

Scientific Diaspora: Stay Plans of Indian Faculty in the United States

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Abstract

In recent years, the “brain drain” experienced by developing countries, as their scientists and engineers chose to work and live permanently in developed countries, is seen as reversing. Although a reverse brain drain is projected as a new trend, a substantial number of immigrant scientists and engineers continue to work and live in developed countries. This paper presents the reasons why Indian faculty in science and engineering stay in the United States. Data for this study come from 51 in-depth interviews of faculty members of Indian origin working in various research universities across the US. Findings show that, although Indian faculty came to the US for higher education without intending to become permanent residents, they chose to stay mostly due to the research opportunities, favorable work environments, career prospects and lifestyle preferences available in the US. They cope with the absence of family and cultural distance through periodic visits to India and by developing professional relationships with scientists and engineers in their home country—activities that facilitate transnational migration. The study adds validity to the international migration theory, which has not taken this particular group of faculty into consideration.

Keywords

brain drain – Indian immigrants – skilled migration – S&E faculty

Introduction

Prior to 1965, very few scientists and engineers from India immigrated to the United States; most of the immigrant scientists and engineers in the US had come from Europe and Canada (National Science Foundation 1965). However, alterations in US immigration policy since 1965 changed that trend and immigration from India increased. In 2010, India accounted for 19% of the foreign-born holders of advanced science and engineering degrees with 13% of those holding doctorates (National Science Board 2014). India is the leading country of origin among immigrants in science and engineering (S&E) in the US.

Although the number of Indian scientists and engineers with doctorates in the United States S&E workforce is increasing, there is very little scholarly work on why this highly trained group leaves India (a developing country) for the United States (a developed country). The immigration of scientists and engineers from developing countries has been addressed by the “brain drain” model, which primarily focuses on the impact of their departure on the economy of their home country. Inferences about their motivations for migration are drawn from a number of theories on international migration. Most of these theories, which are outlined in the next section, see migration from developing to developed countries as a unidirectional movement and focus on low-skilled and manual labor in agriculture and manufacturing. They assume that the motivating factors for migration are similar for all types of laborers. When migration theories have included skilled workers, they have focused on technology industries. It is assumed that the motivations behind the migration of skilled workers are similar to those of scientists and engineers. Although the two groups might share similar motives for immigrating, there are important differences due to the globalization of S&E.

Immigration by scientists and engineers is no longer a one-way movement. Some emigrants from Asia return to their home country after studying and/or acquiring work experience in the United States (Cao 1996). Vivek Wadhwa (2010) has called this phenomenon “USA reverse brain drain” and drawn attention to low visa quotas and bureaucratic delays. He has further claimed that the US is experiencing “the immigrant exodus” (Wadhwa and Salkever 2012). Claims of an “exodus” are most likely to apply to returnees with bachelor’s or master’s degrees in science or engineering who worked in the area of information technology. Although some immigrant scientists and engineers with doctorates have moved back to India, many continue to work and live in the US. Michael G. Finn (2012) has shown that the number of India-born PhDs in science or engineering who stay in the US has dropped slightly, from 85% in 2005 to 79% in 2009. The majority of Indians (79%) who received

science or engineering doctorates in 2004 were in the US between 2005 and 2009. Finn's studies, however, have been limited to quantitative data and do not shed light on the reasons that lead Indian scientists and engineers to remain in the US.

The majority of the literature in the field of migration has centered on the brain drain of skilled individuals from the developing world to developed countries. Past studies have identified various push-and-pull factors that prompt migration and overwhelmingly focus on the economic loss and gain to host and receiving countries (Borjas 1994; Beine, Docquier and Rapoport 2001; Massey et al. 1994). But very few studies explore the motivations of highly skilled S&E migrants who leave their home countries to pursue higher education in the US and continue to stay and work in America.

This paper examines why Indian faculty in S&E leave India and decide to permanently stay in the US. As a group, they are likely to present different patterns of international mobility from manual laborers and low-skill workers. From the day they first arrive, most Indians in S&E tend to perceive themselves as guests who are to acquire an education, get training, enhance their careers, or accumulate wealth which they will use to fulfill their goals back in India (Varma 2006 and 2007). The "sojourner hypothesis" holds that Indians in the US are transients or sojourners; they intended to earn money and then return to live in India. But most have stayed in the US. This paper seeks to find out why this is the case.

