

BRITISH AND INDIAN SCIENTISTS MOVING TO THE U.S.

ABSTRACT

This paper analyses why British and Indian scientists working in Boston's pharmaceutical and biotechnology sector moved to the U.S. Based on over two hundred structured interviews, I examine two aspects of their migration. First, whether both groups differed in their reasons for migration, and second, how important economic and social network factors were in influencing their migration. I show that there were distinct differences between both groups. British scientists were driven mainly by professional opportunities, whereas Indian scientists were mainly driven by educational opportunities. Both groups used social contacts to varying degrees when making the final decision to move to the U.S.

KEY WORDS

Highly skilled migrants; Social networks; Boston; Pharmaceutical and biotechnology sector; Human capital

There is now an extensive literature on highly skilled migrants (Koser & Salt, 1997; Meyer, 2001; Saxenian, 2002, 2006; Raghuram & Kofman, 2002; Beaverstock, 2002, 2005; Zhang, 2003; Hernández-León, 2004; Borjas, 2005; Yeoh and Willis, 2005; Williams & Baláž, 2005; Williams, 2006; Zaletel, 2006; Scott, 2006, 2007; Khoo *et al.*, 2007a, 2007b; Millar & Salt, 2008), but what remains relatively under-researched is

why they leave their home countries and move abroad. In addition, few scholars have compared the reasons why highly skilled workers from developed and developing countries immigrate to other countries. Much of the literature on skilled migrant workers continues to employ microeconomic theories to explain why people move abroad. Although such cost-benefit perspectives are important in helping to explain why people migrate, they tend to overlook the significance of social network factors.

This paper analyses some of the principal reasons why highly skilled British and Indian scientists immigrated to the U.S. I argue that there are four broad categories that explain why they moved. First, for postgraduate education; second, for professional training; third, for job opportunities; and fourth, as a result of social networking with groups such as family members. I question to what extent highly skilled migrants from the U.K. and India differ in their reasons for migrating to the U.S. In addition, I examine how important economic and social network factors are in influencing highly skilled workers to move abroad.

REVIEW OF THE LITERATURE

Economic determinants

Microeconomic theories of migration argue that individual rational actors decide to migrate because of a cost-benefit calculation. Sjaastad (1962), for example,

argues that people migrate when they are more likely to receive an increase in per capita labour earnings. Later, Borjas (1999) developed the idea of a 'global migration market', when individuals rationally calculate the benefits of staying in a particular country versus immigrating to one or a number of foreign destinations. He argues that individuals migrate to places where they expect their net returns over a period of time to be greatest. This argument is particularly relevant to highly skilled migrants in specialised fields who move to other countries to find good professional opportunities. Within this group the highest numbers of people are leaving middle-income countries because they have both the incentives and means to move (Beine *et al.*, 2008).

Although microeconomic theories of migration are critical in helping to explain why people migrate, some scholars have argued that people do not respond mechanically to wage and employment differences, they are not homogeneous with respect to tastes and motivations, and the contexts within which they make their decisions are not the same (Massey *et al.*, 1998). This is important in the context of establishing the significance of economic and non-economic factors in driving migration decisions. A study of highly skilled migrants from developing countries who were working in the U.K., for example, found that income was a 'significant' rather than a 'dominant' factor in their decision to move to the country (DTI, 2002, p. 12). In addition, microeconomic theories of migration say little about the ways in which migrants from different countries may vary significantly in their motivations

to move. Furthermore, migrants do not always have access to the necessary information to make a rational choice about migrating to one place rather than another because of differences in wages and opportunities. As a result, many scholars now accept that migration is a heavily social process with family members and social relationships influencing individual migration decisions (Boyd, 1989; Ackers, 2004).

A common assumption made of microeconomic theories of migration is the exclusive focus on 'economic' costs and benefits (DaVanzo, 1981). Although economists have considered the importance of other factors such as 'opportunity costs' (job opportunities), 'direct costs' (transportation and moving expenses) and 'psychic costs' (the expense of keeping in contact and visiting family and friends) in influencing migration, such factors have been considered secondary in importance compared to economic factors. Campbell (2001, p. 161) argues: "It is universally acknowledged that economic motivators are stronger than social ones (such as children's education) in determining a decision to emigrate." What remains unclear in the context of highly skilled migration is how important both economic and social factors are in shaping migration decisions, and whether there are any distinct patterns among migrant groups which determine their movement.

Within the microeconomic framework lies human capital theory which views labor migration as an investment decision in which a migrant balances his or her expected returns with the costs involved, including risk and uncertainty (Sjaastad,

1962). If an individual expects his or her human capital to hold greater value abroad than domestically then this will strongly influence that person to move (Regets, 2001). Economists argue that higher levels of education will increase the propensity of people to migrate (Chiswick, 1999; van Dalen & Henkens, 2007). In addition, it is well-known that many students move abroad for their education. The U.S., for example, attracts a large volume of international students because its universities offer well-recognised degrees and therefore better opportunities in the labour market. The U.S. State Department issued 65,000 student visas in 1971, compared to 315,000 in 2000 (Borjas, 2002). More recently, Hazen and Alberts (2006, p. 201) argued: "By 2003, there were an estimated 586,323 international students in the US, representing a 17-fold increase since the mid-1950s." Although there was a temporary fall in student numbers moving to the U.S. since September 11th, 2001, it remains an important entry route into the country's labour market for many migrants because education and work experience in other countries are often of a lower quality and more difficult to transfer. In the academic year of 2008-2009, for example, international students in Colleges and Universities in the U.S. rose again to an all-time high of 671,616 (Institute of International Education, 2009). In spite of these rises, many foreign students are restricted from paid employment opportunities in the U.S., which pushes them into self-employment (Kanas *et al.*, 2009). In short, human capital theory argues that education is the ultimate "investment increasing the productivity of human resources" (Sjaastad, 1962, p. 83), and yet it does not discuss investment in education as a key determinant of

migration, nor does it suggest any differences in the way that migrant groups invest in their education and skills. In contrast, at a national level, Beine *et al.* (2008) found that skilled migration can actually have a positive impact on the human capital levels of developing countries, which questions the pessimistic view of the brain drain argument.

Some scholars claim that student mobility has been neglected within the skilled migration literature (Baláž & Williams, 2004). This is surprising given that students are “[...] the only group who migrate primarily in order to enhance their human capital, and ostensibly for fixed time periods” (Baláž & Williams, 2004, p. 218). The international movement of students is important because: “Students and scholars, in fact, represent the largest numbers of the highly-skilled in the global economy and where people choose to attend universities is a solid determinant of where they will settle” (Ewers, 2007, p. 125). A number of scholars have argued that students from developing countries in particular move overseas for educational opportunities. Biao (2003, p. 28) showed that in 2001, 146,000 Chinese left to study overseas. Similarly, Saxenian (2006) found that many engineering and computer science students from China and India studied at Stanford University and UC Berkeley before working in the ICT sector in Silicon Valley upon graduating. Waters (2006) argued that many students from Hong Kong moved to Canada because of their perception of achieving a more valuable ‘Western’ university degree. In this example, human capital and cultural capital were significant in influencing student

migration decisions. Whilst the above literature compares the factors that drive migrants to move from different countries, it does not tease out the degree to which the relative level of economic development in the home country compared to the host country may determine these factors.

