad was definitely of great benefit; I was able to work in a first-rate Department in a world-class university; the outstanding quality of many of the PhD students was of particular importance. Research funding was good compared with before the move. The return was more of a move horizontally, as far as career development. The quality of my colleagues is excellent, that of PhD students definitely worse, and research funding about equal. [Returner: Professor of Genetics; age c. 60]

Going to the USA to do my MSc, PhD and postdocs was good. I got training I could never have got in the UK, and have established a unique lab using that training. [Returner: Professor of Ecology; age c. 44]

International mobility is essential for modern researchers. [Returner: anonymous]

Science is an international discipline and I found it invaluable to work in labs outside the UK and understand the differences in scientific approaches influenced by different funding schemes and academic structures. Mostly I wanted to go to the most interesting lab for me at the time, regardless of geographic/political borders which are in many ways irrelevant to the scientific community. [Returner: Professor of Pathology; age ?]

Opportunity to learn new approaches, ways of thinking. [Returner: Professor of Biological Medicine; age c. 50]

There was (this was 25 years ago) a strong feeling that exposure to US science was useful, and it made you more employable I think. I certainly was able to do cutting-edge research with the latest technology, which greatly helped by subsequent research. [Returner: Professor of Biological Medicine; age c. 51]

Benefits include better pay and better work conditions. Downside is the United States culture. [Returner: Professor of Psychology; age 53]

Built lifetime links with world-leading researchers in the USA. [Returner: Professor of Physics; age ?]

It is essential to understand both one's academic subject and the world! [Returner: Professor of Biochemistry returned from Canada; age 47]

Working abroad provides insight into the research set-up elsewhere which is invaluable. [Returner: Professor of Biology; age ?]

Australia gave me opportunities to develop, which would have been difficult in the more conservative, traditional framework in the UK. [Returner: Professor of Medicine; age c. 63]

I have not moved abroad and back to the UK since my post doc in Sweden in 1981/2. I spent 20 years as a UTO in Cambridge, and recently moved to Cardiff - internationally but not abroad! Academic Benefits have all accrued through working in the best labs on an international stage. Personal/lifestyle benefits abound from periods working abroad.

[Returner: Professor of Medicine; age ?]

Benefits accrue from experience gained and from publications generated. [Returner: Professor of Biology; age ?]

It is good for the UK if the academics at universities were not all trained in the UK.

[Returner: Professor of Ecology; age c. 44]

The research positions I held in the USA allowed me to substantially improve my publications record which stood me in good stead when applying for jobs. Also, for some reason, postdoctoral experience working in the USA seems to be held in higher esteem in the UK than 'home' experience. The negative side is that you do not have the contacts when you return and need time to establish those. [Returner: Senior Lecturer in Medicine from USA; age ?]

Benefits: 1) I am at a well-known research institution with a lot of time to do research and interesting teaching at the MA level; 2) Have received a lot of support in rewriting my dissertation and publishing; 3) Less short term pressure than the US, but very dynamic and with a lot of opportunities; 4) The UK is a bridge between the US (where I did my Ph D) and Europe (I am from Spain). Disbenefit: 1) The pay does not allow you to support a family in London. [Foreign: Economics lecturer from Spain; age 29]

The department in which I work is very well integrated into the international research community. That has been beneficial. [Foreign: Professor of Economics from Germany; age 36]

The UK research environment is vibrant and motivating. A good part of the industrial bodies are keen to work in joint research project. In general the environment also seems to be more compatible with my personality. [Foreign: Professor of Computer Science, age 39]

My previous position in a research Lab in Japan had many benefits (large well-funded lab) but it was impossible to advance my own research agenda, so the compromise I made was to have more freedom to pursue my own research at the cost of not being in as well-equipped a lab. However, in time I have obtained most of the equipment I need to pursue my research. [Foreign: Senior Lecturer in Psychology from USA; age 45]

Academic salary is lower than in United States. Living expenses are higher. [Foreign: Senior Lecturer in History from Germany; age 40]

It is a challenge for family to be disconnected. It is extremely advantageous for both mover and host to experience different cultural approaches and backgrounds. [Foreign: Professor of Astronomy from New Zealand; age ?]

There was a certain amount of resentment from my UK colleagues at the beginning due to the fact that the money for the chair came from the outside and that I was teaching courses on the EU. Stories appeared in the “pulp” press that I was a “Commission spy”. I ignored these and continued with my work. Now, EU politics and policy represent one of the main attractions of MScs at []. Foreign: Professor of Political Science from USA; age 60]

It started me off in science, which has been a great life. [Foreign: Professor of Molecular Biology from Canada; age ?]

Most of my training beyond first degree has been in the UK. [Foreign: Lecturer in Physics from New Zealand; age 35]

In the short term, I see generally better research opportunities here because 1) Italy has very poor support for research 2) I moved to human genetics which in general is more advanced and has better funding than plant research. 3) my current supervisor has a higher profile than the previous. It is however unclear what my opportunities will be in the long term. [Foreign: Postdoc of Genetics from Italy; age ?]

As Director was given full responsibility for research as well opportunity for leadership.

Cost: being an outsider carries social costs and lack of appreciation by the community.

[Foreign: Professor of Pharmacology from Hungary; age ?]

I was able to work in an outstanding, international research environment. [Foreign: Professor of Medicine from Germany; age ?]

I was just starting out on my career. My main support network (colleagues and ex-teachers) were not as effective outside the US. It probably wouldn't have mattered if I had more time to establish myself first. [Foreign:

Lecturer in Philosophy from USA; age c. 40]

Granting infrastructure better in UK than in other countries I would work in (US or Australia), though not as much money put in to sciences. Close to many people in my field; however, many also work in the US which is a fair way to travel. Teaching loads in UK relatively low, allowing more time for research. [Foreign: Lecturer in Psychology from Australia; age 29]

A longer contract than in the USA, overall less jobs available on the market. Thus in a way and even change. [Foreign: Postdoc in Genetics from Italy; age c. 38]

Better networks, more stimulating research, more funding possibilities. [Foreign: Professor of Linguistics from Germany; age 55]

Quality of Life effects

I was able to bring up a family in far more comfortable circumstances than would have been the case in the UK. A high quality lifestyle, a good school system for our children, and a wonderful physical environment were all major benefits [Abroad: anonymous]

The major disadvantage has been a persistent concern about continuing grant support. My salary is based entirely on federal grant support and I have to ensure a steady stream of successful proposals to maintain my salary/research. However, this does keep my research program continuously developing and prevents stagnation. [Abroad: Fellow of Astronomy in USA; age 52]

In terms of monetary reward, improved; in terms of personal relationships, initially deteriorated (my wife of that time didn't like the US, and we divorced), then improved (my present marriage has lasted 24 years, with two kids currently going through college, and many rewards). However, I still miss the cultural heritage of England. [Abroad: Professor of Biochemistry in USA; age 60]

Worsened my lifestyle e.g. relationships. [Abroad: Research Engineer in Switzerland; age 29]

Based on comparisons with friends and colleagues in the UK universities, and with my family members who are not academics, it appears to me that salaries and other funding opportunities all are greater in the US than in the UK, while cost of living is lower. Housing costs are much lower here and obtaining comparable housing in the UK would be impossible on an academic salary. My parents visit frequently (up to twice a year) and my sisters and their families somewhat less frequently, but family relationships have remained strong nonetheless. Opportunities for personal travel are high and I'm sure that my children have already travelled more (including some transatlantic trips) than they could have expected were I based in the UK. [Abroad: Professor of Philosophy in USA; age 45]

Improved hugely. [Abroad: Professor of Anthropology in USA; age c. 45]

I have a tenure-track job that pays very well and live in Honolulu! I get to see family members about once a year which is enough for all of us: family issues are less important to me than my career and lifestyle. [Abroad: Assistant Astronomer in USA; age 38]

Having eventually ended up in Israel, where being Jewish does not mean being different, I would say that overall it has improved our lifestyle. [Abroad: Professor of Mathematics in Israel; age 57]

There are some one-off costs to relocation - understanding the new way of life (driving licenses, healthcare, education, taxation & culture generally). These were difficult and hard. At the time it was very frustrating but it did feel like it made you stronger. Now we are over the hump and we are very fortunate to have wonderful lifestyle. [Abroad: Professor of Economics in USA; age 65]

Overall the move was a huge win. The cost of living, even in the SF Bay Area, is less than in England and salaries are higher. Berkeley is a very cultured environment and also has excellent weather and spectacular scenery. Drawbacks are 1) children grow up speaking American 2) schools are of dubious quality 3) distance from family in the UK. [Abroad: Professor of Computing Science in USA; age 44]

This is a hard question to answer but I think it has improved it. I had a friend who graduated before me and has become a professor of English at Birmingham University. My income is higher than his, and there is no stress of the RAE in Canada. Whereas he pulls his hair out over it whenever I see him. The only drawback is being so far away from my family, which as my parents get older is increasingly problematic. [Abroad: Professor of Geography in Canada; age 44]

It has created significant but manageable strains on family life and leisure time. [Returner: Professor of Business; age 59]

Worsened—impacted on family life especially. [Returner: Professor of Psychology; age 53]

The move to [place] has markedly improved my income and research freedom but has markedly complicated matters on the home front because my wife has found it very difficult transferring to the anti-English Welsh culture - we will always in some senses be 'foreigners' here, even though I find it affects me much less than it does her. [Returner: Professor of Medicine; age ?]

Initially, returning to the UK was very difficult for family relationships as my wife was unable to find work for the first year, having held a significant position in the US and having contributed equally to our joint income. This led to a significant drop in our standard of living. Whether it has recovered is difficult to say as we have been here now almost 10 years. [Returner: Senior Lecturer in Medicine from USA; age ?]

Improved: 1) London is a very dynamic city; 2) My wife and I are closer to Spain, our home country, something particularly important after having a baby; 3) The city has a lot of professional and personal opportunities

Worsened: 1) London is very expensive and we have some financial difficulties; 2)

Transportation and housing are not very good and are very expensive; 3) The weather is not so good for a Spaniard! [Foreign: Economics lecturer from Spain; age 29]

University incomes in the UK are very low, so finances are worse, most cultural factors are better matched to personal tastes (otherwise I wouldn't be here). [Foreign: Professor of Astronomy from New Zealand; age ?]

Financially worse off, but I like the lifestyle better. [Foreign: Professor of Molecular Biology from Canada; age ?]

Salary is slightly better (not hugely). Overall the balance is positive because I like London, but were I not married I would be very worried about the possibility of leading an independent life in London in the long term (at post-doc salaries it is impossible to buy a house). [Foreign: Postdoc of Genetics from Italy; age ?]

It is a trade off. Better in some areas, and worse in others. [Foreign: Lecturer in Philosophy from USA; age c. 40]

Consequent academic contacts

a. UK contacts

I'm sure I have fewer UK contacts than I would otherwise have had. (In fact, I'm surprised to have received this survey since most UK academics have assumed me to be American if they haven't met me, and I was not aware of being on any list of UK academics abroad.) [Abroad: Professor of Philosophy in USA; age 45]

Weakened contacts. UK academics are not yet as attuned to international collaboration as are US academics. [Abroad: Professor of German in USA; age 44]

Less direct contact with the wider UK academic community but I have maintained close contact with my active collaborators who work at roughly five different UK universities. [Abroad: Fellow of Astronomy in USA; age 52]

These have waxed and waned depending on interest rather than on distance. [Abroad: Professor of Biochemistry in USA; age 60]

Expatriates tend to be forgotten by UK colleagues. [Abroad: Doctor of Pathology in USA; age unknown]

Contacts were strengthened in the early years, and then (inevitably) weakened after a decade or so. [Abroad: Professor of Chemistry and Biochemistry in USA; age 60]

This is only because I am on a committee involved with the running of a UK telescope in Hawaii. Otherwise the answer would be that it weakened them. My main research collaborators are in the US. [Abroad: Assistant Astronomer in USA; age 38]

Although I still maintain good contacts with older British biostatisticians, I have "skipped a generation" and do not know the younger people. [Abroad: Professor of Mathematics in Israel; age 57]

Again, initially the move weakened contacts, but after I spent a year at Bristol University on leave (1989-90) contacts improved, and by the mid-1990s I was more involved with British academics than I ever had been before. [Abroad: Professor of Geography in Canada; age 44]

b. International contacts

My contacts and collaborations with colleagues in Europe continued, and I have built new collaborations in Russia and Japan. [Abroad: Professor of Biochemistry in USA; age 60]

Had I stayed in the UK I'm sure I would have had different international contacts, but I can't say that they would have been better or worse. [Abroad: Professor of Philosophy in USA; age 45]

A mixed bag – I am away from European colleagues but have made many new contacts here in US. [Abroad: Professor of Anthropology in USA; age c. 45]

It's a little hard to answer this question since I moved to do a PhD and had no pre-existing research career. I usually attend the major international conferences and a few invitation-only workshops and have contacts everywhere. (It helps that my textbook is used in over 90 countries.) I know many excellent researchers in the UK, but have observed that at international conferences the UK contingent is far outnumbered by the American, German, and Japanese contingents, who are all well funded for conference travel. [Abroad: Professor of Computing Science in USA; age 44]

At least initially my location on the west coast of Canada made it more difficult to strike up collaborations. The collaborations I made were with either people at the University of Minnesota where I was a graduate student or with people locally within the Vancouver area. Only much later (sometime in the mid 1990s) did I engage in more far flung international collaboration. [Abroad: Professor of Geography in Canada; age 44]

Made no difference except that knowing the US makes travel there easier. [Returner: Professor of Biological Medicine; age c. 51]

As evidence of maintained link, I was recently the first foreigner to be elected as President of a major US-based scientific society. [Returner: Professor of Physics; age ?]