Theories of International Migration

Ever since Ernest George Ravenstein (1885 and 1889) presented empirical generalizations on migration based on the British census and other data, scholars have proposed theories to describe the causes of international migration. There is no single coherent theory that explains the root causes of international migration, but several explanations have been put forward (Van Hear 2010). Scholars have studied international migration within the framework of their own respective disciplines; namely economics, geography, political science and sociology.

The push-pull model credited to Everett Lee (1966) is the most popular explanation of international migration from developing to developed countries. It is based on the principle of utility maximization and individual rational choice in the context of inequality among nations (Portes 1987). Push factors that compel people to migrate from developing to developed countries tend to be negative such as an authoritarian government, political repression, poverty, unemployment, low social status, and rigid social customs. In con-

trast, pull factors tend to be positive and attractive such as democratic government, political freedom, prosperity, employment prospects, high social status, and personal freedom.

Economic explanations within the push-pull model have dominated much of scholarly thinking on international migration. Neoclassical theory viewed migration as a means to maximize personal income and therefore focused on differentials in wages and employment conditions between developed and developing countries as well as the cost of migration (Sjaastad 1962; Todaro 1969; Borjas 1989). It is assumed that people would invest in a move if the expected benefits of immigration exceed the perceived costs. Studies have shown income in developing countries to be negatively related to the propensity to immigrate and income in developed countries to be positively related (Burki and Swamy 1987; Stark 1991). The neoclassical theory further projected that over time international labor migration will raise wages in the sending countries and lower wages in the receiving countries thus eliminating the incentives for migration in the long run.

Dual labor market theory—which involves a primary labor market of secure, skilled, and well-paid jobs for native workers and a secondary labor market of insecure, un-skilled and low-wage jobs for foreign workers—linked international immigration to the structural requirements of industrial economy in developed countries. Michael J. Piore (1979) argued that migrants from developing countries do not come on their own but are recruited by industrial companies in developed countries to perform tasks that the native workers will not do. Similarly, Binod Khadria (1999) argued that knowledge workers from developing countries are recruited to fill jobs in developed countries that are experiencing a labor shortage. By bringing in immigrant knowledge workers, industrial companies gain a cheap source of labor.

The dependency school did not develop a migration theory per se, but characterized labor mobility from developing to developed countries as a natural outcome of capitalist development and market penetration. Andre Gundar Frank (1967), Samir Amin (1976) and Immanuel Wallerstein (1980) argued that the development of the core (developed countries) was founded on the underdevelopment of the periphery (developing countries). A prevailing, international imbalance in the standard of living and career opportunities produced by the core-periphery dynamic creates incentives for immigration (Massey et al. 1994).

Recently, social networks—interpersonal ties that connect immigrant and nonimmigrant people within a framework of mutual responsibilities that facilitate gaining entry, finding employment, and adapting to the destination country—have been seen as the most important explanatory factors for migration (Arango 2004; Portes 1994). Through social networks, many new migrants

are able to obtain information and receive assistance in finding work, a place to live and legal help. Most importantly, such information is not accessible through contracting companies, lawyers or immigration agencies. The immigration of one person belonging to a social network creates an information feedback loop (Boyd 1989). Migration sustains itself by creating more migration (Massey 1990). Because social networks reduce the costs and risks associated with immigration and increase the probability of future immigration, they favor immigration to places where a social connection already exists (Appleyard 1992; Fawcett 1989).

The new economics of labor combine neoclassical theory with social networks. Oded Stark (1991) argued that migration decisions, that is, who goes where to do what, are not individual decisions but family decisions to seek income diversification and risk reduction. This is mostly because people in developing countries cannot take care of economic downturns with personal savings or bank loans. Families, therefore, minimize risks to their economic well-being by diversifying their income earnings with internal and international immigration. Remittances sent by migrants to their families back home provide expenses for daily living, investment money for small businesses and protection against market failures.

A critical evaluation of the aforementioned theories shows that they are limited in their explanations of the causes of international migration. At first glance, the push-pull model appears to incorporate various factors prevalent in developed and developing countries that are likely to play a role in an individual's decision to migrate. However, the model consists of ad hoc explanations for migration and presents "push" and "pull" factors as opposites that are unrelated to each other (e.g., political stability in developed countries versus political instability in developing countries). In other words, "push" and "pull" factors should be treated as two sides of the same coin (McDowell and De Haan 1997). Also, the model cannot be tested empirically as relative weights cannot be assigned to some key factors affecting migration decisions such as poor living conditions in developing countries and better living conditions in developed countries.