The above cases show that a significant number of students are moving to developed countries to study and are subsequently remaining in their host country to pursue work opportunities. Surprisingly, there has been less analysis of students from developed countries or comparison of students from both developed and developing countries. This is significant because these students have the potential to improve international knowledge flows and production (Regets, 2001) and yet theoretically there may be key differences between both groups. This paper aims to address this gap in the literature through comparing the international migration experiences of highly skilled workers from developed and developing countries. Ackers (2005) observes that it is important to separate undergraduate flows from postgraduate and postdoctoral flows because although the former are numerically more dominant, the latter may be of greater concern because sending countries have invested more in the development of their human capital.

Social networks

Since the 1960s, scholars have started to emphasise the importance of family members, friends and other actors outside of the workplace, who influence people to

migrate. Sjaastad (1962, p. 85) argued that non-monetary costs must be considered when understanding migration: "Since people are often genuinely reluctant to leave familiar surroundings, family, and friends, migration involves a 'psychic' cost." Ritchey (1976, p. 375) also found: "The presence of relatives and friends is related to choice of destination area. In general, the factor is thought to operate through increasing psychic benefits of an area, reducing the pecuniary cost of job relocation, and increasing information availability." Many scholars have tended to overlook these important psychic costs because they are more difficult to quantify than economic variables such as income.

However, it is well acknowledged that non-economic factors such as family members, friends, colleagues and professional contacts are critical in influencing migration decisions (Stark & Bloom, 1985; Massey et al., 1998; Taylor, 1999; Robinson & Carey, 2000; Raghuram, 2004; Ackers, 2004; Ley & Kobayashi, 2005). The new economics of migration theory critiques some of the traditional assumptions made in neoclassical theory:

Migration decisions are not made by isolated individual actors, but by larger units of related people – typically families or households, but sometimes communities, in which people act collectively not only to maximize expected income, but also to minimize the risks and to loosen constraints associated with various kinds of market failures, apart from those in the labour market (Massey et al., 1998, p. 21).

Raghuram (2004, p. 305) argues that family members have tended to be absent from

the migration literature “[...] partly because the significance of the notion of human capital in such accounts means that the unit of analysis is inherently individualised.” Ackers (2004) rightly observes that although economic determinants can well-explain the migration of young, single and more footloose workers, for those with partners, children or elderly parents other family factors come into consideration. I explore in this paper to what extent highly skilled migrants make the decision to immigrate to another country with members of their family and other social contacts, or whether they make such decisions independently.

Scholars are now developing non-economic links between people in sending and receiving countries which influences migration (Boyd, 1989). Social networks, for example, connect migrants and non-migrants in the receiving country as well as migrants and family and friends in the home country. Boyd (1989, p. 642) argues that migrant networks help explain the causes of international migration.

Thus, studying networks, particularly those linked to family and households, permits understanding migration as a social product – not as the sole result of individual decisions made by individual actors, not as the sole result of economic or political parameters, but rather as an outcome of all these factors in interaction.

Social relationships among individuals, firms, or institutions are arguably significant in influencing people to migrate: “The effective units of migration were (and are) neither individuals nor households but sets of people linked by acquaintance, kinship, and work experience” (Tilly, 1990, p. 84). However, it remains relatively

unclear how important social networks have been for highly skilled migrants. The work by Robinson and Carey (2000, p. 101) is one of the few exceptions: "Highly skilled migration was thus not just prompted by social and economic imperatives, but was also operationalized through non-economic networks and facilitated by socially and culturally derived obligations." Hernández-León (2004) found that social networks were so effective that they replaced formal recruitment channels for helping highly skilled industrial workers from Mexico to find work in the U.S. Having said this, Perreira *et al.* (2007) found that social relationships beyond work ties and school networks were not significant for the immigrant youth in their sample. This paper analyses further the degree to which different social networks as well as economic factors are important in shaping the migration decisions of highly skilled workers.

The literature on migrant networks distinguishes between different types of ties, which draws on the work of Granovetter (1973) who argues that strong ties (i.e. family members and close friends) are less important than weak ties (i.e. acquaintances) for providing professionals with new job information. In the context of migration, Massey (1990) finds that strong ties are more critical than weak ties for enabling migrants to move. In contrast, Bagchi (2001) suggests that many, although not all, highly skilled professionals are more likely to use weak ties for job searches abroad because they have better access to such contacts and they do not hold strong ties in the host country. Harvey (2008), on the other hand, finds that British and

Indian scientists in Boston use a combination of strong and weak ties for finding work and there are no significant differences between senior and junior workers in terms of the types of social contacts they use. This study follows-up on Bagchi's (2001) call for further research into differences in network usage when making migration decisions.

An important component of migrant social networks is 'chain migration', when a large number of people from the same country of birth move to a particular country. This relates to the cumulative causation theory of migration, which argues that as workers accumulate migration experience they create new incentives to move (Massey *et al.*, 1998). Over time, positive migration experiences lead to further flows of migration (Sana and Hu, 2007). Newly-integrated migrants use their social networks with potential migrants to provide detailed information about their experiences of moving to other countries. Chacko (2007) finds that large numbers of Indian graduates from the same universities have immigrated to the U.S. to pursue further educational and professional opportunities because they have heard positive stories of working in the U.S. from their predecessors. Montgomery (2008) extends this point showing that students at IIT universities in India strategise about what U.S. universities to apply to. As her respondent Krishna states:

We meet and discuss which schools are the most likely to accept certain individuals, and then we are careful not to flood any particular school with applications. If a school gets a lot of applications from India they may just select a few of us. So we try to spread

ourselves out (Montgomery, 2008, p. 84).

In short, social networks can help lower the costs of migration and integration. This has led to some economists arguing that people of lower socioeconomic status are more likely to use social networks than people of higher socioeconomic status (Goodman, 1981, p. 137). Johnston *et al.* (2006, p. 1247) argue that chain migration among skilled migrants “[...] may no longer play the central role posited for it a few decades ago” because they “have many more sources of information about opportunities – including their own experience – in other countries than was available even four decades ago.” This reinforces the importance of exploring the significance of social networks for determining highly skilled migration.