Cambridge to Lund, Sweden in 1981 back to Cambridge 1982 was of major importance at foundation of my subsequent career. [Returner: Professor of Medicine; age ?]

Overall no difference. probably shifted networks more to European ones and loosened American ones. [Foreign: Senior Lecturer in History from Germany; age 40]

With the latest move I have changed fields from plant to human genetics research. Research collaborations have been strengthened as a result of my work being more multidisciplinary now. [Foreign: Postdoc of Genetics from Italy; age ?]

Future career plans

Probably not, but I am always looking for different opportunities. I have interviewed for a senior academic position in the UK in the past year. [Abroad: Fellow of Astronomy in USA; age 52]

Perhaps to the UK but unlikely. [Abroad: Professor of Anthropology in USA; age c. 45]

I have multiple sclerosis. I continue to work full time and travel but I need a lot of medical support. I worry that the UK cannot meet my medical needs, and in addition I am worried about obtaining disability insurance should I return. In any case, I am very happy personally and professionally living in Vancouver and working at UBC. Comments. Five of out last eight hires at my Department have not been Canadian. International mobility of researchers is firmly entrenched. [Abroad: Professor of Geography in Canada; age 44]

I don't expect to move from the US, but I'm not opposed to it and would seriously consider offers in Europe, Canada, or Australia and New Zealand. [Abroad: Professor of Philosophy in USA; age 45]

No, although I expect to visit Europe and the UK at least once a year and eventually have a sabbatical there. [Abroad: Assistant Astronomer in USA; age 38]

I intend to apply for academic jobs on both sides of the Atlantic, and it seems more likely than not that the best offer I receive will be from an American institution. [Abroad: Postdoc in Philosophy in USA; age 38]

It's possible we'll move to the UK if/when my wife sells her company. Brief history: Considered moving back to England after my PhD. Starting salaries for Lecturer in UK were *lower* than the UK-provided PhD student stipend I received at Stanford. Was first offered a UK Professorship in 1989 when I was 27 at Aston Univ. After a visit it was clear the university was barely surviving. Was offered an endowed chair at Oxford in 1999; seriously tempted but by then was married to an American and could not find a way to make it work. Even at the top of the scale, a professorial salary does not stretch to buying a decent house in or around Oxford. Turned down another such offer yesterday, but eventually we expect to work it out. [Abroad: Professor of Computing Science in USA; age 44]

Comments I think it is of great value to most of the individuals concerned, and also of course benefits the countries who acquire migrants. The downside is the drain of talent out of countries where there is a net outflow, but basically this is a reflection of the realities of the different opportunities available in different places. [Returner: Professor of Genetics; age c. 60]

I intend to move within the UK in the near future, but ultimately would like to leave the UK again as many aspects of science here are in danger of becoming 'too provincial'. [Returner: Professor of Pathology; age ?]

No, probably but not certainly. If things got difficult a move to another European country would be considered but I am now retired with a visiting appointment at Essex. [Returner: Professor of Biochemistry returned from Canada; age 47]

The plan is to split my time between Australia and UK. [Returner: Professor of Medicine; age c. 63]

Probably not - in the hope that we can resolve the family circumstances then this suits me well academically for the last 10 years to retirement. However, if the right offer was forthcoming, eg to direct a research institute, then for the same reasons I would probably be attracted. This is much more likely to come from overseas than UK. [Returner: Professor of Medicine; age ?]

I am planning to move to the US in 2 months, for an estimated 18 months. [Foreign: Postdoc of Genetics from Italy; age ?]

Perhaps, it depends where the best opportunities arise. [Foreign: Professor of Astronomy from New Zealand; age ?]

Who knows? I've no intention to move again, and no great desire to do so. But life is a funny business. [Foreign: Lecturer in Philosophy from USA; age c. 40]

General Comments

I would say that when you make a choice, you flip the dice. There's no guarantee that things will work out better. However, a move does open opportunities. [Abroad: Professor of Biochemistry in USA; age 60]

I would recommend to anyone involved in research to move to another country for at least a year. There are many enormous benefits to be gained, but with some personal sacrifices. Most important I feel, is the opportunity to spend time in a country where the government/country realise that MONEY is a very important motivating factor both in facilitating quality research, but also in rewarding researchers' personal finances in an appropriate manner. If one is to relocate to another country, sufficient time and money must be made available to allow the individual (& family) to return home at regular intervals for decent periods of time. After a short 2 year contract in the UK beginning in August, for these financial reasons, I am now seriously considering permanently relocating to another country to conduct my research. [Abroad: Research Engineer in Switzerland; age 29]

I think all junior researchers should spend 1-2 years in another country as part of their training. The research atmosphere in the US is exhilarating and vibrant and should serve as the role model. [Abroad: Doctor of Pathology in USA; age unknown]

At various times I have had the opportunity to interview UK-based candidates for jobs in the US. My impression is that junior candidates from the UK are at a disadvantage in competing for entry-level positions in the US because UK PhDs in philosophy appear rather narrow and specialized compared to US PhDs, producing candidates who are less prepared to teach a broad range of courses, or to talk to colleagues on a broad range of philosophical topics. UK-based faculty become attractive in the US at the senior level if they have established a reputation through publication. Perhaps an analysis of actual migration data would show me wrong, but my impression is that mobility is highest at two points: at the very beginning of an academic career—when entering postgraduate training—and much later, when individuals become candidates for positions at the U.S. rank of full professor.

In the reverse direction, I am aware of some recent high-level recruitment to the UK in connection with specially funded research centres at British universities (and likewise to Australia, although their program seems more deliberately aimed at repatriating Australians). I think the number of individuals involved is too small to buck the general trend—opportunities in the US still remain much higher—and I would have questions about the long-term viability of such arrangements if I were to be offered such a position. [Abroad: Professor of Philosophy in USA; age 45]

I may decide to return to the UK but this is unlikely until much later in my career. [Abroad: Professor of Medicine in Canada; age c. 40]

I can't ever see myself coming back to the UK to work. One reason is lifestyle/salary issues - I would take a big cut in salary to return and housing is so expensive I don't ever see myself obtaining an equivalent standard of housing as I have here (this I know is also an issue among my academic ex-pat UK friends and colleagues). There are academic reasons too - some of which I alluded to above - my career development in the States has been much better than I can imagine it having been in the UK or in Europe for that matter (I did an initial post-doc in Germany before coming to the US, and frankly I didn't have a clue when I finished my Ph.D. as to what was available and what I should have been looking for in a post-doc). The system here is also much less hierarchical than in the UK. The "old boy network" of science exists in this country too, but I think it has less influence and is generally less important than in the UK - I feel much more that here one is accepted more on one's merits than on one's connections. I am now much more used to the free and easy way of working and communicating here - collaborations seem so much easier to set up and maintain in this country than in Britain, even given the much greater distances involved. The other point of course is money - money for research in the US is tight but I have the impression that it is still much easier to obtain research funding here than in the UK - especially when one hears of the closing of so many science departments. I also have friends and colleagues at

Newcastle, Cambridge and UCL, all of whom paint a fairly depressing picture - one has recently taken a job abroad. I am fortunate to have a faculty position at a major research university, but I have never encountered problems in doing whatever I wanted in terms of equipment or resources. I left and did a post-doc in Germany at a Max Planck institute as soon as I finished my Ph.D. and then came to the States to do another post-doc just to see what it was like - certainly when I came here I had no intention of staying more than 2-3 years before going back to the UK - that 16 years ago!! I still think it was valuable to obtain my graduate and undergraduate education in the UK - I think the UK educational system is much better than in the States - however, I regret not having come to the US as soon as I finished my Ph.D. - in retrospect, it would have been the better move than to go to Germany. Overall, I just find it so much easier to work here than I remember it being at home. I do miss the UK but really only for personal reasons - family, friends etc., not for work - for me the ideal situation would be to work in the US and go home to Britain for evenings and weekends!! So in the meantime I guess I'm staying put! [Abroad: Assistant Professor of Physiology and Biophysics in USA; age 43]

Apart from family reasons, my main reason for moving was to get away from lack of funding in UK, very much to get away from RAE and teaching exercises which I think are excessive, and to get away from inflexible university structures. Where I am in us there is much more flexibility, more open-ness, more opportunity. [Abroad: Professor of Anthropology in USA; age c. 45]

My experience may not be very typical, or relevant, since I came to the US in the mid-1970s and have remained here ever since, while maintaining very many connections with researchers and friends in the UK. [Abroad: Professor of Chemistry and Biochemistry in USA; age 60]

I think that increased availability of funding opportunities for UK researchers to collaborate with academics from outside UK would greatly enhance the UK's research profile. Right now it seems that the funding comes from elsewhere (i.e. US). [Abroad: Professor of German in USA; age 44]

There are positive reasons for working in the U.K. universities. However as an academic Veterinary Surgeon, I found that salaries were modest and the support for research insufficient. The UK is still a very attractive place to live. [Abroad: Professor of Veterinary Science in USA; age c. 44]

Circumstances beyond my control have made it difficult to leave this country although I would have liked to end my career back in the UK. Now I am past retirement age but in this country there is no mandatory retirement and so I will continue in my present position for another year or two. [Abroad: Professor of Physical Education, Recreation & Dance in USA; age c. 65]

I think it's important not to underestimate how much the current system of funding hurts UK institutions, both because those who are willing to consider positions elsewhere in the world often receive offers from them which include guaranteed funding, and because of the process by which it is necessary to reapply each year. This wasn't the only factor in my decision to study in the U.S. but it was very important. [Abroad: Postdoc in Philosophy in USA; age 38]

Understand that research is global. Frequent international visits are essential. Longer stays abroad are often very useful. [Returner: Professor of Business; age 59]

It is very useful for people to gain experience of different systems and widen their horizons - it makes them bolder and more willing to try new things. I would still regard this as an advantage for someone applying for a position here. [Returner: Professor of Biological Medicine; age c. 51]

UK is best place to live, wonderful people. University research is tough in my field Very little funding. RAE is total waste of time. QAA even worse. Academic freedom has been eroded considerably over last 25 years. [Returner: Professor of Psychology; age 53]

There are more schemes now providing funds for international mobility and this is a great incentive. [Returner: Professor of Biology; age ?]

The UK system has no real mechanism for encouraging people to leave the UK for training or to come back. This mechanism of neglect is benign in some respects, but may result in many people who leave the UK never coming back. [Returner: Professor of Ecology; age c. 44]

It is a lot more difficult to return to the UK that people anticipate, at least for those who have spent a significant time abroad (I was there for 15 years). [Returner: Senior Lecturer in Medicine from USA; age ?]

I think the UK system is much more open to some others in Europe, particularly Italy and Spain. This is important to enrich the academic system both in teaching and research. Because of historical and cultural reasons the UK is also a fantastic bridge between Europe and the US and that makes it very attractive for researchers. However, salaries are relatively low and that may be a problem in some cities. [Foreign: Economics lecturer from Spain; age 29]

I am born and educated in the USA but before coming to the UK I had already spent 7 years in Japan. Thus, much of the loss of contact with the USA had occurred before I arrived here in the UK. Overall, being in the UK has helped me to strengthen some ties with the US.

Although I say migration has had little effect on my lifestyle I think what I am saying is that it has had some great advantages and disadvantages and in the balance it is even. It certainly does little to promote a stable lifestyle. I would like to go back to the USA someday but honestly I think that is more wishful thinking and I would guess at the soonest would be 5 years away. [Foreign: Senior Lecturer in Psychology from USA; age 45]

There is a major difference in salary considerations. The UK will have difficulty in retaining top international researchers given current salary levels. Foreign: Professor of Political Science from USA; age 60]

Although mobility is essential in any researcher's career, there is little help (both financial and not) coming from institutions, also taking into account the fact that each move entails a certain degree of disruption in one's career. [Foreign: Postdoc of Genetics from Italy; age ?] In my MRC Unit of about 40 people about two third are from abroad. In research attracting the best is a key to success. The Government's policy (illegal under EU rules) of not paying the subsistence element to EU national PhD students grants results in a major loss of talent for developing the future of this country. [Foreign: Professor of Pharmacology from Hungary; age ?]