Neoclassical theory views immigration as a function of wage differentials in developed and developing countries that can be empirically tested. However, it assumes a homogeneous social structure without any constraints in both countries. In reality, class divisions are often prevalent in both countries; thus, not every migrant has equal access to resources, possesses the same skills or is thoroughly informed. Often, factor markets in developing countries are imperfect because of who, in the society's lower strata, does not have easy access to capital and other financial resources.

Unlike neoclassical theory, dependency theory speaks from the point of view of developing countries in the global context and the lower strata of people within those developing countries. However, it is not clear that the incorporation of developing countries into the global economy will only have a negative impact on people and the economy as the theory suggests. Connected to the global economy, some developing countries have achieved sustained economic growth (Sen 1999). One study found that remittances sent back to developing countries rose from \$31.10 billion in 1990 to \$76.80 billion in 2000 to \$167.00 billion in 2005 (De Haas 2008). This suggests migration facilitates some income redistribution and poverty reduction through remittances.

The push-pull model, neoclassical theory and dependency theory are also limited in explaining why the vast majority of people do not migrate. Gunnar Malmberg (1997) has called this the “immobility paradox.” These theories do not explain why certain developing countries experience sizable immigration while others, suffering from worse conditions, do not (Arango 2004; Massey et al. 1993). There are several examples in which higher wages in developed countries have failed to attract migrants from developing countries. For instance, both Mexico and India have highly unequal income distribution patterns. However, the number of Indian unskilled laborers migrating to the US is much smaller than that of Mexican laborers.

Social network theory incorporates non-economic factors—namely, family members and friends—as important variables in international migration, thus shedding some light on the immobility paradox. However, it only discusses internal processes within a social network and does not include external factors that may lead to migration. It assumes that collective migration decision-making within a family is without any disagreement or tension. Also, it only addresses the migration of some family members and not of the entire family. Finally, not all social networks are playing positive roles. Michael Samers (2010) has drawn attention to the negative functions of social networks such as its role in human trafficking and keeping migrants indebted.

All of these theories view migration as a one-way movement of people from developing to developed countries. If there are some returns, they are considered due to miscalculations of the costs and benefits of migration; hence returns are viewed as movements of failure. In recent years, however, return migration has been increasing and returnees are considered successful in achieving their goals of returning with accumulated savings (Cassarino 2004). It is assumed that savings are to be used as an investment in a business for future prosperity.

Most importantly, these theories are silent on the immigration of scientists and engineers from developing to developed countries. Their departure

has been commonly referred to as brain drain—the loss of developing countries' highly trained and skilled workforce through migration. The large-scale departure of scientists and engineers from developing countries tends to depress their long-term economic development (Gaillard 1991). Discussions of brain drain are mostly concerned with the economic impact; they do not focus on the reasons why scientists and engineers leave developing countries to permanently stay in developed countries, which is the focus of this paper.

Methodology: A Qualitative Approach

This paper is based on 51 in-depth interviews conducted with Indian faculty members in S&E in 2013. The subjects came from 18 universities, which were selected from a pool of 108 institutions identified by the National Science Board (2012) as doctorate-granting institutions with very high research activity. The selection was balanced for geographical locations with the highest Indian population. The faculty was selected on the basis of working in the US academe for a minimum of five years. The selection was then balanced for various fields in S&E. Most interviews were conducted face-to-face, although some were conducted by telephone. Typically, each interview lasted about one hour. Audio for these interviews was recorded and transcribed. NVivo software was used for the subsequent data analysis. A total of five questions out of 40 (excluding demographic questions) formed the basis for this paper. For some of these five questions, respondents gave more than one response, however, their responses were coded only once in a single primary category. The findings are reported with interview excerpts to highlight the complexity of concepts and to show their strength by how frequently they were mentioned.

Most respondents (78%) were employed by public institutions and the rest (22%) worked for private institutions. The majority of them (78.5%) worked in an engineering department: aerospace, civil, computer, electrical, environmental or mechanical. The remaining (21.5%) worked in biology, chemistry and physics departments. An occupational ranking of respondents showed that nearly half them were full professors (47%), followed by assistant professors (27.5%) and associate professors (25.5%). The mean number of years the respondents lived in the US was 23 years, while the mean number of years that they had been in academia was 15.5 years. A majority of them were somewhat young; 33% were in the 30 to 39 age group and 31% were age 40 to 49. About one fourth (22%) were in the 50 to 59 age group, and the rest (14%) were age 60 and above. A large number of them (86%) reported being married and most of the married respondents (73%) had children. Of those who had children, the

mean number was close to two per respondent. All but three of the respondents were male. This study, therefore, does not take gender into consideration.

Why Come to the USA?