It remains unclear to what extent migrant groups from developed and developing countries differ in their use of social networks for making decisions to work abroad. Meyer (2001) shows that highly skilled South African and Colombian migrants have marked differences in why they left their home countries. Colombians are more likely to move abroad for educational opportunities, whereas white South Africans are more likely to migrate for professional purposes. He argues that there are distinct variations between highly skilled migrants from countries with different levels of development. These variations mean that people differ in the types of social contacts they use for moving abroad. The literature also distinguishes between *bonding* social capital, which refers to social networks within migrant groups of a similar socioeconomic status, and *bridging* social capital, which

refers to social networks between immigrants and the indigenous population (Putnam, 2007). With social capital, which is the value instilled within social relationships, it is argued that the larger the number of social contacts immigrants hold, the greater their social capital and therefore the better their economic position (Kanas *et al.*, 2009).

Social networks also enable potential migrants to assess the advantages and disadvantages of moving to different places compared to their current location. Developing Ravenstein's (1876, 1885, 1889) 'Laws of Migration', Dorigo and Tobler (1983) argue that migrants will move depending upon a range of 'push' and 'pull' factors. Push factors are characteristics that cause a person to be dissatisfied in his or her current location contributing to their departure, whereas pull factors are the positive characteristics in other places which attract that person to move. Sana and Hu (2007), for example, argue that a lack of social security, which is an indicator of job informality, is a powerful push factor for migration from Mexico to the U.S. In terms of highly skilled professionals, Oteiza (1967, 1971) argues that there four differentials (i.e. push-pull factors) in the sending and receiving country that are critical for influencing migration: income and remuneration, logistical support, prestige and status, and political circumstances. These differentials have often led to a brain drain from developing countries: "Emigration of elite occupations is a consequence of international imbalances which permit advanced industrial nations to offer more attractive remunerations, work facilities, social standing, and general

life conditions to those whose skills and talents they need” (Portes, 1976, p. 492). Lowell *et al.* (2004) appropriately use the term ‘brain strain’ to emphasise the two-way mobility of highly skilled migrants as a result of positive and negative factors. The Chinese Government, for example, has encouraged many of its top students to be educated abroad and is now seeking the rewards of their return. Saxenian (2006) refers to this return of highly skilled migrants to their home countries as ‘brain circulation’. According to Portes (1976), the key driver of highly skilled professionals leaving their home countries is a lack of jobs that can satisfy the professionals’ aspirations. This paper aims to explore the importance of economic and social network factors for determining movement amongst migrant from developed and developing countries.

Push-pull migration theory importantly explains some of the structural factors in sending and receiving countries that influence migration, which are strongly influenced by social networks at home and abroad. Donato *et al.* (2008), for example, found that U.S. immigration policies affected the employment of Mexican migrants to the U.S. and have worsened the economic and social costs for women and to a lesser extent men. Rodriguez (2004) argues that this flow of migration into global cities has also occurred because of the demand for specialized skills and expertise in the primary labor market. Importantly, although this demand has stemmed from the labor market, the process has been facilitated by immigration policies. The H-1B visa, for example, has historically enabled employers to quickly recruit highly skilled

foreign workers into the U.S. as an alternative avenue for skilled labor (Rodriguez, 2004). This significant flow of highly skilled workers has led to further demands for low waged workers in the secondary labor market such as cleaners and bar staff, who represent a larger share of the immigrant workforce (Bean *et al.*, 2004). In the U.S., this has culminated in a bimodal pattern of immigrant education as well as labor market segmentation, with many people either being very poorly educated and later occupying low paid jobs, or very well educated and later occupying well paid jobs (Bean *et al.*, 2004; Rodriguez, 2004). In both instances, push and pull factors are the reasons migrants give for moving. These explanations stem from both the demand side, including employers and immigration policies, and the supply side, including the immigrants in the sending and receiving countries who acquire knowledge through their social relationships with different actors, which lowers the costs of movement (Hagan, 2004).

Further development is needed into the supply side and in particular the degree to which migrant groups may differ in the weight they place on various factors for moving. This is important because we know that there are marked differences in education and job opportunities in developed and developing countries, but there has been little in the way of theorising these differences. One would expect, for example, that highly skilled workers from developing countries that have a lack of good universities, would move abroad at an earlier stage in their lifecycle compared to highly skilled workers from developed countries who have

good universities in their home countries. Equally, if developed or developing countries have strong universities, but weak labor market opportunities, then one would expect highly skilled workers to move abroad at a later stage in their lifecycle, for job opportunities.

In light of the above literature review, I aim to address the following two research questions:

1. To what extent do highly skilled migrants from developed and developing countries differ in their reasons for migrating to the U.S.?
2. How important are economic and social network factors in influencing highly skilled workers to migrate?

METHODOLOGY

This research is part of a larger project on the social networks of British and Indian scientists working in Boston. Boston was chosen as the case study location because it is one of the largest high technology clusters in the U.S. and hosts a significant proportion of foreign inhabitants (25.8%) according to the U.S. Census Bureau (2000). Theoretically, it is not clear whether migrants from developed and developing countries differ in their reasons for making migration decisions. I wanted to choose two migrant groups that had a strong history of science in their home countries and that had a similar proportion of expatriates in Boston. Both the

U.K. and India have a good historical background in science and there is a similar representation of first generation British (0.4%) and Indian nationals (0.4%) in the Boston area (U.S. Census Bureau 2000).

The term 'highly skilled migrant' is not well-defined in the theoretical literature. Hernández-León's (2004) highly skilled Mexican respondents moving to the U.S., for example, hold very different levels of education and training to my British and Indian scientist respondents. My respondents are considered highly skilled because at the time of the research they had obtained at least a bachelor's degree, with nearly three-quarters of both groups holding a Ph.D or an M.D. (see Table 2). In addition, all respondents had acquired three or more years of paid or unpaid employment since their highest educational qualification. At the time of their migration many of my respondents would not have been categorized as highly skilled under the above definition because they were students or recent graduates. As a result, I decided to classify respondents as highly skilled at the time of the research so as not to discount the views of those that were not highly skilled at the point of their migration. Most British and Indian expatriates have lived in the U.S. for an extensive period of time with many arriving on L1 and H-1B visas and the average respondent having lived in the U.S. for twelve and fourteen years, respectively. This is not necessarily the norm amongst the highly skilled since secondments, expatriation and short, medium and long-term business travel are also becoming viable alternatives (Faulconbridge *et al.*, 2009; Millar and Salt, 2008).

Interviews were chosen as the principal data collection method because respondents worked very long hours and were unwilling to invest too much time into this research. Structured interviews enabled me to collect high quality data in a relatively short time period.