Just before I came to the UK I was in a department in the US where there were about 8 people. One had just come from the UK. Three of us that were there then moved to the UK. Most of these moves were for personal reasons. Being part of an international "community" provided the opportunity, but not the motive. [Foreign: Lecturer in Philosophy from USA; age c. 40]

It's a pity that there are less fundings for that: EU reduced them a lot. IT helped a lot to meet other researchers in EU and to improve research and be more competitive in respect to US. [Foreign: Lecturer in Finance from Italy; age ?]

Mobility is a great opportunity to open your mind and create interesting collaboration. The only problem exists when it is a one way move. The only general drawback is the difficulty to come back to Europe after a period in the USA, both the distance and time to come for interviews are a problem - united with the lack of funding to support such invitations for most researchers. Furthermore, there are not many positions available in Europe for researchers compared with the USA job market in this field. [Foreign: Postdoc in Genetics from Italy; age c. 38]

Annex D

The literature survey

Lesley Grayson

1. There is a substantial literature from the past four decades relating to the international mobility of researchers and other highly skilled personnel. Much interest has focused on the potential impact on less developed countries of the drain of talent to the developed world, although there is also a literature on the mobility of skilled people between the developed countries – within Europe, or from Europe to North America. There seems, however, to be relatively little literature that deals in any detail with the issue as it affects the UK. In this Annex some 30 publications on, or relevant to, the UK have been identified and summarised. The summaries at the end of this Annex run in time sequence. It should be emphasised that this collection of material does *not* represent the outcome of a comprehensive, fully systematic search of the literature, an exercise that would have been impractical given the timescale of the project. Its contribution is to summarise previous empirical evidence and the terms in which the question of international academic mobility has been addressed in the UK.

Nature of the literature

2. The publications vary greatly in terms of their

- Scope – the coverage varies from individual academic disciplines to all of science and technology, or to all disciplines; to researchers working in industrial as well as academic sectors; and to the broader picture of the mobility of highly skilled people.
- Methods – many studies are based on surveys, of opinion as much as behaviour (e.g. Royal Society, 1963; Pearson and Parsons, 1983; Schuster, 1994), and often without time series analysis. Only in the last decade have annual Higher Education Statistics Agency data on academics become available for secondary analysis (Mahroum, 1999a; Turton and Walder, 2003, Association of University Teachers, 2004). The inadequacy of mainstream statistical sources is a frequent theme in studies of highly skilled migration, and both the OECD (Dumont and Lemaître, 2004) and the World Bank (Docquier and Marfouk, 2004) are working to improve the quality and comparability of data in this area.
- Status – the documents, published over the last forty years, include academic research studies, the reports of government inquiries, and papers from interested parties in the scientific and higher education communities. They range from formally peer reviewed empirical evidence to lobbying documents.

Patterns of mobility

3. Mobility between Europe and the USA has been long studied, from the UK (Schuster, 1994), European (Mahroum, 1998, Hansen and Avveduto, 2003) and US (Regets, 1999; Stephan and Levin, 2001) viewpoints. More recently there have been studies of mobility within Europe (Ackers et al, 2003, Turton and Walder, 2003) and analysis of mobility between developing countries and the UK (Findlay, 2002). This work has covered a range of highly skilled scientific talent from postgraduate students to tenured academic staff and industrial researchers.

4. Given such a varied body of evidence, it is not possible – or wise – to draw from it definitive evidence on the trends and patterns of academic mobility to and from the UK. However, some tentative conclusions can be drawn –

- Academic mobility is not exceptional or undesirable. It is part of an overall increase in the international mobility of highly skilled professionals, especially since the 1990s. Consultation responses to the 1997 report of the National Committee of Inquiry into Higher Education, headed by Sir Ron Dearing, suggested that one in six UK academics had worked at a foreign university, and the probability of having done so increased with age and experience⁸. Academic scientists will naturally wish to gravitate to where leading edge science is conducted (Mahroum, 1999b; Casey et al, 2001; Roberts, 2002) and among high-flying young researchers, becoming part of an international ‘brain circulation’ may be considered an essential part of career development. Policy initiatives – for example in the European Union – have been designed to facilitate the process and the UK is an active participant; while it undoubtedly exports talent, it also imports it to a significant degree (OECD, 2002; Roberts, 2002).
- Initial studies of academic mobility (Royal Society, 1963; Committee on Manpower Resources for Science and Technology, 1967) focused on outward migration and failed to take account of counter-balancing inward migration, and later analyses which did so (Royal Society, 1987; Ringe, 1993) suggested that the ‘brain drain’ problem was less severe than at first thought. More recent studies argue that the UK is a net beneficiary of the international movement of highly skilled people (Findlay, 2002; OECD, 2002), even following revisions to the UK’s international migration flow statistics that had the effect of reducing net migration gains (Salt, 2003). However, the lack of fine detail in the data sources on which secondary analysis of this kind is based may mean that the generally positive picture masks net losses among some categories of highly skilled people. For example, the UK may be suffering net losses of elite scientists or the brightest post-docs. Equally, some institutions or disciplines may have a positive migration balance, and others a negative balance.

⁸ Casey, B (1997) *Report five: academic staff in higher education: their experiences and expectations* London: HMSO, 1997. para 5.11. Available at: <http://www.leeds.ac.uk/educol/ncihe/>
This report is not included among the summaries as little more detail is provided.

- The USA has long been the most popular emigrant destination for UK and other European scientists (Pearson and Parsons, 1983; Schuster, 1994; Mahroum, 1998; Hansen and Avveduto, 2003) although within the USA they are now dwarfed as a group by immigrants from China and India (Regets, 1999). The USA recognises that foreign-born and foreign-educated elite scientists make a disproportionate contribution to its science base, with the UK being the most frequent country of origin of elite foreign-born life scientists according to one study (Stephan and Levin, 2001). However, there is also evidence to suggest that continental Europe is becoming a more popular destination. This was noted by Ringe (1993) in his comparison of data for 1975-85 and 1984-92. The Association of University Teachers (2004) claims that the numbers of UK academics leaving for EU destinations rose by 76% between 1995-96 and 2001-02, with the EU as the main overseas destination in the latter year.
- The UK appears to be a significant importer of scientific and technological talent and is the main overseas destination within Europe for some disciplines (Casey et al, 2001). In higher education as a whole, some 9% of the workforce comes from Europe, compared with less than 2% in general employment (Turton and Walder, 2003). The AUT analysis (Association of University Teachers, 2004) shows that the EU was the main source of incoming academics in 1995-96 and 2001-02, and that between these years the numbers rose by 21%.
- Migration may be temporary or permanent. Stay rates vary by discipline, and there is some evidence to suggest that UK-born postgraduates, including recipients of US doctorates, have a higher stay rate in the USA than those from other European countries (Mahroum, 1998; Regets, 1999). A brief report on a bibliometric analysis of scientists awarded a doctoral degree in the UK in 1988 also suggests that those who choose, and stay in, a US destination may be of higher quality than those who remain in the UK or emigrate to other destinations. A possible counterbalancing trend to this loss of talent is provided by a very large expansion of overseas students in the UK. The numbers have trebled since the start of the 1980s, primarily because of EU exchange programmes, and many stay on (Findlay, 2002).

Motivations

5. There has been relatively little empirical analysis, but much speculation and assertion, on the reasons behind scientific mobility. In all migration decisions there are both push and pull factors, and for scientists the latter may be dominated by the attractions of working at the leading edge of their discipline, wherever that may be geographically located. Other, generally subsidiary, pull factors may include higher material rewards, the potential benefits to be gained from experiencing another culture, and possession of a common language.

6. Debate in the UK has tended to focus on push factors, and it has been persistently argued that emigration is driven by poor financial rewards, low status and recognition for academic researchers, and lack of opportunity caused by under investment in R&D (Pearson and Parsons, 1983; Schuster, 1994; Association of University Teachers, 2004; Save British Science, 2004). In some cases these claims are made not on the basis of actual emigration decisions but on 'propensities' to emigrate (Schuster, 1994), and should perhaps be considered within the context of the wider UK debate about academic salaries, employment conditions and investment in the science base (Roberts, 2002; Thewlis, 2003).

7. While motives for outward migration are dominated by career development, those for return migration seem largely personal. There is evidence from Europe that the majority of young researchers who emigrate do plan to return at some point, and stay rates for non-UK, European-born doctorate students are lower than those for their UK-born colleagues. However, loss of contact with their home institutions and broader scientific systems may lead some to be 'locked out', while those who do return may be subject to brain waste because they have fallen off the ladder of domestic career development (Casey et al, 2001; Ackers et al, 2003). Measures to ease the return of expatriate scientists are an important element of any policy to boost beneficial brain circulation (OECD, 2002) and while particularly important in those European countries with 'closed' academic systems, such as Italy (Ackers et al, 2003), may also need consideration in the UK.

8. Among established, elite scientists migration may be more likely to be permanent. Hansen and Avveduto's (2003) findings on EU-born members of the American Association for the Advancement of Science show that 70% were working outside their country of origin, over 80% in the USA. Only 13% planned to return home, including 60% of those with children.

Concepts and policies

9. Initial policy thinking in the 1950s and 1960s saw the 'brain drain' as a damaging phenomenon, as the pejorative nature of the term suggests. It was perceived as a threat to UK economic success. Later consideration of compensating inflows of skilled immigrants brought 'brain gain' into the vocabulary. The most recent formulation speaks of 'brain circulation' within a global scientific community. Encouraging young scientists and engineers to boost their skills and experience with work abroad is as important a policy objective as luring overseas talent to the UK. The latter strategy – if broadly defined to include more than just 'star' scientists – potentially has dual benefits: not only attracting scientists from overseas, but also creating the conditions in which fewer UK researchers feel the need to emigrate for good.

10. This thinking seems to be coalescing around the notion of ‘magnet’ disciplines and research institutions. Ringe (1993) associated increased immigration rates with the government’s policy of greater research selectivity and the focusing of investment on centres of excellence. Later, Mahroum (1998) emphasised the geographical clustering of European migrants to the USA in a few centres of excellence (in California, New York State and Massachusetts) but noted that ‘magnetism’ is not simply generated by good science. Additional factors such as flexible and open career structures, high rewards, a strong entrepreneurial culture and a good quality of life are also key elements in the reputation of a magnet (Mahroum, 1999b). Evidence from Italian immigrants to the UK confirms the importance of magnets, with their mix of scientific and ‘cultural’ attractions (Ackers et al, 2003).

11. The magnet concept confirms that domestic science and innovation policies are a vital element in fostering scientific immigration. However, the broad cultural element of magnetism indicates that factors other than these are significant, and possibly in a less positive way. Pearson and Morell’s (2002) study of knowledge migrants to the UK noted the standard of public services and high living, especially housing, costs as deterrent factors or sources of disquiet once in the country. The latter factor is also a significant obstacle to internal brain circulation, with 37.3% of UK higher education institutions citing cost of living as an adverse influence on recruitment and retention (Thewliss, 2003).

12. In addition to purely domestic policies, programmes to ease or assist immigration are also thought to be influential. Mahroum (1999b) argues that countries with special legislation to attract highly skilled migrants are the best placed to benefit from the global talent pool, with measures to ease the entry and boost the post-training employment and entrepreneurial opportunities of overseas students being particularly significant. Recent studies (McLaughlan and Salt, 2002; Pearson and Morrell, 2002) suggest that the UK is particularly well placed in this respect.

Impacts and implications

13. From this body of literature, some tentative conclusions on the impact of academic mobility on the UK can be drawn:

- In overall terms the UK seems to be a net beneficiary of ‘brain circulation’, with some highly rated ‘magnets’ that draw in overseas immigrants because of a combination of scientific excellence and broader, cultural attractions. Specialised immigration schemes, research policies designed to concentrate investment on disciplines and centres of excellence, and systems that provide markers of quality (such as the Research Assessment Exercise), are seen to be positive influences in this respect. However, a broader range of policies may need to be considered to address the wider dimensions of magnetic attraction such as the environment, housing costs and the state of the public infrastructure.