Indian faculty members were asked to identify the primary reasons to come to the United States. They were further asked why the US and not another destination. Their responses were supplemented by asking an additional question: "What are the factors that influenced your decision to choose where you live?" All but two respondents came to the US to acquire doctorates. A typical response was, "I first came as a PhD student." Some respondents arrived after obtaining their master's degrees. Others arrived soon after earning their bachelor's degrees with the intention of only acquiring a master's, but they continued their studies in the US and completed their PhD studies. As one respondent said, "Master's . . . My ambitions really were to get a master's degree, learn more about computer science, come back, and modernize [my father's] factory."

The respondents selected the US for higher education for a variety of reasons. They believed European countries were no longer the center of advanced education in S&E. For them, the US was and still is the preeminent destination for higher education. As one respondent said, "I got admitted to Stanford University, which was ranked number one in my field. It was a tremendous opportunity to study at Stanford so I took it." Another stated, "I wanted to be in scientific research and the USA is the leading place in my area and that is why I came here . . . Yes, USA is the best place to get a PhD, best place to be a researcher." Another believed that "the USA is probably significantly the height of [sic] pretty much any other place."

Education in India was modeled after the American system of higher education, which made it possible for students to apply for admission to American schools. In fact, students believed that, after earning a master's degree in India in a science or engineering field, it was normal for the best students to go to the US. They did not consider any other country. As one respondent said, "That is the only country where all my friends were going. They said we have to go to the USA. That is where everything is happening. So I went with the flow." Similarly, another stated, "It was a very popular trend when I graduated in 1987." Yet another noted, "At that point, my entire batch was leaving IIT [Indian Institute of Technology] to come to the USA to study so I joined them also."

Most importantly, admission to American universities was backed with financial support. Several respondents described how it was feasible for them to study in the US because they were offered assistantships, fellowships or

scholarships. Typically, respondents believed that they would “get better scholarships in the USA” than other countries. As one respondent said, “I was given a prestigious scholarship. It was like everything paid off to go for education. So, I thought it was a good opportunity.” Another stated, “When I applied I got a fellowship from Ohio State. At that point, my parents were behind me because it did not cost them anything.” Yet another respondent said, “I got a lot of scholarships when I applied to the USA. And I went to the University of California Riverside where they offered me the Dean’s Fellowship. So basically, that was my primary motivation for going there. I was paid for the PhD experience.”

Many respondents found the quality of higher education in India to be average. As one respondent said, “The quality was lousy [in India]. There are some exceptions to it. But, by and large, the quality of the field, as well as the professors, was not so great.” Another said, “It is a catch phrase to say ‘the cream of the crop.’ But among the cream, there is a very wide range . . . By and large, the teaching quality is not so good . . . So many students are so bright that things just kind of go on.” In addition, educational opportunities in some specialized fields were unavailable in India at the time the respondents were students, but were available in the US. As one respondent said, “In India, biomedical engineering was offered by very few institutes.” Another said, “I wanted to work on hardware designs. There were no strong programs in India at that time.” One elaborated, “At that time, probably in [India] there were only 2 or 3 labs that were doing electrophysiology technique . . . I really wanted to get a better exposure to a range of techniques . . . I came [to the US] to learn and expand my expertise.”

A few respondents found the American educational system to be more flexible than their Indian counterparts; they could not get admission in some fields in India because of their own background in a different field, but more options were available in the US. As one respondent declared, “I am a big fan of the American educational system. It is not very rigid.” Another said, “I wanted to combine engineering with medicine and at that point it was not possible in India. Engineering and medicine were considered two different disciplines which did not intersect when I wanted to do graduate studies.”

Why Stay in the USA?

Indian faculty members were asked to describe the primary reasons to stay in the US. They were further asked to rank those reasons. Their responses were placed into four categories: research prospects, work environment, career

TABLE 1 *Primary reasons for Indian faculty to stay in the USA*

| Reasons | Number | Percentage |
|----------------------|-----------|------------|
| Research Prospects | 23 | 44 |
| Work Environment | 10 | 20 |
| Career Goals | 8 | 16 |
| Personal Preferences | 7 | 14 |
| Others | 3 | 6 |
| Totals | 51 | 100 |

goals and personal preferences (Table 1). Typically, respondents contrasted their reasons to stay in the US with conditions in India.