A total of one hundred and one British-born scientists and one hundred and one Indian-born scientists were interviewed between January and June of 2006. The majority of respondents were interviewed over the telephone (60%) with the remainder in person (40%). There were no apparent differences in the quality of responses provided in face-to-face interviews compared to telephone interviews. The average age of British respondents was 42 and the average age of Indian respondents was 39. Eighteen percent of my British sample and twenty-eight percent of my Indian sample were women (see Table 1). Although scholars have recognised how gender may affect the migration experiences of skilled workers (Kofman, 2000; Purkayastha, 2005), it was not the focus of this study. However, this is a potentially important area of enquiry given the predominance of men in the pharmaceutical and biotechnology sector around Boston as well as in my sample. Ethnicity is another significant social characteristic, but it is not the focus of this paper since my respondents did not appear to receive preferential or worse treatment because of their ethnicity. One of my respondents, for example, was British-born and of Indian ancestry and had made similar career accomplishments to other respondents with the same levels of education and professional experience. In short, my British and

Indian respondents did not indicate to me either directly or indirectly that they had experienced invisible barriers such as glass ceilings as a result of their gender or ethnicity.

Table 1: The age range, gender, visa status and company position of British and Indian scientists in Boston

A number of key gatekeepers were used for gaining access to respondents because there was no register of foreign scientists working for pharmaceutical and biotechnology companies in the Boston area. I also made important contacts through professional events such as conferences, workshops and meetings, as well as through social events such as sports and recreational clubs. Snowballing was another important technique used to gain additional contacts. These different avenues ensured that a range of people was interviewed within each expatriate group. Pseudonyms are used in this paper to protect the identity of interviewees. I do not give the name of companies for confidentiality reasons, but give an indication of the type (for example, pharmaceutical or biotechnology) and size of the company. I use the following categories to distinguish between different sized firms: small firm: 0-49 employees; medium firm: 50-249 employees; large firm: 250 or more employees.

This research is not an attempt to be statistically representative of all highly skilled expatriates working in the pharmaceutical and biotechnology sector in the U.S. However, the purpose is to try and represent the views of British and Indian

scientists working in this sector in the Boston area. Although there are no figures on the number of British- and Indian-born scientists working in the pharmaceutical and biotechnology sector around Boston, a sample of over one hundred respondents from each group as well as particular patterns in responses suggest that they are representative of British and Indian scientists around this city. After interviewing approximately fifty respondents from both groups it was clear that many of the answers that respondents gave started to cluster around key themes, but I continued to interview over a hundred respondents from both groups and probed them to explain their answers to increase the quality of my results.

British and Indian scientists were attracted to working in the U.S. because of its strong academic and industrial reputation in the scientific sector. The high concentration of pharmaceutical and biotechnology companies around Boston made the city an ideal location for analysing scientists. The city holds the second largest number of venture capital funds and hosts several world-renowned universities such as Harvard University and the Massachusetts Institute of Technology (MIT) (Brookings Institution, 2002). The fact that Boston holds some of the best universities and hospitals in the world, as well as most of the leading pharmaceutical and biotechnology companies has meant that it has attracted a large number of scientists, both nationally as well as from abroad.

REASONS FOR MOVING TO THE U.S.

Graph 1: Principal reasons for immigrating to the U.S.

British and Indian scientists differed significantly in their reasons for immigrating to the U.S. As Graph 1 illustrates, for British respondents, 30% came to conduct postdoctoral research, 29% for a new job, 26% for an internal company transfer, 8% for social reasons and 7% for postgraduate education. In contrast, for Indian respondents, 50% came for postgraduate education, 32% for postdoctoral research, 10% for social reasons, 7% for a new job and 1% for undergraduate education. Theoretically, these results are important because they demonstrate distinct differences between migrant groups in their reasons for immigrating to the U.S.

POSTGRADUATE EDUCATION

Table 2 shows that both groups held advanced educational qualifications, but most British scientists graduated from universities in the U.K., whereas Indian scientists predominantly graduated from universities outside of India. A small proportion of British scientists (7%), for example, immigrated to the U.S. for furthering their education (postgraduate university education), compared to 50% of Indian scientists. Although there are marked differences between British and Indian scientists in terms of the reasons given for immigrating to the U.S., the majority considered when they were migrating to the U.S. that they would be moving

temporarily. Having said this, at the time of the fieldwork the average British respondent and the average Indian respondent had lived in the U.S. for twelve and fourteen years, respectively. These results are an important extension of human capital theory because highly skilled migrants from both countries invested in their education with the expectation of greater economic returns after their migration compared to the original costs incurred before moving. Similarly, most scholars argue that highly skilled migrants move abroad for professional or educational purposes (Meyer 2001; Baláž & Williams, 2004; Saxenian, 2002; Zaletel, 2006; van Dalen & Henkens 2007). Saxenian (2002, p. 13), for example, found that 79% of Chinese, 79% of Taiwanese and 54% of Indian engineers in Silicon Valley moved to the U.S. to further their education.

Table 2: The location and highest educational degree of British and Indian scientists

There is an important *geographic* component to human capital theory in the context of this research with most British respondents completing their education internally in the U.K., whereas most Indian respondents completed their education externally in the U.S. Nearly two-thirds of British respondents (61%), for example, studied for their highest educational degree at a Russell Group university.ⁱ The average British respondent moved to the U.S. when they were 30 years old and more qualified, compared to the average Indian respondent who moved to the U.S. when they were 25 years old and seeking further qualifications. This is significant because there is little discussion in the literature about how an individual's investment in his

or her human capital may depend upon where he or she is residing. A person is less likely to move abroad to invest in their human capital, for example, if he or she has good educational opportunities domestically. Graph 1 shows that Indian scientists immigrated to the U.S. for postgraduate education by 43 more percentage points than British scientists. Human capital theory does not show *where* migrants obtained their highest educational degree, which is significant because migrant groups from developed and developing countries in this case differed in where they decided to complete their higher education (see also Meyer, 2001). This is important because it shows that individuals have varying perceptions of where the best educational and professional opportunities are. In terms of British respondents, they were confident of completing their education in the U.K. and subsequently moving to the U.S. after graduating because both countries hold a number of world-leading universities, pharmaceutical and biotechnology companies as well as research-intensive hospitals. In contrast, many Indian scientists either did not have the same opportunities to complete their university education in India or did not feel that a university degree from India would be recognised on the same level as one from the U.S.

PROFESSIONAL TRAINING

Gaining professional training in universities and pharmaceutical and biotechnology companies was an important reason that British and Indian scientists moved to the U.S. A similar proportion of British (30%) and Indian (32%) scientists

said that they immigrated to the U.S. to conduct postdoctoral research. Janet Reid, head neuropharmacologist of a large biotechnology company, said that she always had the desire to work in the U.S. because of its strength in scientific research. Like most respondents, when she moved to the U.S. she did not intend to remain in the country permanently, but was offered a job before she left the U.K. that was distinctly better in terms of professional opportunity than anything that was available in the country. Previous social relationships that she forged with professionals in the U.K. as well as in the U.S. helped her to make an informed decision about whether it would be strategically better to work in the U.K. or the U.S. Her decision to immigrate to the U.S. was initially driven by her desire to gain international professional experience and she realised at the time of moving that she would benefit more in terms of knowledge and career development than if she remained in the U.K. Therefore, professional development was the principal reason that Reid immigrated to the U.S. rather than necessarily a higher salary.