- The UK exports significant amounts of scientific talent, and this may be seen as a positive contribution to the beneficial process of brain circulation. However, there is some concern that too much of this talent is permanently lost (especially to the USA) because of a mix of factors that adversely affect recruitment and retention in higher education. This aspect of the ‘brain drain’ debate is closely entwined with the much broader debates over academic status, pay, terms and conditions, and the funding and management of the science base. The overseas brain drain may be employed by stakeholders in these debates as a useful headline issue to draw attention to circumstances that are more significant in a purely domestic sense, for example in leading to an internal brain drain (out of academia, or research altogether) or ‘brain waste’ (of talented young people who are ill-served by the science and technology education and research system).
- Particular concern focuses on the loss of elite scientists, both first class young postgraduates and ‘star’ researchers who, if they leave the UK, may be more likely to stay away. Individuals of this kind are essential to build up the reputation of UK ‘magnets’ which will, in turn, attract overseas talent. Policy initiatives to address problems of domestic academic recruitment and retention should help to replace a damaging overseas drain with a beneficial circulation. However, specific measures to ease the return of expatriate scientists, and ensure that they can capitalise on their new knowledge and skills, may also be needed. There seems to have been no analysis of whether the loss of UK-born elite scientists is matched by an influx of foreign-born replacements and, ultimately, the nationality of UK-domiciled elite scientists may be of little concern. What matters is to create a system that simultaneously provides a launch pad for talented scientists to enter the global brain circulation, a communications system to keep them in touch with base, and touch down facilities that welcome both domestic returnees and newcomers from other lands.

ANNEX: the literature summaries

The summaries are presented by author, in chronological order of publication. In some cases, related references are included for further information.

Royal Society (1963) *Emigration of scientists from the United Kingdom: report of a Committee appointed by the Council of the Royal Society* London: Royal Society. 32pp

This report was prompted by the Royal Society's concern at the loss of 'a number of outstanding scientists' in the previous five years including nine of its own fellows. The analysis covered the emigration of scientists qualified at PhD level or above for the period from May 1952 to 1962, in the following disciplines: anatomy; bacteriology; microbiology; biochemistry; biophysics; botany; chemistry; engineering (all types); genetics; geology and geophysics; mathematics; metallurgy; pharmacology; physics; physiology; and zoology.

Data source

Questionnaires to 563 professors or other heads of departments (96% response rate)

Some key findings

- The scale of permanent emigration of recent PhDs is estimated to be at least 140 a year (12% of the total output) and has increased by a factor of three over the study period. If temporary migration is included, the figure is estimated at least 260 (22% of the total).
- Of these individuals some 60 went to the USA, 20 to Canada, 35 to other Commonwealth countries and 25 to other countries.
- The annual rate of permanent emigration of university staff is estimated at some 60 a year (about 1% of the total) and has also increased by a factor of three over the study period.
- Of these individuals some 25 went to the USA, 25 to Commonwealth countries and 10 to other countries

The study did not cover counter-balancing scientific immigration, and was particularly concerned about the loss of talent to the USA and its implications for UK science. It notes that while there may be a compensating flow from Commonwealth countries, 'permanent immigration from the United States is negligible'.

Committee on Manpower Resources for Science and Technology (1967)

The brain drain: report of the Working Group on Migration London: HMSO, 124pp (Cmnd 3417)

This report (unseen) was one of a series of studies on scientific manpower conducted by the Committee which was established by the British Advisory Council on Science Policy in the 1950s and pioneered the collection of statistics on UK scientific and engineering manpower. The remit of the Working Group was 'to study the international migration of qualified engineers, technologists and scientists as it affects

the United Kingdom; to identify both the advantages and disadvantages; and to make recommendations’.

The Working Group used a range of its own statistical sources, concluding that there was a major brain drain of research and teaching talent, which was a serious threat to the country. The principal destination was the USA, with its higher levels of R&D expenditure, higher salaries, better career opportunities and ‘overall different attitudes’. The report also considered the benefits of the UK brain drain in respect of the assistance it provided to developing countries.

Over 20 recommendations were made, including the need for a high and sustained level of industrial investment and investment in R&D, specific financial incentives to keep talent in the country, and stronger links between higher education and industry.

Further reference

This report, as well as earlier analyses of scientific and technical manpower by the Committee, was later heavily criticised for statistical shortcomings. For example, in studies of the brain drain no distinction was made between temporary and permanent employment abroad, and compensating inflows of scientific talent were ignored. For a Canadian paper that examines the historical development of S&T manpower statistics in OECD countries, including the UK, see:

Godin, B (2002?) *Highly qualified personnel: should we really believe in shortages?* Institut Nationale de la Recherche Scientifique, Centre Urbanisation, Culture et Soci  t  : Montreal and Quebec, 33pp (Project on the History and Sociology of S&T Statistics Working Paper 15)

<http://www.inrs-ucs.quebec.ca/inc/CV/godin/shortages.pdf>

Pearson, R and Parsons, D (1983) *The biotechnology brain drain: a report prepared for the Biotechnology Directorate of the Science and Engineering Research Council by the Institute of Manpower Studies* Swindon: the Directorate, 46pp

This analysis was carried out in the context of considerable anecdotal concern within the biotechnology field about the loss of UK talent abroad, and the part played in this by the alleged lack of government support for R&D in this sector. Part of its purpose was to test the desirability and feasibility of a register of UK biotechnologists working overseas to act as an aid to their future return.

Data sources

Detailed interviews with 54 companies, higher education institutions and other research organisations

Written evidence submitted by 20 organisations

Questionnaires submitted to 133 biotechnology emigrants (68% response rate)

Some key findings

- A total of 141 UK nationals working abroad were identified, 46% in the USA, 16% in Switzerland and the rest spread across another 11 countries. A 'very rough estimate' is given of a brain drain of 250 biotechnologists since the mid-1970s (15% of the total number employed in the UK) although this includes postdoctoral researchers on short term contracts.
 - The main losers from the brain drain were higher education institutions (42%) and the main gainers were businesses (53%).
 - Virtually all the 91 emigrants surveyed by questionnaire were qualified at PhD level or above and nearly a third were in 'senior' jobs (departmental head or above).
 - The main motivation for emigration was the non-availability of 'suitable' opportunities in the UK, although the attraction of new opportunities abroad was also an important factor.
 - The majority of emigrants did not expect to return to the UK, the main barriers being the perceived lack of suitable opportunities and attendant loss of income.
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Royal Society (1987) *The migration of scientists and engineers to and from the UK: a study by the Science and Engineering Policy Studies Unit of the Royal Society and the Fellowship of Engineering* London: Royal Society, 75pp

This study focused on migration in biochemistry, chemistry, earth sciences, electrical engineering and physics, covering both emigration and immigration for the period 1975-85. Unlike the survey of more than 20 years earlier, it also covered inflows of scientists and engineers to the UK. It concluded that the brain drain was a relatively small scale phenomenon, but one that was a legitimate cause of policy concern.

Data source

Questionnaire survey of universities, research institutes and industry

Some key findings

- From the university sector 740 UK emigrants between 1975 and 1985 were identified, and 556 immigrants (including 140 who were British nationals).
- The emigration rate for postdoctoral research assistants and more senior researchers averaged about 2% of the total population annually. The figure for established university staff was much lower (0.5%) and for recent PhD graduates much higher (9%, later revised upwards to 13.5%).
- The immigration rate to university research groups (excluding those studying for a higher degree) was some 2.9% of the total UK population per year. At more senior levels immigration to university departments was 0.4% or less.
- Emigrants tended to move to long term appointments (three or more years), while immigrants tended to move to shorter term appointments (under three years).
- The motives for emigration from the UK were dominated by professional factors such as enhanced career opportunities, better pay and access to better

equipment and facilities. Non-Britons coming into the UK moved for the same reasons.

- The motives for return to the UK were dominated by personal or family factors.
 - Both emigrants and immigrants were assessed to be of ‘relatively high quality’.
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Ringe, M (1993) *Migration of scientists and engineers 1984-1992* London: Royal Society, and Royal Academy of Engineering, xii, 75pp (SEPSU Policy Study 8)

This study was closely modelled on the analysis of 1975-85 data published by the Royal Society in 1987, and covered the same subject areas of biochemistry, chemistry, earth sciences, electrical engineering and physics. However, it was confined solely to universities on the grounds that the industrial representatives interviewed for the previous study expressed little concern about the brain drain. It found a slight rise in immigration compared with 1975-85, but no change in emigration. Overall, it concludes that ‘there has not, in numerical terms, been a major exodus (or brain drain) from UK universities to other countries’, although it notes continuing worries in the scientific community that UK academia is a less attractive place to work than the private sector or overseas universities.

Data sources

Questionnaire survey of 218 heads of department and 325 research group leaders (response rate just under 70%)

Universities Statistical Record data

Interviews with ‘a range’ of academics and other relevant staff

Some key findings

- The questionnaire responses named 447 scientists and engineers who had left the UK between 1984 and 1992, of whom 228 were ‘experienced’ and 219 newly qualified PhDs.
 - Over the same period 462 scientists and engineers entered from abroad, of whom 318 were foreign-born and 144 UK returnees.
 - The average emigration rate was 2.1% for postdoctoral research assistants and more senior researchers, 13.5% for new PhDs, and 0.3% for senior staff. These figures were not statistically different from those in 1975-85.
 - The average immigration rate to university research groups was 4% (compared with 2.9% in 1975-85) and to university departments 0.5% (virtually identical to the 1975-85 figure). The UK government’s research selectivity policy and the greater concentration of funding on centres of excellence are thought to be partly instrumental in boosting scientific immigration.
 - European countries had increased in popularity as destinations for UK emigrants since the 1975-85 survey.
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Schuster, J (1994) Emigration, internationalization and 'brain drain': propensities among British academics *Higher Education* 28(4) pp437-52

Schuster re-analysed unpublished data from the 1989 Survey Among Academic Staff, which was directed by Professor A H Halsey of Nuffield College, Oxford. This was the third in a series of surveys and, for the first time, included a question on whether respondents had seriously considered applying for, or accepting, a permanent post abroad. It also asked which country or countries they had considered. Schuster recognises that the survey may have been used as 'a no-risk opportunity to "send a message" [to policy makers] under cover of anonymity', and that serious consideration of a post abroad does not amount to actual emigration. Nonetheless, his analysis, together with Halsey's broader findings, indicated widespread discontent in UK academia at this time over issues such as low salaries and declining status within society.

Data source

Questionnaire survey of 7,665 university and polytechnic staff (54.2% response rate)

Some key findings

- 40% of university and 28.7% of polytechnic staff had seriously considered a permanent move abroad. For Oxbridge academics the figure was 46.7%.
- The USA was by far the most popular destination, selected by 69.9% of university staff (including 86.4% of those from Oxbridge) and 49.6% of polytechnic staff. Australia/New Zealand was less popular with the university group (41.6%) than the polytechnics (51.2%), while Canada and Europe each appeared on about 25% of responses. 'Other' regions (including Asia, Indian sub-continent, Africa, Middle East, South America) were chosen by only 14.4% of university staff, but 32.1% of polytechnic staff.
- Roughly twice as many staff whose prime self-reported interest was research were emigration-prone as those whose primary interest was teaching.
- The proportion of academics (universities and polytechnics combined) considering emigration did not vary greatly between broad disciplinary groups. Social studies (40.9%) was followed by humanities (39.7%), biosciences (38.4%), physical and mathematical sciences (35.7%), creative arts (36.6%), health services (30.2%) and 'other professional' (30.2%).
- Interest in emigration was more pronounced at more senior tenured staff levels. For example, 50.2% of university professors had seriously considered a permanent post abroad, as against 36.5% of lecturers.
- Interest in emigration was also high among the lowest ranked, least well established 'researchers' in universities (46.7%), a finding that Schuster (a visiting American) describes as 'curious'

Further reference

For Halsey's analysis of the full 1989 Survey Among Academic Staff, see:

Halsey, A H (1992) *Decline of donnish dominion: the British academic professions in the twentieth century*. Oxford: Clarendon Press, 344pp

Mahroum, S (1998) Europe and the challenge of the brain drain *IPTS Report (29)*
6pp

<http://www.jrc.es/home/report/english/articles/vol29/SAT1E296.htm>

Mahroum considers the emigration of highly skilled individuals from Europe, particularly to the USA. He emphasises the magnetic attractions of the latter which not only encourage talented Europeans to study in the USA but ensure that many of them stay there. Rather than a mutually beneficial brain exchange between the two continents, there is a danger of a one-way brain drain. Mahroum has used the concept of magnetic attraction to study the pulling power of the UK for overseas scientists and engineers (see Mahroum, 1999).

Data sources

None; a general review article.

Some key findings

- The UK and Ireland dominate highly skilled emigration from the EU to the USA.
- A very high proportion (81%) of emigrants are in executive and managerial occupations, often entering the USA as temporary intra-corporate transfers that later become permanent. Engineering, science and medicine together account for the remaining 19% (source of data not given).
- About 50% of Europeans completing a PhD in the USA stay on, many of them permanently. In contrast, only about 8% of Japanese recipients of US doctorates remain.
- UK-born graduates have the highest stay rate of EU citizens. Only some 30% of UK PhD graduates return home compared with 70% of Germans.
- There are variations by discipline: 73% of UK engineering PhD graduates stay, compared with 65% in the life sciences and 60% in the physical sciences.
- Highly skilled European migrants to the USA are heavily concentrated in a few centres of excellence, notably in California, New York State and Massachusetts.
- It is the presence of many more such centres of excellence that is the key difference between the USA and Europe. Although European research units may perform better research in some areas, 'they lack the magnet power that can transform them into pivotal points in their fields'. This power encompasses not just scientific excellence but flexible and open career structures, a strong entrepreneurial culture, high living standards and a good quality of life.