A large majority of respondents (44%) identified prospects for research as the major reason to stay in the US, which included cutting-edge research, up-to-date technical resources, instant flow of scientific information, effective administrative support for research activities, well-trained graduate students and a sizable scientific community. One respondent generalized, "My reason to stay here is the love for science. The science I can do here and the productivity I might have here would be far more than if I was to go back to India." Quality of research in India was certainly an issue for some. As one believed, "Research is done [in India], but it is not cutting-edge research that is over here." Another showed his disappointment: "Look at the journal in my field, *Journal of General Physiology*. In the last 10 years, you can find hardly any paper from India. I am not joking . . . In India there is no research life, no mind set for research."

Numerous respondents discussed physical resources that were available to them in the US in order to conduct research than in India. Some felt that the kind of research they wanted to do could not be done in India mostly because of the lack of up-to-date technical resources. As one noted, "The hype of what I do is the best [in the US] than anywhere in the world . . . We deal with things that are very small, very intense, like dioxins. So you need extremely high-tech instruments. And they are mostly in the USA." Another said, "I will show you the reactors . . . These reactors are big thing. There are about 20 locations in the USA that have these. This is one of the largest insulated reactors . . . In 2008, there were none in India." Certain respondents emphasized the significance of having an information rich environment to reduce uncertainty and engage in up-dated research. As one said, "In USA, we are in constant touch with what is happening in research . . . This does not happen [in India]. There

is so much delay that you are kind of isolated and would not know for months.” A few respondents pointed out the positive relationship between the research administration and overall research productivity in the US. As one said, “Administration does not promote research in India as much as we do here in the USA . . . So, it is mainly how much time I would spend not doing science and doing something else like paper work.”

Several respondents emphasized human resources that were accessible to them in the US to conduct research as compared to India. Typically respondents liked having good quality graduate students in the US, whom they train for research and scholarship as well as working with them to enhance their own research. As one said, “It is harder to get good, strong graduate students in India. Best students either get jobs in industry after graduation or come here for higher study. You do not have good students left for PhDs there.” Some explained the importance of having an appropriate number of qualified researchers to generate scientific knowledge. As one said, “In many areas, the critical masses are missing [in India], which you have here. So, I felt like I was more interested in the science rather than science in India.” Another respondent elaborated, “You need an ecosystem . . . Not just one person, but many people working in an area and then relating their areas and so on. It is just not there . . . I am here primarily because of the research ecosystem.”

About one-fifth of the respondents (20%) identified the existence of an intellectually stimulating work environment in the US as their main reason to stay. These respondents did not have a positive feel of the overall work environment in India primarily due to its hierarchical value system compared with what they have become accustomed to in the US. For them, a positive work environment was important as it generates a feeling of cooperation. They believed it was more important for them as scientists and engineers to be involved in brainstorming and creativity. As one respondent said, “It is my belief that America is probably the best in terms of the freedom in research that you enjoy . . . I am an assistant professor here and I have the privilege of choosing my own research.” Another echoed, “I like a lot of things about the educational system in the USA, especially the freedom we have to pick what we want to work on and the fact that the department chair is not your boss.” Many respondents were vocal about negative elements of the work environment in India. As one said, “I could see the politics being played [in India]. If I go there I will be dead. Professionally, I would be dead . . . Freedom of thought is not there. You cannot do what you want to do.” Another remarked, “[In India] things are dominated by a few people and they kind of constrain you, they constrain you in a very fundamental way in terms of thinking freely.” Yet another complained, “I do not feel very comfortable with the very hierarchical culture

that exists in India. It is more appalling to me than anything else." One gave an example: "Whenever you are sitting in a room, senior professors walk in and you are expected to stand up." Overall, the feeling was that they "would have been misfits in India, in its academic-political culture."

For some respondents (16%), career goals were the main motivation to stay in the US. As one respondent said, "I felt that I would end up in a situation [in India], which would not be productive for my career growth, where I wanted to go. So, I decided to stay around in the USA." Some respondents tied their career goals to physical needs such as income and job security. As one said, "Academic jobs in India do not pay well . . . They do not pay as compared to American universities." Other said, "It would be very difficult for anybody in India to pay me the kind of money that I get here. It would be out of scale for any institution out there." Other respondents tied their career goals to professional needs such as productivity, reputation and recognition. As one said, "You could do a lot of research [in India], but there are no rewards for doing that, rewards in the sense of promotion. Basically all the promotions are based on seniority there." Another said, "I came here over other offers that I had because I was told 'we want to build up your work here, and there is no one else in this department that works in this . . .' It is unthinkable in India." A few respondents believed they had worked hard to get where they were and wanted their careers to grow further without being constrained by compulsory retirement. As one said, "In India, there is mandatory time and age. Here [in the US] I can teach wherever as long as I am healthy."