Professional experience and social networks were also important reasons that Indian scientists immigrated to the U.S. Padam Rachit, senior scientist at a small biotechnology company, said that in large part he moved to the U.S. because people in a similar situation to him were doing the same.

The decision was really a herd instinct. Out of thirty-two people in my grad class in Bangalore, twenty-eight came to the U.S. for higher studies. Given the economic circumstances of India at the time and the fact that my school was highly reputed, it was

easy to get a job and an easy decision to make because everyone else was doing the same.

My main reasons was [sic] partly economic, partly lifestyle, and partly, more importantly, opportunities for my professional and scientific area.

The socially expected norm of studying overseas as well as the reduced risk because others were doing the same were key reasons that Rachit and most of his contemporaries at university moved to the U.S. His social network with his peers was an important source of information, but not necessarily the key driver of his migration. Lack of opportunities in India contrasted with excellent professional training prospects and a better standard of living in the U.S. as well as a 'herd instinct' are important factors in explaining why Rachit and other Indian scientists moved to the U.S.

Theoretically, British and Indian scientists are principally immigrating to the U.S. to increase their professional and university experience, but they are using social networks to reinforce their decisions. In other words, they have already made the choice to move to the U.S. and are using social contacts to support their decision as well as to help with the process of finding work, moving and integrating. Rather than relying on social contacts of friends and former colleagues, many respondents tended to take advantage of their social contacts with people from their current university who helped with the process of securing their postdoctoral position. Matthew Watson, senior scientist of a small biotechnology company, said that the U.S. was the best place in the world to build-up his scientific training and the process

of getting his first job was achieved through key university contacts.

JOB OPPORTUNITIES

Most British respondents said that they immigrated to the U.S. for a job opportunity. Graph 1 shows that the majority (55%) of British respondents immigrated to the U.S. for professional purposes (internal company transfer and job opportunity). Adam Vince, Vice-President of a medium biotechnology company, said that there is a strong emphasis on having exposure to and experience of working in science in the U.S. that many people talk about a 'BTA' (Been to America) as a vehicle for career progression. He explains that his experience of working in science in the U.S. for the first time opened his eyes to the opportunities that were available compared to those in the U.K.: "My eyes had really been opened. I had never seen science of that scope. It was 1996/1997 and there was a gold rush for gene search. They were doing science on an industrial scale which made your eyes pop as a post doc. Something clicked in my mind that this was the future." Many British respondents considered a job opportunity in the U.S. as an important way of developing their own skills that would benefit their long-term career progression. Conceptually, this is important because there is a fuzzy boundary between moving for job opportunities and moving for professional training. A number of British respondents, for example, said that they moved to the U.S. for both a good job opportunity as well as to gain a different type of scientific training.

A significantly larger proportion of British scientists than Indian scientists immigrated to the U.S. for job opportunities. Graph 1 shows that the percentage of British scientists that move to the U.S. for a new jobs was 22 points higher than Indian scientists. In addition, 26% of British respondents moved to the U.S. for a company transfer, compared to zero Indian respondents. These results highlight the wide differences between British and Indian scientists in their reasons for moving to the U.S. As discussed above, one of the main reasons for this difference is that most British scientists (91%) studied for their highest educational degree in the U.K. and migrated to the U.S. after they had graduated or after working for a few years. In contrast, many Indian scientists moved to the U.S. for postgraduate education.

In the same way that many Indian scientists immigrated to the U.S. for educational purposes because there were few opportunities in India, many British respondents immigrated to the U.S. for job purposes because there were very few attractive jobs available. Michael Johns, scientist at a large pharmaceutical company, argued that there were a limited number of jobs available in the U.K. and he was given an excellent career opportunity in the U.S.:

In all honesty, the lack of jobs. My boss was going to start a company, but it was going to take six months or so. I fancied a change and wanted to get out of Cambridge [U.K.] and I had the opportunity here to set up a group from scratch. I'd never have had that opportunity in any other country.

The above quotation mirrors Portes' (1976) finding that highly skilled migrants move

because of a lack of opportunities in their home countries.

A large proportion of British scientists (26%) were already working for global companies in the U.K. before they were posted overseas as internal company transferees. Ralph Field, general manager of pre-clinicals at a large pharmaceutical company, did a secondment in Connecticut for eight weeks and then worked for a large pharmaceutical company in the U.K. and then the U.S. He then worked for another large pharmaceutical company in the U.K. before transferring to Boston. He emphasised that the decision was based on a temporary prospect. "It was not like everything in Britain was awful. It wasn't like a defining moment of leaving the U.K. and never coming back. It was a wonderful opportunity and if it didn't work out then we'd come back to the U.K." Nigel Thompson, Director of a large pharmaceutical company, said that he transferred to the U.S. because he was dissatisfied with his work in the U.K. and he had the opportunity to expand into chemistry, which was not available at his company's branch in the U.K. Although most British respondents were 'pulled' to the U.S. by a good professional opportunity, some of these people were also 'pushed' through unsatisfactory job experiences in the U.K. In both cases, this research shows the tendency of British scientists to adopt a professional-benefit and to a lesser extent a cost-benefit decision when migrating. In other words, respondents decided to immigrate to the U.S. because of the better job opportunity, including the remuneration package. These explanations relate to microeconomic, social network and push-pull theories of

migration: microeconomic theory because of the cost-benefit decision, social network theory because information was acquired through personal contacts, and push-pull theory because factors in the home and host country were compared.

Financial issues

A large proportion of British and Indian scientists said that when they made the decision to immigrate to the U.S. they thought their income would be higher compared to other countries. Many British (80%) and Indian (54%) scientists said that they thought they would receive a higher income in the U.S. One of the reasons for this difference was because at the time when they were moving, most British scientists were migrating for job purposes and therefore expected a higher salary to encourage them to move. In contrast, Indian scientists were mainly moving for either postgraduate or postdoctoral training and as a result they did not necessarily expect to receive a higher salary. David Ball, global head of clinical trials for a large pharmaceutical company, said that his salary would be double what he was being paid in the U.K. However, "My decision wasn't necessarily a financial one, but a welcome bonus." Indeed, although most British scientists thought that their income would be higher in the U.S. this was not the main reason that respondents said they immigrated to the U.S. Peter Mason, Director of a large pharmaceutical company, for example, said that his salary would not change significantly, but in the long-term it has worked out that way: "It was a toss up. My income was going to be higher, but my wife wasn't working so it worked out about the same. In hindsight, it has turned

out quite a lot higher.” Several British scientists immigrated to the U.S. purely to do postdoctoral research, which for Charles David, Director of a large pharmaceutical company, meant: “I might have been earning say \$12,000 a year.”