Further reference

Regular analyses of the stay rates of foreign born recipients of US doctorates in science and engineering have been carried out by the Oak Ridge Institute for Science and Education. For the latest analysis, which appears to show a declining stay rate for UK-born PhDs, see:

Finn, M (2003) *Stay rates of foreign doctorate recipients from US universities, 2001*
Oak Ridge, TN: Oak Ridge Institute for Science and Education, 17pp

<http://www.ornl.gov/orise/pubs.htm>

Mahroum, S (1999a) Global magnets: science and technology disciplines and departments in the United Kingdom *Minerva* 37(4) pp379-90

Mahroum examines the geographical flows of overseas scientists into the UK, focusing on 'magnet disciplines' (those which have attracted 10% or more of total overseas recruits) and the five 'magnet institutions' (leading recruiters) in each discipline. The disciplines covered are clinical medicine; biosciences; chemistry; electrical and electronic engineering; physics; nursing and paramedical; IT and systems sciences; mechanical and aero engineering; and mathematics. The analysis provides insights into the factors which attract foreign scientists to particular institutions in the UK (and, conversely, may encourage indigenous scientists to stay).

Data source

Higher Education Statistics Agency data on turnover of foreign staff, 1994-97

Some key findings

- UK higher education institutions had a turnover of 11,314 foreign staff between 1994 and 1997.
- Reputation is a key factor in attracting overseas scientists, and in the UK this is signalled by Research Assessment Exercise scores of 5 or 5*.
- For the most successful institutions 'mobility and excellence are reciprocally constitutive'. Highly talented scientists flow to sites which have a reputation for excellence and, in turn, reinforce that reputation.
- Location is a secondary, but still important, aspect of magnet status. The attractions of an institution's scientific reputation are reinforced by those of working and living in a 'world city' with its attendant social, cultural and other benefits (Oxford and Cambridge count as 'world cities' in scientific terms).
- In some cases (for example, Dundee in the biosciences) scientific attractions may be sufficient to overcome the apparent lack of 'world city' status.

Further references

For another version of this paper, and for a more general paper on scientific mobility and the formation of magnets, or 'gravity centres', see:

Mahroum, S (1999) Patterns of academic inflow into the higher education system of the United Kingdom *Higher Education in Europe* 24(1) pp119-29

Mahroum, S (2000) Scientific mobility: an agent of scientific expansion and institutional empowerment *Science Communication* 21(4) pp367-78

Mahroum, S (1999b) *Highly skilled globetrotters: the international migration of human capital* Paris: OECD, 18pp (DSTI/STP/TIP(99)2/FINAL)
<http://www.oecd.org/dataoecd/35/6/2100652.pdf>

Mahroum draws on earlier studies and his own empirical investigations to identify influences on the mobility of the highly skilled. He emphasises the significant variation in push/pull factors and migration channels for different categories of highly skilled worker, and the need to tailor policy interventions to address the very different 'organisational and cognitive structures' of:

- 'accidental tourists' (managers and executives)
- 'economy class passengers' (engineers and technicians)
- 'pilgrims' (academics and scientists)
- 'explorers' (entrepreneurs)
- 'passengers' (students)

Some key findings

In respect of academics and scientists:

- International mobility is a normal and expected part of professional life.
- Bottom-up developments in science are the most influential push factor in mobility: scientists will naturally wish to gravitate towards places where leading edge work is being conducted.
- For scientists working in industry, a reputation for scientific 'openness' (freedom to publish) in the employing organisation is an important pull factor.
- For those working in academia the most important pull factors are the attraction of a country in a particular discipline, and the prestige of an individual institution. The presence of 'star' scientists such as Nobel laureates within an institution is a key marker of reputation.
- Scientists tend to more or less consciously seek out colleagues of like mind and status: 'a top scientist from Harvard will go only to another top organisation abroad that is operating in the same field'.
- Despite the significant differences between academics and other types of highly skilled migrants, immigration policies remain the most significant policy intervention. Countries that introduce special legislation to attract highly skilled migrants are the best placed to benefit from the growing global pool of talent.
- Higher education is the 'major backdoor for international mobility'. The easing of immigration rules on overseas students (and their families), and the provision of good 'after-training' opportunities (for example, venture capital and a business-friendly climate) are among the effective methods of ensuring that the host country continues to benefit from their skills.

Further reference

For a journal version of this paper, see:

Mahroum, S (2000) *Highly skilled globetrotters: mapping the international migration of human capital* *R&D Management* 30(1) pp23-32

Regets, M (1999) *Foreign science & technology personnel in the United States: an overview of available data and basic characteristics* Paris: OECD, 10pp
(DSTI/STP/TIP(99)2/FINAL)
<http://www.oecd.org/dataoecd/35/58/2102002.pdf>

This National Science Foundation paper outlines US statistical sources on foreign-born or non-citizen scientists and engineers, and presents data for the mid-1990s. A little data relating specifically to the UK is provided, and this paper is a useful short guide to US statistical sources that can provide information on UK scientific emigration. Public use versions of the NSF's SESTAT data, which provide some insight into the foreign-born science and engineering workforce, are available via <http://srsstats.sbe.nsf.gov> together with relevant workforce chapters from *Science and engineering indicators 2002* and *2004*.

Data sources

Immigration and Naturalization Service Admissions
NSF Survey of Earned Doctorates
NSF Survey of Graduate Students and Postdocs
NSF SESTAT Workforce Data

Some key findings

- In 1993 more than a quarter (135,000) of the US resident population of science and engineering PhDs were foreign-born, including some 10,000 from the UK. This is a significantly higher figure than for any other European country, but dwarfed by China and India which each provide some 21,000.
- Of foreign-born recipients of US doctorates in 1990-91, 142 were from the UK. While this is a modest number and lower than for the two other European countries cited – Greece with 240 and Germany with 177 – the stay rate of Britons in the USA is higher: 59% of this group were still working in the USA in 1995 compared with 35% of Germans and 41% of Greeks.
- Later data from *Science and engineering indicators 2004* show that in 1999 the UK contributed 5% of US foreign-born residents with the highest science and engineering degrees. It is on a par with Germany, Canada, Taiwan and the Philippines, but significantly less important than India (14%) or China (10%). In an analysis of foreign-born residents with S&E doctorates, the UK comes third with 7% after India (16%) and China (20%).

Further references

For related papers from Regets, see:

Johnson, J and Regets, M (1998) *International mobility of scientists and engineers to the United States: brain drain or brain circulation?* Washington, DC: National Science Foundation, 4pp (Issue Brief 98-316)
<http://www.nsf.gov/sbe/srs/issuebrf/sib98316.pdf>
Regets, M (2001) *Research and policy issues in high-skilled international migration: a perspective with data from the United States* Paris: OECD, 23pp
<http://www.oecd.org/dataoecd/34/26/2097008.pdf>

Pierson, A S and Cotgreave, P (2000) Citation figures suggest that the UK brain drain is a serious problem *Nature* 7 Sep 407(6800) p13

This brief report, in the form of a letter, presents the results from a bibliometric study of a stratified sample of 770 people awarded a doctoral degree in a science subject from a UK university in 1988. It was carried out for the pressure group Save British Science, recently renamed the Campaign for Science and Engineering in the UK. Although the findings are 'not, of course, proof of a brain drain', the letter claims that many of the 'rising stars of British science' emigrate to the USA and that more thorough analysis is needed.

Data sources

Not stated, but assumed to be citation data from Institute for Scientific Information.

Some key findings

- 252 were identified as still publishing scientific papers in 1999 or 2000. Of these, 157 had a UK address, 43 had a US address and 52 were elsewhere in the world.
- The UK-domiciled researchers had published an average of 2.4 articles during 1985-89; the US-domiciled an average of 2.07 during the same period (when they were still in the UK). This difference is not felt to be statistically significant. Those domiciled elsewhere had published an average of 1.15 papers.
- Papers published by the US-domiciled researchers in 1985-89 subsequently gleaned significantly more citations than those who had remained in the UK or gone to other locations.

Further reference

This small scale analysis seems to have been partly instrumental in encouraging further study of the potential of bibliometrics as a fine-grained tool for exploring the brain drain of elite scientists. For a study that summarises the strengths and weaknesses of attempts at studying the issue, and claims to be the first systematic attempt to use bibliometric methods and confirm their value in this area, see:

Laudel, G (2003) Studying the brain drain: can bibliometric methods help?
Scientometrics 57(2) pp215-37

Casey, T; Mahroum, S; Ducatel, K and Barré, R (eds) (2001) *The mobility of academic researchers: academic careers and recruitment in ICT and biotechnology* Seville: Joint Research Centre, Institute for Prospective Technological Studies, 62pp (EUR 19905)

<http://www.jrc.es/home/publications/publication.cfm?pub=728>

This study was commissioned by the European Parliament's Committee on Industry, External Trade, Research and Energy, and aims 'to identify features of emerging best practice to encourage a free and even circulation of scientific talent around the European Union and beyond'. Specifically, it focuses on the factors that condition the return of young researchers in ICT and biotechnology after a period spent abroad.

The final report is a synthesis of experience in which individual variations between countries are used to illustrate points.

Data source

Structured interviews with a research director and two returning researchers in each of 24 universities, university research institutes or national research centres. These were evenly divided between ICT and biotechnology, and located in Austria, Belgium, Finland, France, Germany, Greece, Italy, Ireland, Spain and the UK. A total of 80 researchers were interviewed.

Some key findings

- A period spent abroad is increasingly seen as an expected part of a successful researcher's career development, and access to funding for this purpose is not a significant constraint on outward mobility.
- The bulk of the researchers interviewed had spent time in the USA, but the main overseas destination within Europe is the UK. Key attractors are scientific excellence, early research autonomy and the openness of research institutions.
- The majority of researchers wish to return home, but there can be significant difficulties unless a secure pathway is planned. A large part of the brain drain may result from institutional rigidities, the loss of local contacts, and other factors that lead to researchers becoming 'locked out' of their home countries or 'locked in' to their overseas hosts.
- Those researchers who do return may be subject to 'brain waste' within their own countries because of the same mix of factors. Financial support for return is not enough if returnees are prevented from establishing autonomous research programmes or otherwise capitalising on their overseas experience.
- Promoting balanced flows of scientific personnel into, out of and within Europe depend on 'attractive institutions rather than attracting individuals'. Mobility schemes that are oriented only towards individual researchers or research projects may exacerbate the problems of brain drain and brain waste.

Stephan, P and Levin, S (2001) Exceptional contributions to US science by the foreign-born and foreign-educated *Population Research and Policy Review* 20(1/2) pp59-79

This paper is claimed to be one of the few analyses of the international mobility of elite scientists. It emphasises the heavy inflow of overseas scientists to the USA, especially since the 1970s, and notes that in 1990 25% of postdoctoral scientific researchers in the country were born abroad. The aim of the analysis is to explore whether these scientists make a disproportionate contribution to US science, comparing data for 1980 and 1990. It concludes that foreign-born and educated scientists are making exceptional contributions to US science and that 'the United States has benefited from the educational investment made by other countries, presumably to their detriment'.

Data sources

Individuals elected to the National Academy of Sciences and/or National Academy of Engineering

ISI data on authors of 'citation classics'

ISI data on authors of 'hot papers'

ISI data on the 250 most cited authors

Authors of highly cited patents

Scientists who have played a key role in launching biotechnology companies

Some key findings

- Birth and educational origins for 89.3% of the more than 4,500 individuals in the study group were identified.
- 23.8% of those who had been elected to the National Academy of Sciences (1990 data) were foreign-born, and 11.5% had received doctorates or medical degrees abroad.
- 19.2% of those who had been elected to the National Academy of Engineering (1990 data) were foreign-born, and 10.7% had received their baccalaureates abroad.
- For physical scientists, those born abroad were disproportionately represented on all the other indicators in both 1980 and 1990.
- For life scientists, those born abroad were disproportionately represented on all the other indicators in both years except in the case of 'hot papers' where the proportion was the same as in the underlying population.
- The most frequent country of origin of elite foreign-born scientists in the life sciences was the United Kingdom, followed by Germany. The reverse was true in the case of the physical sciences.