Finally, some respondents (14%) chose to stay in the US for personal reasons. Some of their personal preferences were internal in the sense that they have a greater control over them, whereas others were external and influenced by the society. Respondents described internal personal preferences in terms of family. Most of them now have spouses and their children were accustomed to living in the US. As one respondent said, "Well, I got married to an American woman and Americans have a hard time living anywhere else, even in Canada they complain. So living in India was not realistic for us." Another said, "My wife is Chinese and she wanted to stay in the US. There was nothing for her in India." One explained, "Now our children are growing up and we are so much absorbed with them . . . We have decided that there is no point to move back because it will be difficult for our children, for them to get adjusted there." A female respondent said, "It goes back to my daughter . . . I want her to intellectually grow in an environment that does not pressure her . . . Growing up in India, there was a lot of emphasis on what I was suppose to do."

Some of the respondents described external personal preferences in terms of India's rigid social value system. A few felt that the Indian society was rather

closed and would not welcome their social life styles. As one said, "I stayed in the USA because I chose to be single and not get married. In India, you are constantly bombarded with comments if you are single. I did not want to deal with that." Another said, "I am gay. The USA is a lot more open for gay people than India. I did not want to deal with the Indian society remarks on my sexual choice."

Is Immigration to the US Permanent?

To find out whether their stay in the US is permanent, Indian faculty members were asked if they had any plans to return to India to work/live in the near future. A majority of respondents (41%) did not want to return to India permanently and one-sixth (16%) wanted to return to India only for a short duration. However, over one-fourth (27%) were undecided and another one-sixth (16%) had no plan to return to India at the time of interview, but were open to the idea. This shows that, as an overall trend, the emigration of Indian faculty is still not permanent.

Respondents who had firm plans remain in the US (41%) gave similar reasons for why they chose to stay. Overall, they were satisfied with their work and life in the US. As one said, "I am kind of happy with what I am doing and I am very excited about things. I have not really faced any issues that would make me reconsider . . . [the US] has been good to me." Another declared, "In terms of salary, you cannot compete with the USA. So it is just not going to happen." One explained, "What I do is not possible in India. I am engaged in developing technologies to improve people's health . . . To continue working on it means moving the whole lab [to India] and it does not look practical to me." Similarly another stated, "What I do here is very unique . . . Working in this area is a big deal. To go to India, I would have to start all over again." Often, respondents were not optimistic about work and life in India. As one said, "It comes back to the same question that the resources are not there. So why would I go back and waste my time there?" Another said, "I was thinking a little bit. But then the reality set in: The hierarchy is very strong and the politics is bad [in India]."

In fact, most of these respondents felt that there was no need for them to move back to India permanently since they go there regularly. In addition to personal visits, several attend conferences and workshops, and give talks at Indian institutes or universities. Some even have collaborative projects with their peers in India. As one respondent said, "I go back to India almost every year. And we have collaborations between [this institution] and some insti-

tutions in India. I am going in August to give a three-week lecture." Another explained, "You do not have to physically relocate yourself. There are so many opportunities. You can go for summer . . . for a semester . . . So there are many ways to contribute and help as opportunities arrive without having the physical move." Another stated, "If you go there permanently, you will deal with the daily life . . . which will eat away your time, will take away your priorities . . . Whereas if you go for a few months . . . you can just get into actions." One recalled, "Last summer, I did a visiting lectureship [in India]. The program is located in the USA . . . It is very competitive. If selected, you go and give talks in various institutes where they have student chapters for various fields." Another said, "I do go back because of the network that I have there."

Consistent with those remarks was the desire of some respondents (16%) to work in India for a short duration, but not to move back permanently. As one said, "It would be nice to take a sabbatical there for 6 months or so. I would be very intrigued in trying something like that." Another noted, "I am open to spending a few . . . maybe a definitive amount of time there to work and to match that to my children's experience of their roots . . . But I do not see it as a permanent thing." One said, "I don't think I would return to India. I would consider a long-term project in India, where I would visit for extended periods and then come back."

Not everyone (43%) had firm plans to stay in the US. Some respondents (27%) could see themselves returning if offered a suitable job. As one respondent said, "If I get a good position in one of the institutes that I prefer and have a good lab, then I definitely will move to India." Another noted, "I do not want to say no. If opportunity arises, I will seriously consider it." However, these respondents were not actively looking for positions in India. Other respondents (16%) who had no plans to return to India at the time of interview, could see themselves returning at some point for personal reasons. As one said, "Definitely not in the next 20 years. I can see myself residing at some point in India, but not spending any significant portion of the career life there." Another declared, "I do not want to say no to moving to India, but for the next 20 years I would not give up the position I have here." These respondents were in constant touch with people in India; they regularly took personal and professional trips there.