Indian scientists also stressed that income was not an important factor in their decision to immigrate to the U.S. Krishna Veer, senior scientist of a small biotechnology company, said that his income as a student was going to be limited: “I was going to be a student, but I knew it wasn't going to be high. It was more the opportunity that would be high. There's only so much you can get from a student stipend.” In this context, Veer was talking about the professional opportunity, rather than the opportunity to earn a high income in the future. Madhu Charu, manager of a large pharmaceutical company, said that her income would be lower in the U.S. compared to her previous job in India: “Actually, I took a big pay cut (I used to earn three times as much). I wanted to be close to my husband and the lab was excellent.” The above responses show that income was not a major consideration for respondents when they made the decision to immigrate to the U.S. Instead, it was issues related to education and career development, as well as social factors involving family members. These findings are important theoretically because they suggest that migration decisions are not made entirely because of economic conditions or as a result of a cost-benefit calculation.

Although many British and Indian scientists said they thought their income would be higher if they moved to the U.S., this was not a major factor in their

decision to move to the U.S. As Tom Churt, Chief Scientific Officer of a medium pharmaceutical company, argued: "Income wasn't a factor in my decision to migrate." More British than Indian scientists said that they thought their income would be higher if they moved to the U.S. because most of them had completed their education when they were considering moving, whereas many Indian scientists were making the decision to migrate based on postgraduate educational opportunities. Both groups made it clear that income was not a decisive factor in influencing them to migrate to the U.S. Instead, it was the opportunity to conduct cutting-edge scientific work in the world's leading country for pharmaceutical and biotechnology research. At a local level, Mahroum (2003) also found that a regional economy's reputation is critical in attracting top foreign scientists.

My results suggest that economic incentives were important *additional* factors that encouraged British and Indian scientists to immigrate to the U.S. A similar proportion of British (64%) and Indian scientists (59%) said that they had received financial support to move to the U.S. There were, however, significantly different levels of economic support that both migrant groups received. This was not because of varying treatment towards these migrant groups, but again because British scientists were largely moving to the U.S. to work, whereas Indian scientists were largely moving to study. The Indian respondents who were moving to the U.S. as students typically received a small sum to cover their air travel. They also received research fellowships, teaching assistantships and stipends from their universities

when they arrived in the U.S. However, generally little financial support was provided to help them move to the U.S. In contrast, most British respondents were moving for job and professional opportunities and were generously remunerated for their relocation costs. Simon Church, scientist of a large pharmaceutical company received a lucrative relocation package from his company:

The company pretty much paid for it all: re-location costs, costs for selling the house in the U.K. (estate agent fees, solicitor fees), flights, a hotel for two months, fees for buying a new house, we were given people to show us around the area and help us settle in. I get a mortgage subsidy over four years; I still get it – it's outstanding.

Simon Fison, Director of a large pharmaceutical company, also received a generous relocation package. His company paid for his flights, the shipping of his household goods, free temporary housing for three months, as well as a generous signing-on bonus, which meant "[...] it was too good an offer to turn down." Economic support in moving to the U.S. was an added benefit that most British and Indian scientists received. However, such financial assistance was not critical in causing people to move to the U.S. as many people moved in any case because they considered it an investment in their human capital.

Methodologically, there is some slippage between professional opportunities and income. It is difficult to establish, for example, whether respondents weighted professional opportunities more importantly than a higher income because it presented them more favourably as scientists. That is not to say that professional

opportunities were not critical in influencing respondents to move to the U.S., but rather that income might have been more important in practice than they suggested. Further research is needed to establish whether professional opportunities and income are independent drivers of highly skilled migration.

SOCIAL NETWORKS

In the context of postgraduate education, professional training and job opportunities, I have argued above that social networks are important for British and Indian respondents immigrating to the U.S. This section highlights that social relationships influenced and facilitated British and Indian scientists moving to the U.S. in different ways. I find that family networks were important for migration decisions, but other strong ties such as friends and professionals were less influential in the decision-making process and more influential in helping with the process of moving. Varsha Uma, scientist at a large pharmaceutical company, for example, said: "A friend of mine who was in the same lab as me moved to a company where she headed the group, which I joined once I graduated." She argued that she would have been less likely to study at university in the U.S. had she not firstly spoken to her friend about the university and secondly not known anyone enrolled at the university. In this instance, a social contact eased some of her concerns about the process of immigrating to and living in the U.S., but this was not the reason that Uma decided to move. Michael Richards, Vice-President of a large pharmaceutical

company, also emphasised the importance of social contacts in two separate instances:

I came to join a small start-up biotech. I did all my education in the U.K. and the person that I was going to do my Ph.D with began working for [...biotechnology company A]; we stayed in touch. I did my post doc at [university A] in New York and then came back to the U.K. I then got in contact with the guy at [...biotechnology company A] and he got me a job there in 1989 in the U.K. My professor at [...university A] then made me aware of an opportunity with a start-up in Cambridge, Massachusetts.

The different social networks that Richards maintained with his Ph.D and postdoctoral supervisors at various stages of his lifecycle were important in helping him to secure two separate jobs. However, it was clear that he already wanted to move to the U.S. if he could find work and as a result the process of moving was made more straightforward through his different personal contacts. This example was typical of the social contacts that British and Indian scientists used to find work in the U.S.

A small proportion of British and Indian scientists, 17% and 6% respectively, said they moved to the U.S. predominantly for social reasons, broadly defined. In these instances, social contacts were critical in influencing scientists to migrate. Piers Flight, Director of Research, at a large pharmaceutical company, said that his wife was influential in his decision to immigrate: "My wife has previously worked abroad and I hadn't, and she encouraged me to come because it would be good experience.

She also wanted to work in the U.S.” In this respect, Flight’s wife was more eager to move to the U.S. than he was. Ian Mason, scientist at a medium pharmaceutical company, was also strongly influenced by his wife:

My wife and I decided that I was going to get out of the academic sector. She was a U.S. national and she was looking at jobs in the U.S. We basically narrowed down to the Boston area and the San Francisco area, and an opportunity in the Boston area came up first.

The above examples demonstrate the significance of family members in shaping a decision to move to the U.S. They also show how decisions of working abroad are often intricately entwined with family needs and in these instances social networks are central in shaping such decisions. In addition, both quotations suggest that the wife is leading the decision to move, which is in contrast to the ‘trailing spouse’ argument (Harvey, 1998). A number of Indian respondents also made the decision to immigrate to the U.S. for family reasons. Monica Chahna, for example, senior scientist at a large pharmaceutical company, said that her main decision to immigrate was owing to her husband wanting to be trained abroad. Deepta Kara, scientist at a small pharmaceutical company, said that she immigrated to the U.S., not for professional purposes, but to join her husband. She had to re-train as a pharmacologist because her education from India was not recognised in the U.S. These examples demonstrate that the husbands of both Indian respondents were the migration decision-makers, which, in contrast to the two British respondents,

supports the argument in the theoretical literature of female 'trailing spouses'.