Further reference

For another study that throws some light on why the USA is so successful in attracting and retaining foreign-born life scientists, see:

Cheney, C C and Diaz-Briquets, S (2003) Foreign scientists at the National Institutes of Health: ramifications of US immigration and labor policies *International Migration Review* 37(2) pp421-43

Findlay, A (2002) *From brain exchange to brain gain: policy implications for the UK of recent trends in skilled migration from developing countries* Geneva: International Labour Office, International Migration Branch, 54pp
<http://www.ilo.org/public/english/protection/migrant/download/imp/imp43.pdf>

Professor Findlay's report is part of a series conducted by the ILO's International Migration Branch in response to a commission from the Department for International Development, and in the light of concern about the implications for developing countries of increasing skilled emigration to the UK. The study covers 'professional and managerial' occupations and students, documenting trends in migration for these broad categories during the 1990s. It also evaluates secondary sources of data on

migration to the UK, and looks at ways in which the information base could be improved.

Data sources

International Passenger Survey

Labour Force Survey

Work Permit Statistics

Asylum and Settlement Statistics

Some key findings

- During the 1990s the UK moved from a position in which the flows of skilled migrants into and out of the country were almost in balance to a position of significant net gains each year. The overall net gain in 1995-98 was 136,700, compared with 60,600 in 1991-94.
- The growth in skilled immigration has increased following changes to the Work Permit system in September 2000.
- Data on the return of skilled migrants to their countries of origin are relatively sparse, but indicate that levels of return migration in the 1990s were both low and falling. Between 1995 and 1998 it is estimated that only one skilled New Commonwealth migrant left the UK for every four that arrived.
- The number of foreign students studying in the UK has trebled since the beginning of the 1980s, primarily because of EU student exchange programmes. Policy changes in 1999 have led to an increase in Britain's global share of non-EU foreign students, and have also created conditions in which more are likely to remain after completion of their studies.
- The number of potential skilled migrants into the UK is expected to continue to rise as enrolment in tertiary education increases in developing countries. In sectors such as IT this may have significant benefits for donor countries, but there may be cause for concern about the implications for these countries in health care (medical students, doctors, nurses) and education (teachers).

McLaughlan, G and Salt, J (2002) *Migration policies towards highly skilled foreign workers: report to the Home Office* London: Migration Research Unit, Geography Department, University College London, 155pp

http://www.geog.ucl.ac.uk/mru/docs/highly_skilled.pdf

This report looks in considerable detail at recently developed schemes to facilitate the entry of migrants at the higher end of the skill spectrum, and to enable foreign-born students switch into employment. The data gathering exercise included visits to selected countries, and interviews with overseas representatives in the UK, to acquire more detailed information. The countries covered are Australia, Canada, Denmark, France, Germany, Ireland, the Netherlands, Norway, the UK and the USA.

Some key findings

Mechanisms and policies used to attract foreign skilled labour can be classified into five main groups:

- Comprehensive schemes (e.g. the German ‘Green Card’ and the USA H 1B visa) which are specifically aimed at attracting highly skilled migrants.
- Minor changes to existing work permit systems to enable quicker access for the highly skilled to the labour market, for example fast-track visas for IT specialists in the Netherlands. Such schemes are specifically targeted at sectoral labour shortages.
- Exemptions from, or relaxation of, work permit regulations, for example the Irish scheme to exempt intra-company transfers from such regulations.
- Tax incentives to reduce the tax burden for highly skilled and high earning foreign workers. This approach is common, and long-standing, in the Nordic countries.
- Policies to encourage the return migration of highly skilled workers, notably in Ireland.

Among the general findings:

- In terms of the range of specific schemes to attract the highly skilled, the UK ‘moved faster and further’ than most countries, and Work Permits UK provides a faster response rate than anywhere else.
- There is a ‘strong sense’ that such schemes are employer-driven, and that the scale of skills shortages has sometimes been over-estimated.
- Measures to help foreign students transfer to the labour market are not yet widespread, but several countries are in the process of examining possibilities. Where schemes do exist, they tend to be sector-specific.
- Only in the USA, Germany and Australia have there been systematic attempts to collect the necessary data for full scale evaluation of schemes. Evaluation frameworks are still at the development stage in many countries.

Organisation for Economic Cooperation and Development (2002) *International mobility of the highly skilled* Paris: OECD, 352pp
<http://www.oecd.org/dataoecd/9/20/1950028.pdf> (summary)

The OECD seminar on the International Mobility of Highly Skilled Workers: from Statistical Analysis to Policy Formulation, held in Paris in 2001, examined evidence on the magnitude and drivers behind the increase in the international migration of highly skilled labour during the 1990s. It includes a chapter (pp327-39) by N Rollason on ‘International mobility of highly skilled workers: the UK perspective’, which focuses on migration policy developments.

Some key points

- Flows of highly skilled labour increased substantially during the 1990s, and remain dominated by movements from developing to developed countries.
- There is growing intra-regional migration of highly skilled people in Europe, the Americas and Asia, partly driven by the growth in intra-company transfers between multinationals. The UK is among the more important sources of skilled migrants to the USA, and these include postdoctoral students and researchers.

- A significant element of intra-regional migration is temporary, suggesting ‘brain circulation’ rather than brain drain. While the UK is exporting high level skills, it is also importing them to a significant degree.
- Policy responses to brain circulation require coordinated action on migration and on science and innovation. The former includes initiatives to target particular types of highly skilled migrant, for example by introducing fast track procedures for work permits, or easing the entry of foreign students to the labour market at the end of their courses.
- Science and innovation policies conducive to attracting highly skilled migrants from abroad also help prevent permanent skilled losses, thus promoting beneficial brain circulation. They include developing research centres of excellence, ensuring a business climate that is innovation-friendly, and introducing measures to encourage expatriate highly skilled workers to remain in contact with their home countries, and ease their return.

Further references

For further data and analysis of highly skilled migration from OECD sources, see:

Salt, J (1997) *International movements of the highly skilled* Paris: OECD, 44pp
<http://www.oecd.org/dataoecd/24/32/2383909.pdf>

OECD (2003) *OECD science, technology and industry outlook 2002* Paris: OECD
 (Ch. 8, pp229-46)

OECD (2003) *OECD science, technology and industry scoreboard 2003* Paris: OECD
 (pp50-61)

OECD (2005) *OECD science, technology and industry outlook 2004* Paris: OECD
 (Ch. 5, pp144-66)

Pearson, R and Morrell, J (2002) *Knowledge migrants: the motivation and experience of professionals in the UK on work permits: final report* London: Department of Trade and Industry, 69pp (URN 02/1291)
<http://www.dti.gov.uk/migrantworkers/km1.pdf>

This study focuses on four professional groups: information technology, electronics and communications; financial services; hospital consultants; and biotechnologists. Some individuals from some of these groups may be working in academic research environments, and the general findings on the motivations of highly skilled migrants may also apply to those with a research destination. Although motivations and intentions vary by occupation, source country and individual circumstances, there are some common factors that apply to all or most knowledge migrants.

Data sources

Review of available statistical data, literature and policy development
Survey of over 300 migrants entering the UK from outside the European Economic Area on a work permit in 2000-01

Some key findings

- Knowledge migrants tend to have settled and relatively prosperous lives in their source countries. Although some faced barriers to advancement at home, for the majority of those surveyed 'pull' factors were more important than 'push' factors in the decision to migrate.
- Career advancement through access to global centres of excellence is the prime motivation for migration, and is shared by all knowledge migrants.
- Many also attach value to the personal development resulting from travel and exposure to a different culture.
- Improved earnings and economic advancement are important to some migrants from developing countries, but are not a dominant motivation for knowledge migrants as a whole. Migrants are readily prepared to sacrifice the chance of higher earnings in order to take advantage of a more interesting challenge, or to be 'at the centre of things'.
- Just over 40% of the surveyed sample had only considered the UK as a destination, the driving factors being familiarity with the language and/or a work opportunity having been made available. In cases where migrants had considered alternative destinations, the UK sometimes gained an edge on cultural grounds including its 'style of working'.
- Factors that may deter migration to the UK include the climate, distance from family and friends, standard of public services and difficulty of getting work permits. These responses were given by migrants already working in the UK, suggesting that none are of overriding importance. Few seemed to have major problems with work permits, and the most serious problems faced after entry to the UK involved high living, especially housing, costs.
- A relatively high proportion of the sample were planning to stay on, either by extending their work permits (30%) or applying for settlement (14%). Of the latter group who were concentrated in the health sector, 57% intended to apply for British citizenship.

Roberts, G (2002) *SET for success: the supply of people with science, technology, engineering and mathematics skills* London: HM Treasury, 2002. 218pp
http://www.hm-treasury.gov.uk/Documents/Enterprise_and_Productivity/Research_and_Enterprise/ent_res_roberts.cfm

The review led by Sir Gareth Roberts examined the supply of science, engineering and technology (SET) skills across the public and private sectors following an extensive consultation exercise. In respect of academia it found 'widespread concern that HEIs are increasingly finding it difficult to recruit and retain their top academic researchers, with universities in other countries and businesses both in the UK and

abroad offering better pay and conditions'. However, this problem is not evenly spread across disciplines.

Some key findings

- Existing evidence in support of an external brain drain associated with recruitment/retention difficulties is often at the 'micro level'.
- Although there is some evidence to support the view that increasing numbers of top scientists and engineers are leaving the UK compared with earlier decades, this is not surprising given the general increase in labour mobility. First destination data from the Higher Education Statistics Agency also show that SET graduates are more likely to move abroad for employment than those in other disciplines, but this is consistent with the international recruitment practices of R&D employers.
- Data from the International Passenger Survey suggest that the inflow of scientists and engineers to the UK from abroad more than matches the outflow of UK personnel. The country may, as a result, be enjoying a brain gain rather than suffering a brain drain.
- Data from the Higher Education Statistics Agency also show that the UK attracts larger numbers of overseas students in science and engineering (undergraduate and postgraduate) than in any other subject. The Review notes that the OECD considers countries receiving large numbers of such students to be best placed to exploit their talents in the workplace.
- Overall, there is insufficient evidence to support the existence of a damaging brain drain from the UK.

Despite the Review's conclusion on the overseas brain drain, it remained concerned about an internal brain drain and 'brain waste'. It argued that both higher education and businesses 'must do more to recruit and retain the UK's best scientists and engineers', for example through improvements in academic pay and conditions, PhD stipends, career development and other measures. In addition, it included many recommendations to improve the quality of science and mathematics teaching and encourage more school leavers to opt for science, engineering and technology subjects at university level.

Ackers, H L et al (2003?) *Mobility and excellence in labour markets: the question of balanced growth (MOBEX)* Leeds: University of Leeds, 11pp
<http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/index.aspx> (report can be accessed by searching on Mobex)

The MOBEX project is funded by the Economic and Social Research Council's Science in Society programme and this 'end of award' report presents 'indicative' findings from a twelve-month empirical pilot study that focused on the flows of scientists between Italy and the UK. As such, it throws light on the reasons why the UK may be an attractive destination for overseas scientists.

Data sources

Policy and legal analysis

Email questionnaires

Eight qualitative interviews with 'key informants'

52 qualitative interviews with Italian scientists in the UK, and returnees

Some key findings

- Inward migration of scientific talent is important to receiving countries both in the context of skills shortages, and as a mechanism for fostering an 'international culture' in which science thrives and knowledge is transferred.
- The UK is looked upon very positively by Italian scientists because of its association with scientific excellence and the perception of an open, transparent and meritocratic science labour market. The contrasting perception of the Italian scientific labour market as relatively closed is a key factor in encouraging migration to the UK.
- Higher and more diverse levels of funding in UK R&D, better salaries and a more established post-doctoral system are further attractions (although many respondents expressed frustration at the difficulty of securing permanent academic appointments).
- The UK is not necessarily perceived as a stepping-stone to the USA. A significant proportion of Italian scientists prefer the UK for cultural reasons.
- Return moves to Italy are 'very limited' because of the relatively closed nature of the scientific labour market and the difficulties associated with re-integration. (This suggests that the UK may derive long term benefit from at least some individuals in this particular group of scientific immigrants)
- UK and EU policy in support of the development of scientific clusters or centres of excellence is both encouraging scientists to move, and generating magnets for the most talented. The UK's 'golden triangle' is, for example, highly regarded by Italian scientists.
- The pilot project emphasises the complex nature of scientific mobility as highly dependent on political, legal and economic contexts.

A follow-up project – MOBEX 2 – on 'The impact of enlargement on scientific labour markets' began in October 2004 and will focus on flows of scientists from Poland and Bulgaria to the UK and Germany. Details are available at <http://www.sci-soc.net/SciSoc/Projects/Economics/The+Impact+of+enlargement+on+scientific+labor+markets.htm>

Hansen, W and Avveduto, S (2003) *Executive summary and conclusions* Brussels: European Commission, 23pp

http://europa.eu.int/comm/research/era/pdf/indicators/merit_exsum.pdf

This paper summarises the findings of a feasibility study for the European Commission, led by the Dutch-based research centre, MERIT. The study was entitled 'Brain drain study: emigration flows for qualified scientists' but was never published in full. The research was prompted by the difficulties of identifying good quality data on the international mobility of scientists and engineers, and looks at the current

mobility situation and at the challenges of developing more effective methods of measurement. The coverage extends to EU candidate countries, and includes analysis of European flows to the USA, Canada, Australia and New Zealand.