Indian faculty members were also asked whether they have regretted their decision to stay in the US. Typically, respondents knew that when they made a decision to stay in the US they would feel regrets if that turned out to be the wrong decision. They took anticipated regrets into account while deciding. Most respondents (68%) were rather satisfied with their work and life in the US. As one respondent said, "Yes, I am happy where I am. I have never regretted my decision to stay in the USA. If I had regretted it, I would not be here."

Another noted, "Sometimes it is hard, very difficult and stressful, but overall I am very happy." Similarly one expressed, "All things considered, my personal life, the time I came which was decades ago, given the choices I had in front of me; all that taken into account, I am satisfied."

Even though they took regrets into consideration while making a decision to stay in the US, the family and cultural distance continued to be an issue for some respondents (32%). As one explained, "One thing I have come to realize as an immigrant is that all this comes at a huge social cost, leaving behind a very strong culture and extended family. With that you cannot compare professional and other factors." Another said, "My parents are there. That is a big factor . . . Now that looks increasingly distant so that is my major regret." "My father suffered a heart attack a year ago," said another respondent, "and my mother had a seizure a couple of years before that . . . they are fine now . . . but when they needed help, I was not around. So, that has been my biggest struggle." Another expressed his disappointment, "I could not go to my father's funeral . . . We are not there when we need to be . . . You feel worthless. That feeling can never be replaced by any success, any academic success that I will ever make." Assimilation was also an issue for some. As one explained, "Culturally, we do belong in India because we bond with more people instantly. We socialize with more in India at that level . . . Here I feel [Americans] do not invite partly because we are Indian." Finally, a few had regrets on the national front. As one said, "I feel guilty. I think most of us do because [India] is our motherland."

Discussion and Conclusion

Why do students from well-known Indian institutions of higher education come to the US? Why do Indian students, after graduation, take a job and continue to stay permanently in the US? The international migration theories reviewed in this paper are limited in providing answers to such questions, mostly because they do not differentiate among labor types. Most theories concerning the impetus to migrate primarily center on the migration of unskilled and low-skilled laborers. However, such laborers are not the only ones to migrate to the US; scientists and engineers are increasingly migrating as well. As this study has shown, the migration of people belonging to S&E professions cannot be taken as similar to unskilled, low-skilled and manual laborers.

Most migration theories are centered on economic determinism. They see salary differentials as the major motivation for people to move from develop-

ing to developed countries. Supporting this is the fact that annual per capita income in developing countries is much lower than in developed countries. Salary differentials may dictate the migration of unskilled, low-skilled and manual workers, but this may not always be the case with scientists and engineers. This study has shown that Indian faculty, as students, did not try to escape from an economically substandard way of life in India to search for an economically prosperous new one in the US. In essence, the sole purpose of their US venture was educational betterment. They chose to earn doctorates in the US in order to discover something new and to be creative. Their move was linked to the ability of US higher education to attract and financially support foreign S&E graduate students. Even when they decided to take a faculty position to stay in the US, only a small number of them considered salary differential between the US and India. Their main reason to stay in the US was linked with research opportunities, which is a natural outcome after obtaining a doctorate. They wanted to continue to do research, to improve their abilities, and to understand and solve problems. Making money was not their main ambition. Since their original intention was not to migrate to the US to find a job, but to study, it shows limitation of the migration theory. Yet, they were able to immigrate once they secured their value as human capital with their doctorates. This points to an extension of the migration theory.

When international migration theories have focused on skilled labor, they have shown how American companies are actively recruiting temporary skilled workers due to the domestic labor shortage and the availability of cheap labor from abroad. These skilled workers may come to the US on a temporary specialty visa known as an H1B to overcome salary differentials. This may be the case with skilled labor holding bachelor's and master's degrees who are recruited to work in technology companies; but this does not apply to scientists and engineers holding doctorates and working in institutions of higher education. As this study has shown Indian faculty were not actively recruited by the institutions of higher education as a cheap source of labor. After earning their doctorates, they applied for faculty positions and were hired from a pool of candidates.