Similarly to the theoretical literature (Raghuram, 2004; Ackers, 2004; Kobayashi & Preston, 2007), the above examples illustrate the importance of family members in influencing highly skilled migrants to move to the U.S. However, most highly skilled migrants did not immigrate for one purpose, but largely owing to a number of decisive factors. Donald Smith, medicinal chemist at a large pharmaceutical company, for example, argued that there were a number of factors that influenced his immigration to the U.S.: "The wife was the main reason, although it also required an attractive job offer in a good location." Arguably social networks are particularly important when there are several reasons why people would consider migrating because they can help clarify the strengths and weaknesses of moving. However, in this example it is not clear whether the social relationship was the most critical factor in the decision, or whether it was the job. This reinforces the argument that social networks, including strong ties, are not necessarily influential in the decision-making process.

Many British (69%) and Indian (47%) respondents said that they made the decision to immigrate to the U.S. with immediate family members and partners. Graph 2 shows the types of people British and Indian scientists used to make migration decisions. The 22 percentage points difference was not owing to British scientists valuing family members and partners more as a migration source than Indian scientists. Rather, most British scientists were older than most Indian

scientists at the time when they were making the decision to migrate and therefore were more likely to have spouses and children. Daniel Grayson, for example, President of a medium biotechnology company, said that his wife was integral:

When I came to [...company A] I had no intention of staying in the U.S. In fact, after two years of working in Cambridge, Massachusetts I moved to South Africa where I lived for another two years. So, I really only decided to stay in the U.S. in 1995. I did this because I got married to an American. She was really the only person I discussed it with.

Avasa Durba, scientist of a medium pharmaceutical company, said that she made the decision to immigrate to the U.S. firstly with her parents and then with her friends. She also said: “My seniors who graduated before me were a good source of information about what it was like here.” In the case of her classmates, these contacts were not so important for her in making the decision, but more in informing her of what it was like to live and work in the U.S.

Graph 2: Partners in immigration decision-making

The above figures suggest that different social contacts such as family members, friends and peers were of varying importance for highly skilled migrants in their decision to immigrate to the U.S. Avasa Durba, for example, was quite nervous about the prospect of migration and would most likely not have moved to the U.S. if it were not for her discussions with these different social contacts. In contrast, thirty British and forty Indian respondents said that they made the decision to move to the U.S. independently (see Graph 2). Rajiv Khalid, for example, Director

of a medium biotechnology company, argued that he made the decision to immigrate to the U.S. independently but the decision was made easier because “I knew people who were at the place of my Ph.D and I came and did the same thing.” This is important because although he made the decision to migrate himself, the decision-making process was eased through his social relationships with his predecessors. In this respect, social relationships were of latent significance in shaping his decision to move. Similarly, most British and Indian scientists who said they made the decision to move to the U.S. by themselves admitted that their decisions were shaped by social contacts with different actors including family members, friends, supervisors and potential employers.

Regardless of whether respondents said that they made the decision to move to the U.S. with social contacts or not, their final decision was still shaped by their conversations and interactions with different people. However, the degree to which these contacts were important was more limited. In short, although social networks helped the majority of British and Indian scientists to make the decision to move to the U.S., the degree to which these contacts *influenced* the decision varied significantly. I would argue that there are at least three broad typologies of social contacts. First, the ‘fact-provider’ who is a person that has visited, studied or worked in the destination country and therefore can provide specific information about its characteristics as a place to live and work. Second, the ‘enticer’ who might be a potential boss or supervisor offering a person a job and therefore a specific incentive

to move. Third, the 'influencer' who is a close family member or friend that assists the person to weigh-up the pros and cons of staying versus moving and who helps with making the final migration decision. Although these are crude categories because there is inevitable overlap between them, they nonetheless demonstrate how social networks can vary in the degree to which they influence highly skilled migration decisions. These categories also overlap with the strong and weak ties argument, with 'fact-providers' being weak ties, 'enticers' being intermediary ties and 'influencers' being strong ties. This research suggests that strong ties ('influencers') are more significant, although because there is a lot of slippage between these different categories, further research is needed to ascertain the relationship between and relative importance of strong and weak ties in shaping highly skilled migration decisions.

CONCLUSIONS

This paper has focused on two main research questions. The first asked to what extent highly skilled migrants from developed and developing countries differ in their reasons for migrating to the U.S. I showed that British scientists tended to migrate to the U.S. principally for job opportunities, whereas Indian scientists migrated principally for educational opportunities. A key rationale for this difference was that British postgraduate qualifications were more highly valued in the U.S. compared to Indian postgraduate qualifications. In addition, at the time of

migration, the university opportunities in the U.K. were stronger than in India, meaning that Indian respondents moved to the U.S. at an earlier stage of their lifecycle than British respondents, who were predominantly educated at university level in the U.K. This suggests that highly skilled migrants from developing countries may migrate at an earlier age than highly skilled migrants from developed countries, although more extensive research is needed to compare and stratify the experiences of groups from other countries with varying degrees of economic development. This research also found that British and Indian scientists moved to the U.S. when they were young which supports the human capital argument that skilled workers will move when they have a longer period of time to recoup their investment in education and training (see also van Dalen & Henkens, 2007). This work suggests that human capital theorists should consider exploring the ways in which people not only invest in their education at different times of their lives, but also in different places. These temporal and geographic choices arguably have marked implications in terms of integration and achievements in the workplace.

The second research question asked how important economic and social network factors are in influencing highly skilled workers to migrate. In terms of economic factors, both migrant groups argued that professional training within universities and pharmaceutical and biotechnology companies were important reasons that they moved to the U.S. I found that economic considerations were one of many important factors in the decision of highly skilled migrants to move to the

U.S. The majority of Indian respondents, for example, were moving to the U.S. as postgraduate students and received small stipends, but knew their future income was likely to be high if they remained in the country, despite many stating that they intended to return to India after their education. British respondents, who were mainly moving for new job opportunities, predominantly argued that income was not an important factor in their decision to move to the country even though they knew their potential income was likely to be higher. In short, these results shed some additional light on microeconomic theories of migration by demonstrating that although economic factors are critical in influencing migration, it is by no means the only or most important consideration. However, what remains unclear is the extent to which highly skilled migrants over-emphasised the importance of professional opportunities and simultaneously under-emphasised the significance of income in their migration decisions. This work could not make this distinction, but it remains a potentially critical area for future research on highly skilled migrants.