Data sources

Existing national data sets

Results of pilots of three surveys to consider the 'push' and 'pull' factors affecting mobility: a questionnaire survey of foreign researchers in Italy; an e-survey of EU- and non-EU-born members of the American Association for the Advancement of Science (AAAS); and a survey of the relationship between foreign direct investment and the entry of foreign-born scientists and engineers to Hungary.

Some key findings

- In 2000 257,640 skilled workers were admitted to the USA under H1-B visas, of whom 7,937 were from the UK. The UK group (many in 'hot' occupations such as IT) also reported the highest median incomes of the top 15 supplying countries.
- In 2000 1,493 EU-born individuals gained doctorates in the USA, of whom two-thirds came from Germany, the UK, France and Italy. Some 55% of UK doctorates were in science or engineering, as against 73% for Germans. Data on EU-born doctorate recipients from 1991 to 2001 show that 70% planned to stay in the USA.
- In 2002 the EU supplied 28% of the 16,422 temporary workers in the natural or applied sciences who were admitted to Canada. The UK is the leading source country for temporary immigrants from the EU.
- Data from the survey of AAAS members shows that 70% of the EU-born were working outside their home country, over 80% in the USA. The magnetic attraction of the USA is further confirmed by the fact that only 13% of the EU-born planned to return home, including nearly 60% of those with children. A third of the EU-born and domiciled planned to move abroad, including 36% of those with children and 31% of those aged 55-64.
- The minority of EU-born AAAS members who choose to stay in, or return to, the EU do so largely for family and quality of life reasons. The majority of the EU-born who move or stay abroad do so primarily because of better career advancement opportunities, broader scope of activities, better access to funding and leading technologies, and better job opportunities. Higher salaries are an important, but not deciding, factor in decisions to move or stay abroad.

Salt, J (2003)

International migration and the United Kingdom: report of the United Kingdom SOPEMI correspondent to the OECD, 2003 London: University College London, Department of Geography, Migration Research Unit, 85pp
http://www.geog.ucl.ac.uk/mru/docs/uk_sopemi_03.pdf

This report follows revisions to the UK's international migration flow statistics (backdated to 1992) in 2003, which have reduced net migration gains compared with the previous method of calculation. Data from the Labour Force Survey 2003 are also not comparable with earlier analyses because of changes in the standard

classification by socio-economic group which has led to a marked increase in the numbers allocated to the professional, employer and managerial category.

Data sources

International Passenger Survey

Labour Force Survey

Work permit data

Unpublished data from various sources

Some key findings

- Professional and managerial workers account for most of the gainfully employed among immigrants to and emigrants from the UK, although net gains fluctuate from year to year. Overall, net gains of labour from non-British people more than compensate for net losses of British workers, especially among the more highly skilled.
- Labour Force Survey data for 2003 show that the UK's immigrant workforce is generally more skilled than the domestic: 49.4% of immigrants were classed as highly skilled compared with 39.5% of the domestic labour force. Among immigrant UK citizens 65.6% were classed as highly skilled, a finding that is consistent with the notion of 'brain circulation'.
- Work permit and 'first permission' data show a rise in the number of natural scientists granted permits from 51 in 2000 to 128 in 2002. Other categories which may include some working in academia and/or in research occupations include Engineers and technologists, which rose from 6,687 to 9,587 over the same period. Health professionals and Teaching professionals also rose substantially, although this is likely to be largely as a result of teachers and doctors entering the country.
- Between 1 February 2002 and 31 July 2003 some 175 individuals were admitted to the UK under the 'Science, academia and research' category of the Highly Skilled Migrants Programme.

Further reference

For an earlier, more detailed analysis under the previous calculation method, see:

Dobson, J; Koser, K; McLaughlan, G and Salt, J (2001) *International migration and the United Kingdom: recent patterns and trends: final report to the Home Office* London: Home Office, 278pp (RDS Occasional Paper 75)

<http://www.homeoffice.gov.uk/rds/adhocpubs.html>

Thewlis, M (2003) *Recruitment and retention of staff in higher education* London: Universities and Colleges Employers' Association, 73pp

http://www.ucea.ac.uk/report_recruitment_retention_staff_he2003.pdf

The Universities and Colleges Employers' Association published an independent review of pay and conditions in 1999 (the Bett Report) and has commissioned regular surveys of recruitment and retention in UK academia since 1998. The latest country-wide evidence relates to 2002, and covers all types of staff.

Data source

Two questionnaire surveys of HE institutions (overall response rate 'around' 75%)

Some key findings

- 22.9% of institutions reported a worsening of academic recruitment problems between 1998 and 2002. For 19.8% the situation had eased, and for 57.3% it was much the same.
- 28.6% of institutions reported recruitment difficulties in science subjects, and 12.7% had difficulties in retaining staff. For engineering the figures were 27.7% and 13.5%. Both were dwarfed by business-related subjects (69.8% and 51.6%).
- 29.4% experienced problems in recruiting young academics, and nearly 25% reported retention difficulties with this group.
- Higher private sector pay levels were seen as a major cause of recruitment and retention difficulties, especially for business-related subjects. Better pay in some other parts of the public sector (e.g. the NHS and schools) were also an issue for some groups.
- Workloads affected academic recruitment for 19% of institutions, but were a more important factor in retention problems (33.3%).
- Location was an adverse influence on recruitment for 34.1% of institutions, with cost of living cited by 37.3% as a problem factor. (A subsequent survey focusing on the London area was published in 2004)
- 24.6% reported that the need to use fixed term contracts hampered academic recruitment, with 27.8% reporting an adverse effect on retention.

Further references

Bett Committee (1999) *Independent review of higher education pay and conditions: report of a committee* London: Stationery Office. Summary of recommendations at:

<http://www.archive.official-documents.co.uk/document/irhec/irhec.htm>

Thewlis, M (2002) *Recruitment and retention of staff in UK higher education: a survey and case studies 2001* London: Universities and Colleges Employers' Association, 89pp

<http://www.ucea.ac.uk/rrresearchreportfinal.pdf>

Incomes Data Services (2004) *London pay, recruitment and retention in higher education* London: Universities and Colleges Employers' Association, 72pp

http://www.ucea.ac.uk/london_pay_recruitment&retention_in_he_august_2004.pdf

Turton, I and Walder, A (2003) *A comparative study of migration of academic workers to Britain from the EU* Leeds: University of Leeds Centre for Computational Geography, 16pp

<http://www.leeds.ac.uk/law/cslpe/phare/>

This paper was given at the Symposium on Science Policy, Mobility and Brain Drain in the EU and Candidate Countries, Centre for the Study of Law and Policy in Europe, University of Leeds, July 27-28 2003. This was held in connection with the MOBEX project on mobility and excellence in labour markets, and further papers on

academic migration to and from other European countries are available via the above web address. This analysis covers academic staff and postgraduate research students.

Data sources

Higher Education Statistics Agency Staff Record 2002

Higher Education Statistics Agency Student Record 2002

Eurostat's Labour Force Survey results for 2001, included in the 2002 edition of European social statistics

Some key findings: staff

- 9.12% of those employed in higher education in the UK come from Europe, compared with less than 2% in general employment.
- Countries of origin are led by Germany (21%) followed by France (16%), the Irish Republic (15%), Italy (12%), Greece (11%), Spain (9%), the Netherlands (5%) and 'other' (11%, each providing 1-2%).
- 44% of European employees in UK higher education are women, compared with 37% of UK employees in the sector.
- The main areas of employment for Europeans lie in the biological sciences, physical sciences and languages. There are proportionally more European than UK women employed in all three disciplines.
- 66.81% of European employees in UK higher education are employed on temporary contracts (fixed term or hourly), compared with 39.72% of UK employees in the sector.

Some key findings: students

- Countries of origin are led by Greece (25.3%), followed by Germany (17%), Italy (13%), France (11%), the Irish Republic (9%), Spain (7%), Portugal (6%) and 'other' (17%, each providing 1-3%). The predominance of Greece may be related to avoidance of conscription and relatively low spending on tertiary education.
- Levels of study, subjects of study and gender balances are broadly the same for UK and European students. More European students, as expected, are studying full time.
- The main areas of study are the physical sciences, engineering and biological sciences. Far more European than UK students study engineering, although the data on UK higher education employment in this discipline suggest that many of these return home or leave academia.

Association of University Teachers (2004) *UK higher education: brain drain or brain gain?* London: Association of University Teachers, 7pp
<http://www.aut.org.uk/media/html/braindrainbraingain.html>

This analysis compares the years 1995-96 and 2001-02 and claims that, in overall terms, higher education in the UK gains more academic staff from abroad than it loses. Its interpretation of the figures are, however, rather different from those of

some other analysts. The AUT suggest that the net importation of academic staff, especially in the sciences and engineering, is less a tribute to the attractions of UK science than a necessary response to supply shortages engendered by deficiencies within the UK higher education system. For example, the closure of undergraduate science departments is leading to shortfalls in the domestic supply of researchers, while poor levels of pay are producing an outflow of potential academics into the private sector.

Data source

Higher Education Statistics Agency data, with percentage calculations by AUT

Some key findings

- In 1995-96 the UK made a net gain of 1,645 academics. In 2001-02 the figure was 1,750.
- The European Union was the main source of incoming academics in both years. The numbers arriving in 2001-02 (1,360) were 21% higher than in 1995-96, while the numbers from the USA (505) were 16% lower.
- The numbers of professors or those of equivalent academic rank coming into UK higher education from abroad fell by 23% between 1995-96 and 2001-02 (from 125 to 95). The reasons are unclear but may include unfavourable pay levels for senior staff compared with the USA.
- The numbers of UK staff leaving for overseas posts rose by 50% between the two years, from 960 in 1995-96 to 1,435 in 2001-02. For professors or those of equivalent rank, the rise was 100%, from 30 to 60.
- The numbers leaving for European destinations rose by 76% between 1995-96 and 2001-02, compared with a rise of 29% for US destinations. The European Union was the main destination for academics leaving the EU in 2001-02.
- In both years the 'great majority' of UK academic cost centres showed a net brain gain. The highest overall levels in 2001-02 were seen in clinical medicine, while other disciplines with significant gains included the biosciences; chemistry; physics; electrical, electronic and computing engineering; mathematics; computer software engineering; and mechanical, aero and production engineering.

Burelli, J (2004) *Emigration of US-born S&E doctorate recipients* Washington, DC: National Science Foundation, 4pp (InfoBrief 04-327)

<http://www.nsf.gov/sbe/srs/infbrief/nsf04327/nsf04327.pdf>

This briefing reflects concern at the reluctance of young US researchers to venture outside their homeland, in contrast to the large numbers of overseas researchers who flock to – and often stay in – the USA. In 2002 over 24,500 people earned research doctorates in science and engineering in the USA, but since the mid-1960s the number of US-born with definite plans to work or study abroad has rarely exceeded 400 per year.

Data source

National Science Foundation Survey of Earned Doctorates

Some key findings

- 3.1% of US native born science and engineering doctorate recipients (1998-2002) had definite plans to work or study abroad. This amounted to 289 individuals. The figure for non-US PhDs on temporary visas was higher (24.7%) but the magnetic pull of the USA is clearly evident in the fact that 75% of these foreign-born young researchers intended to stay in the USA.
- For those US-born doctorate recipients who did plan to go abroad, the top seven destinations (in this order) were Canada, the UK, Germany, France, Japan, Switzerland and Australia. The top three accounted for 38%, with the UK and Canada each taking about 13.5%.
- The three largest fields of those who planned to go abroad were the biological sciences (27%), physical sciences (25%) and social sciences (22%). The UK tended to be favoured by those with doctorates in the biological sciences.
- 71% of those planning to go abroad were intending to engage in further study (postdoctoral fellowship, research associateship etc). About 26% had plans for employment, with 60% planning to work in an academic institution.

Docquier, F and Marfouk, A (2004) *Measuring the international mobility of skilled workers (1990-2000): release 1.0* Washington, DC: World Bank Development Research Group, 37pp (World Bank Policy Research Working Paper 3381)
http://econ.worldbank.org/files/38017_wps3381.pdf

This paper builds on an influential 1998 study by Carrington and Detragiache, and provides estimates of skilled workers' emigration rates for some 190 countries in 2000, and 170 countries in 1990. The aim 'is to build an exhaustive international database on the brain drain' for all developed and developing countries, to act as a foundation for systematic empirical assessment of its economic effects. This, it is argued, has been impossible hitherto because of the lack of harmonised international data on migration by country of origin.