Social network theory has emphasized the importance of non-economic factors in migration decisions. Knowing people in developed countries may play an important role in international immigration of unskilled, low-skilled and manual labor as well as in the case of skilled labor granted H1B visas. However, social networks are not the leading cause of students coming to the US to study. As this paper has shown, Indian faculty came to the US as students to study in the best institutions, not because they knew someone. Although

family approval was important for students moving to the US to the study, it was not a family decision in the manner implied by the social network theory. It is not the case that the entire family, including extended family, sat and evaluated information provided on the US. They did not think how going to the US would be beneficial to the entire family. The fact that students were provided with financial assistance to study in the US meant that the family did not have to think about the possible cost to them.

The push-pull model relies heavily on economic factors, but also incorporates social and political factors that make people leave their home countries. This model may have been applicable in the past when people escaped to avoid religious and political conflicts and wars. Many European scientists and engineers fled the German Third Reich to reach safety in the US during the middle decades of the 20th century. As this study has shown, faculty did not leave India as students to overcome social and political limitations imposed by Indian society with the expectation of better conditions in the US. Instead, they left for higher education. However, after experiencing employment as faculty in the US, some of them expressed dissatisfaction with the work environments and social norms in India.

Embedded within the economic and non-economic theories of international immigration is the assumption that the different peoples of the world are physically and culturally separated from one another by daunting geographic boundaries. As this study has shown, some Indian faculty stay in the US, but establish and maintain long-term relationships with researchers in India through periodic visits, conferences, workshops, and collaborative research. Through this process, they constitute a scientific diaspora remaining connected with the S&E community in India. In some institutions, such linkages are well developed and institutionalized. Those who are not connected to the S&E community in India maintain family and cultural connections and make personal visits. The physical location of Indian faculty members does not prevent them from remaining connected to their home country in some way. Whether they are aware of it or not, they are contributing to a new global reality where the borders containing Indian faculty are beyond the control of any country. One of the main reasons why Indian faculty in the US do not feel a need to move back to India is that those outside of India can easily connect with colleagues, friends and family in India. In their mental world, the nation-state space has collapsed and they are living with a form of long-distance nationalism.

Increasingly, migration is seen very differently from what was once believed to be a one-way phenomenon (Gmelch 1980). With the advent of globalization, the rapid development of transportation systems and the diffusion of informa-

tion and communication technologies, scholars have focused their attention on *transnational migration*—a process by which immigrants forge and sustain simultaneous, multi-stranded social relations that link together their societies of origin and settlement (Schiller, Basch and Blanc 1995). Transnationalism goes beyond circular migration theory, which requires physical mobility of migrants in contrast to transnational migration. The theory instead posits that the spaces migrants occupy are so widespread that the exchange of ideas and norms happens without having to cross physical borders (Levitt and Jaworsky 2007). Within the transnational framework, return migration does not signify an end in itself. Instead, a global and transnational perspective makes the concept fluid and continuous rather than terminal (Ley and Kobayashi 2005). In an increasingly connected world, return and stay have as many individual ramifications as global considerations. Future studies can investigate the concept of transnational migration with greater depth.

For the globalization of science to truly take effect, scientists and engineers have to work across borders on problems that impact people on a global scale. With ties to both India and the US, scientists and engineers who decide to stay in America are in an advantageous position to serve as a conduit between the two nations. Governments of both of these nations could invest in creating platforms that will enhance such formal exchanges by making interactions more purposeful and concrete.

International immigration as theorized in the past does not apply to the S&E students moving from India to the US for higher education who then take permanent faculty positions. Physically, the movement of Indian faculty is a one-way journey as they have decided to permanently stay in the US. Mentally, however, they are connected to India and travel there freely and frequently. Globalization of S&E education is one of the main elements in the scientific diaspora of Indian faculty.

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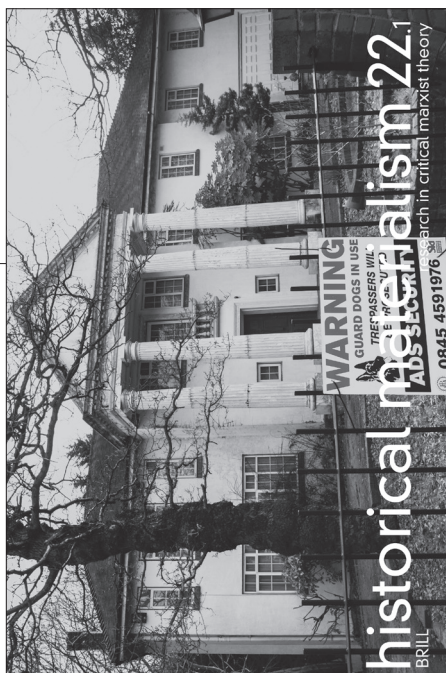
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