In terms of social factors, highly skilled workers said that key actors such as family members, friends, as well as potential employers and supervisors were important in shaping migration decisions. Many British (68%) and Indian (51%) scientists said that they made the decision to move to the U.S. with immediate family members. Even the people that did not make the final decision to immigrate to the U.S. with others (30% of British respondents and 40% of Indian respondents) said that their decision was still strongly influenced by key actors such as family

members. Although in the vast majority of cases social contacts were important, the degree to which respondents were influenced in the decision-making process varied from spouses, many of whom essentially made the decision to move, to classmates who tended to share insights, but did not share the decision-making process. Similarly to the literature on migrant networks, I find that individual social relationships, and in particular interactions with family members, are central as sources of migration information for the highly skilled. However, this research highlights the importance of 'reading through the lines' when conducting research on highly skilled workers. These types of respondents, for example, might claim that they made the decision to move with key contacts such as family members when in fact it was predominantly their own decision. Equally, they might claim that social networks were not influential when they were making migration decisions because they want to give the impression that they are independent professionals. Further research is needed to fathom exactly to what degree different actors are influential in driving highly skilled migrants to move abroad. Although this study has found that both economic and social factors were to some extent important in the decision-making process for highly skilled migrants from developed and developing countries, future research could also explore the *relative* importance of these factors.

Table 1: The age range, gender, visa status and company position of British and Indian scientists in Boston

Age range	26-35	36-45	46-55	56+
(%)				
British	24	47	25	4
Indian	33	51	14	2
Gender	Male	Female		
(%)				
British	82	18		
Indian	72	28		
Visa status	U.S. citizen	Green card holder	H-1B visa	L1 visa
(%)				
British	25	56	11	8
Indian	36	45	19	0
Company position	CEO or President	Vice-President or Director	Manager of senior scientist	Researcher or scientist
(%)				
British	10	50	19	21
Indian	7	22	35	36

Graph 1: Principal reasons for immigrating to the U.S.

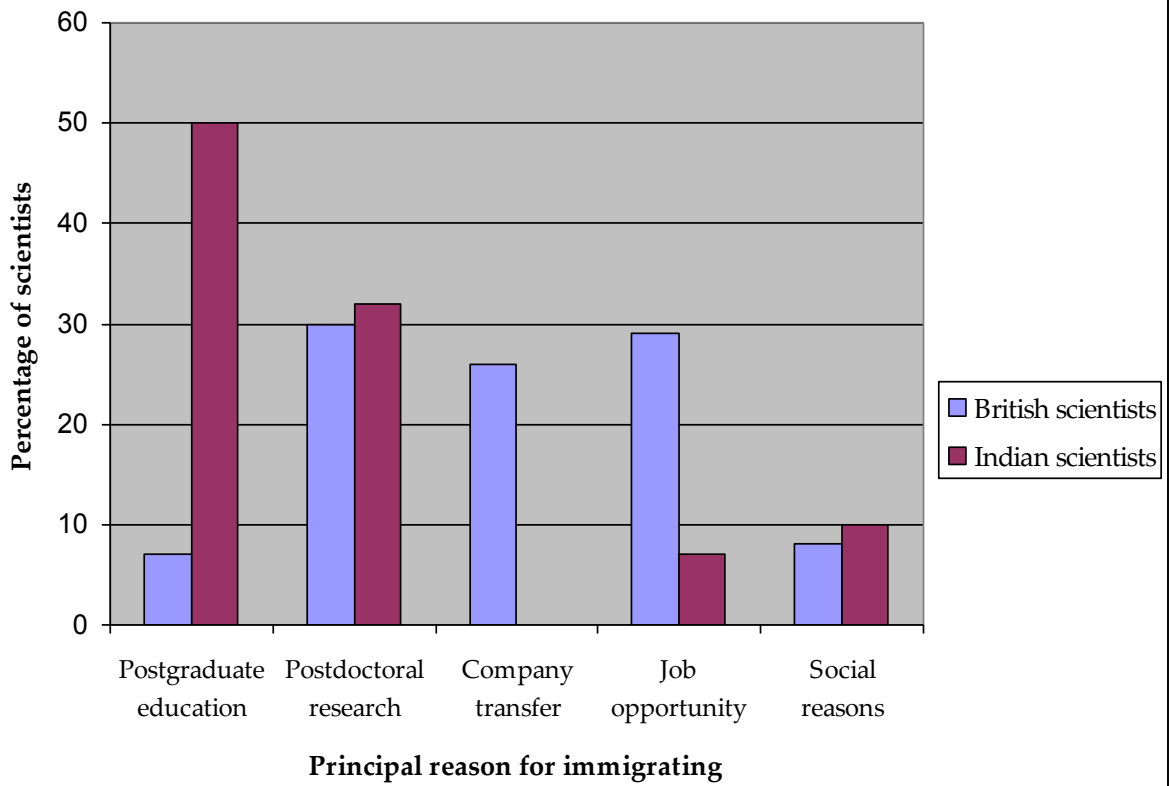
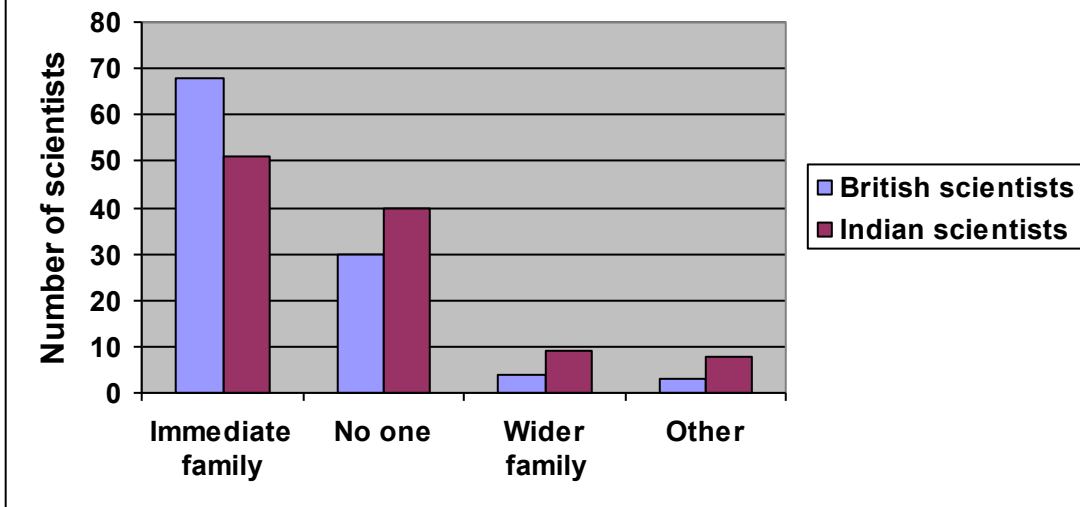


Table 2: The location and highest educational degree of British and Indian scientists

Location of degree	Home country	Massachusetts	Other U.S. states	Other
(%)				
British	91	3	6	0
Indian	38	18	36	8

Highest degree	Bachelor's	Master's	Doctorate or equivalent
(%)			
British	15	13	72
Indian	7	16	77

Graph 2: Partners in immigration decision-making



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ENDNOTES

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