The brain drain is defined for the purposes of the study as 'the proportion of working age individuals (25 and over) with at least tertiary educational attainment, born in a given country but living in another country, taking into account neither their occupation, nor where education took place, nor when they arrived.'

Data sources

Census data on immigration

Survey data from 12 European countries for which Census data is not available in the required format

Some key findings

- The USA is the major destination for skilled workers, and its attractions are increasing. The proportion of OECD-educated migrants living in the USA increased from 48% in 1990 to 53% in 2000.
- The European Union is the second most popular destination, attracting 15.2% of the educated in 1990 and 16.3% in 2000 (these figures include intra-EU migration). Europe is also among the largest sources of highly skilled immigrants (in absolute terms)
- Skilled emigration rates are highest among developing countries, but the figures are also relatively high in the UK where the migration rate for those with tertiary education is calculated at 16.7% in 2000. However, this is lower than the 18.8% figure calculated for 1990 and represents a 2.2% decline in the brain drain over the decade.

Further reference

Carrington, W and Detragiache, E (1998) *How big is the brain drain?* Washington, DC: International Monetary Fund, Research Department, 27pp
<http://www.imf.org/external/pubs/ft/wp/wp98012.pdf>

Dumont, J-C and Lemaître, G (2004) *Counting immigrants and expatriates in OECD countries: a new perspective* Paris: OECD Directorate for Employment, Labour and Social Affairs, 34pp
<http://www.oecd.org/dataoecd/27/5/33868740.pdf>

This paper presents preliminary findings from a data collection exercise launched in July 2003 in collaboration with the national statistical offices of OECD member states, with the aim of gathering information on the foreign-born population of each OECD country by country of birth and educational attainment. This resource has been developed specifically in response to the need for better data on highly skilled migration and the processes of brain drain/brain exchange. The source data cover place of birth, nationality and level of educational attainment only. They do not discriminate between different kinds of qualification (science and technology, for example) or provide information on employment (e.g. in universities or industry).

The paper also includes an overview of OECD member state policies to encourage highly skilled immigration.

Data source

Census data from the 2000 round

Additional for countries where Census data was insufficient

Some key findings

- The UK has an expatriate community over the age of 15 of 3,229,676, of whom 1,265,863 (41.2%) possess tertiary level qualifications. This percentage

is higher than in any other European country, but exceeded by Korea (44.2%), New Zealand (44.6%), Australia (45.9%), Japan (49.7%) and the USA (49.9%).

- Only the USA, Australia, Canada, Switzerland, Spain, Sweden, Luxembourg and Norway are net beneficiaries of highly skilled migration from other OECD countries. The UK has 700,000 more highly skilled expatriates living in OECD countries than it has highly skilled immigrants from these countries.
- More than 10% of the highly skilled born in the UK are living in other OECD countries, but when inflows from all countries (not just the OECD) are taken into account, the UK is a modest net beneficiary of highly skilled migration.

Further reference

For background to the development of the new data collection, see:

Åkerblom, M (1999) *Mobility of highly qualified manpower: a feasibility study on the possibilities to construct internationally comparable indicators* Paris: OECD, 1999. 40pp

<http://www.oecd.org/dataoecd/34/62/2098912.pdf>

Save British Science (2004) *Attracting the best: report of a Save British Science Symposium on recruiting and retaining world class researchers in the UK's universities* London: SBS, 16pp

<http://www.savebritishscience.org.uk/texts/documents/2004/SBS0407.pdf>

Save British Science (recently renamed the Campaign for Science and Engineering in the UK) is a lobby group of behalf of the UK science base, and the brain drain evidence it provides is generally anecdotal and often indirect. However, this symposium report reflects a widespread perception within UK universities that pay, terms and conditions of employment and other factors are contributing to difficulties in academic recruitment and retention.

Some key points

- UK universities routinely face difficulties in recruiting and retaining world class science and engineering researchers.
- The market for top class researchers is complex and driven by factors such as pay, availability of project funding, availability and standard of equipment and facilities, freedom to pursue individual research interests, level and nature of teaching commitments, and amount of bureaucracy and administration.
- The brain drain may be internal (e.g. to research posts in UK industry, or to non-scientific careers) or external to research posts in other countries.
- Pay is an important, although not the only, factor in recruitment and retention. The report plots the 'average trajectory' of research salaries, identifying 'crunch points' at which the competition for scientific talent is likely to be particularly strong. These are the point of entry to the system, the point at which a researcher has 'proved' him/herself and the point at which a researcher begins to take on a leadership role.

Proposals costing some £250m a year are presented to alleviate pressure at crunch points. A substantial increase in the variance of salaries is advocated to allow researchers in shortage areas to be paid substantially more than the average.

The impact of international mobility on UK academic research
August 2005

Annex E
Current policies and programmes
William Solesbury

1. This note summarises the national and international policies and programmes that impinge on the mobility of UK academics. The information is drawn from the publications and websites of inter alia

Academy of Medical Sciences
British Academy
British Council
European Commission
European Science Foundation
H M Treasury
Office of Science and Technology
Research Councils
Research foundations
Royal Academy of Engineering
Royal Society
UKRO
UNESCO.

A. UK policies

2. There are a number of UK policies relevant to international academic mobility and they are sketched below.

The Science and Innovation Framework 2004-2014 (July 2004)

3. In this document the Government stated its desire for Britain to be

‘the most attractive location in the world for science and innovation.’

And, in pursuit of that, it set out plans

‘to drive up the numbers of skilled scientists and engineers; to put the science base on a sound financial footing through better management and investment in infrastructure; to support business R&D and to make the best of research across Government, especially in medical research.’ (H M Treasury et al, 2004: Foreword)

In relation to the development of skills,

‘its overall ambitions are to achieve a step change in
the quality of science teachers and lecturers in every school, college
and university;
the results for students studying science at GCSE level;
the numbers choosing SET subjects in post-16 education and in higher
education;
and the proportion of better qualified students pursuing R&D careers.’
(ibid, para 1.25)

Then in Annex B of the document it provided indicators by which it will measure progress towards these objectives in future annual stocktakes.

4. The Framework says little on the question of the international mobility of scientists. It refers to ambitions ‘to support growth in its [ie the UK’s] share of internationally mobile R&D investment and highly skilled people.’ (ibid, Box 1.1) And ‘to foster a strong, vibrant research base which attracts both talented individuals and corporate investment into the UK.’ (ibid, para 1.19) But its plans and indicators, noted above, focus exclusively on increasing the quantity and quality of the home-grown scientific workforce.

DTI’s five year programme (November 2004)

5. However, the later five year programme for DTI was a little more specific. It stated

Economic migration can also make a major contribution to our success, bringing in new entrepreneurs and investors and ensuring our businesses are not held back by being unable to find the skilled people they need. We need to make Britain a magnet for talent from all over the world. Working with the Home Office, we will therefore bring forward new policies to expand the Highly Skilled Migration Programme, retain overseas PhD students in key skills shortage areas, and give a renewed focus to UK Trade & Investment to encourage ‘brain gain’ – recruiting top business and entrepreneurs from around the world. (DTI, 2004: p 11)

The Highly Skilled Migrant programme

6. Under this programme highly skilled people from outside the EU can enter the UK to look for work or self-employment – unlike the general work permit scheme that requires a prior job offer. Applicants are assessed on a points score that covers educational qualifications, work experience, past earnings, achievement in the applicant’s field and any spouse or partner’s achievements. A stay of up to a year to search for work is allowed with a longer stay once economically active. Related to this is a policy that permits both newly qualified, non-EU MBAs and science and engineering postgraduates to stay on for a year. (Home Office, 2005)

B. Programmes supporting international mobility

7. There is a rich mix of funding programmes that can support the international mobility of academic researchers. The British Council's SISTER website (www.sism-uk.com) provides a portal leading to about 150 schemes available to 'UK researchers, postgraduates and international students who are seeking funding for international collaboration in science and technology.' These schemes vary in a number of ways, notably –

a. what activity is funded?

Here there is a wide range of offers with increasing degrees of commitment expected of the participants. The range extends from support for international workshops, through research visits, to short term posts and longer term fellowships, but usually time-limited and with an expectation that the holder will return. For example,

- The COST (Co-operation in Science and Technology) programme supports networking between researchers already active in a field of shared interest.
- The Royal Society provides funding for short visits (between one week and three months), for networking through meetings or workshops, and for joint projects between UK and overseas researchers.
- The Daiwa Anglo-Japanese Foundation offers both small grants to individuals and larger awards to institutionally-based applicants.

b. what disciplines are eligible?

Here there are distinctions based on the overall remit of the funders – they may have a commitment to particular disciplines or they may have adopted research priorities. For example,

- The UNESCO Man and the Biosphere (MAB) programme, launched in 1971, promotes international co-operation in research, training and information concerning the development and management of terrestrial ecosystems; UNESCO has similar programmes in oceanography, geology and hydrology.
- The individual UK Research Councils support international collaboration within their fields. To illustrate, the BBSRC funds an international scientific exchange scheme, an international fellowship scheme and international workshops as well as research programmes that allow or encourage international collaboration.
- Other funders, like the Leverhulme Trust's research interchange scheme or the British Council's visit scheme, support most disciplines.

c. at what career stage?

Most programmes are clear about the career stage at which they are targeted and, as such, are informed by a view of the benefits to the researcher of the mobility supported.

For example,

- The European Science Foundation's Young Investigator Awards (EURYI) scheme is designed to attract outstanding young scientists, with between 2 and 10 years postdoctoral experience, from anywhere in the world to create their own research teams at a European research centre.
- The European Community Framework Programme's Marie Curie awards provide support for intra-European and international mobility at all career stages, through advice and funding for training, visits, networks, events, fellowships and chairs.

d. for outward or inward mobility?

Most schemes available in the UK are designed to provide opportunities for outward mobility; but there are exceptions in schemes to support visits or appointments in the UK or schemes to foster mobility in any direction. Examples of the latter two cases are

- The Leverhulme Trust's Visiting Professorships that enable a UK university to host an internationally distinguished foreign academic for between 3 and 10 months; the Royal Society and the British Academy offer similar Visiting Fellowships and Professorships.
- Among the Marie Curie awards are both Incoming and Outgoing Fellowships with, in both cases, support for the reintegration of the holder in their country of origin on their conclusion; there are also grants for any European researchers who have worked outside Europe for more than five years and wish to return.
- While not exclusively targeted at inwardly mobile researchers, the general fellowships or professorships offered by research funders or institutions may provide an attractive return route for UK academics after a period working abroad.

e. how restricted geographically?

Many schemes that fund mobility are restricted to participants moving to or from specific countries; few are global in their scope. Some are restricted to particular groupings, for example,

- The Association of Commonwealth Universities provides Scholarships and Fellowships to increase mobility between Commonwealth countries (and the USA).
- The NATO Science Programme has initiated a Science for Peace and Prosperity programme focused on its new partner countries in central and eastern Europe to assist their transition to market economies and democratic governance.

Other schemes are bilateral, for example,

- Schemes run by the Anglo-German Foundation or the Daiwa Anglo- Japanese Foundation and the many joint schemes that the British Academy and Royal Society run jointly with foreign academies.

C. Overview

8. Taken together, the policies summarised in section A above have two important characteristics. First, none of them are *specifically* concerned with *academic* mobility beyond the postgraduate level – fostering international mobility is seemingly a missing dimension to science policy. Secondly, they are all concerned exclusively with *inward* migration – encouraging outward flows or circulation seems not to be on the policy agenda.

9. Regarding the programmes summarised in section B, it is impossible to estimate what is the annual take-up by UK academics of the offers in them. It is probably fairly slight - most of the UK schemes are only offering small numbers of awards annually and the international schemes are obviously open to non-UK competition. Evenso, three general observations can be made –

- many organisations funding research in the UK and the EU attach importance to mobility, clearly regarding it as a valuable investment in their research communities;
- they take a broad view of mobility and are keen to support its many forms, both short and long-term; and
- inward mobility is valued as well as outward mobility and, in a few cases, the return of the mobile researcher is offered support.

In these respects the programmes take a broader view of mobility than is explicit in the policies summarised above.

References

Department for Trade and Industry (2004), *Creating Wealth from Knowledge: the DTI Five Year Plan*, DTI, London, available at www.dti.gov.uk/fiveyearprogramme.html

European Commission (2003), *A rough guide to the Marie Curie Actions*, Brussels

H M Treasury and Department for Trade and Industry, Department for Education and Skills (2004), *Science & innovation investment framework 2004-2014*, , HMSO

Home Office, *Working in the UK, Information about the Highly Skilled Migrant Programme* – on www.workingintheuk.gov.uk