

**WHY ONE LEAVES? RETURN MIGRATION OF ACADEMIC SCIENTISTS AND
ENGINEERS FROM THE UNITED STATES TO INDIA**

Meghna Sabharwal^{1,2}

Assistant Professor

The University of Texas at Dallas

School of Economic, Political and Policy Sciences

Public Affairs Program

800 W. Campbell Road, GR 31

Richardson, TX 75080

Telephone: 972-883-6473

E-mail: meghna.sabharwal@utdallas.edu

Roli Varma

Professor & Regents' Lecturer

School of Public Administration MSC053100

University of New Mexico, Albuquerque, NM 87131

Telephone: (505) 277-7756

Fax: (505) 277-2529

E-mail: varma@unm.edu

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¹ Corresponding Author

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Return migration among foreign-born scientists and engineers in the United States is rising a trend which is commonly referred to as reverse brain drain. To examine why India-born scientists and engineers leave the U.S, it is important to examine the satisfaction and research productivity of this group since these factors impact retention. Thus to improve our understanding of the environmental and social factors that impact return migration, we employ a combination of data; one is the 2003 *Survey of Doctorate Recipients* (SDR) conducted by the National Science Foundation and the second, a pilot study on returnees. The results from the SDR data and the pilot study reveal the successes and challenges India-born faculty members are faced in the U.S. While the SDR data are restricted to India-born faculty members currently working in the American professoriate, the results are indicative of factors that might prompt return migration.

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Meghna Sabharwal and Roli Varma

Today, there are hundreds of thousands of students excelling in our schools who are not American citizens.... [They] come here from abroad to study in our colleges and universities. But as soon as they obtain advanced degrees, we send them back home to compete against us. It makes no sense.

President Barack Obama, State of the Union Address, January 25, 2011

1. INTRODUCTION

The U.S. foreign-born¹ represent 12.5% (38.5 million) of the total population (Grieco & Trevelyan, 2010). The country's 23 million foreign-born workers account for 15.8% of the total civilian workforce age 16 and over (Bureau of Labor Statistics, 2011). Over the past decade, foreign-born in the science and engineering (S&E) workforce has grown dramatically. Of the 21.6 million scientists and engineers² in the U.S in 2003, 16% were foreign-born (Kannankutty & Burrelli, 2007; National Science Board 2010). Full-time, foreign-born doctoral faculty employed in S&E disciplines rose from 21% in 1992 to 28% in 2003, with a few disciplines like mathematics, physical sciences, engineering and computer sciences experiencing a much higher growth rate (47%) (National Science Board, 2010). The increasing numbers of foreign-born in the S&E workforce indicates the country's increasing reliance on them for its rapidly growing needs.

¹ U.S. Census Bureau defines foreign-born as individuals who had no U.S. citizenship at birth. It includes, among others, naturalized citizens, lawful permanent residents, legal non-immigrants such as student and temporary workers, and persons residing in the country without authorization.

² National Science Foundation uses two indicators—education and occupation—to define scientists and engineers. The term “scientists and engineers” includes all people who have at least a bachelor's degree in a science or engineering field or an occupation in one of those fields.

Among foreign-born in the United States, Asians constitute the largest group in academic S&E. According to recent S&E indicators report, in 2006, Asian faculty occupied 14.1% of full-time positions in academic institutions, a three-fold increase from 1973; with some disciplines like computer sciences employing over 35% (NSB, 2010). Of the foreign-born faculty members, scholars of Chinese (22%) and Indian (15%) origin occupy more than a third of the full-time positions at four-year colleges and universities in the U.S (Sabharwal, 2011a).

Increasingly, India-born faculty members in S&E are returning home. A recent survey conducted by the Massachusetts Institute of Technology (MIT) in 2011 on India born post-doctoral and junior faculty indicates an overwhelming majority (87%) would consider returning to India to help strengthen the scientific community in India and abroad (Sarkar, 2011). Similar results were reported by another survey conducted by the Tata Institute of Social Sciences in collaboration with Rutgers and Pennsylvania State Universities. The sample comprised of approximately 1,000 individuals currently studying in the U.S. or graduated from an American institution of higher education (75%) and those who graduated from India and are currently working in the U.S (17%). Nine of the 10 Indians surveyed wanted to return to India. The main reasons cited for return were family and the chance to give back to their motherland (Finegold et al., 2011).

Despite these statistics, systematic studies examining reasons why India-born faculty members decide to leave the U.S are limited to the very best (Saxenian, 2002; Varma, 2006). The main objective of this paper is to examine return migration – the process of a person returning to his/her country of origin – among Indian faculty in S&E institutions in the U.S. We focus on the U.S. academic sector as it relies heavily on the contributions made by foreign-born scientists and engineers (Levin & Stephan, 1999; Stephan & Levin, 2001; Corley & Sabharwal, 2007; No &

Walsh, 2010). According to Florida (1999, p. 68), universities are viewed as the “provider of talent, knowledge, and innovation,” and “it provides these resources largely by conducting and openly publishing research and by educating students.” Success in academia is a combination of several factors, but research productivity is considered one of the most important in establishing reputation and visibility in the academic community (Fairweather, 2002). We focus on returned Indian faculty mostly because: (i) they are increasingly present in the U.S. S&E workforce and contribute significantly to scientific, technological, and economic growth of this nation through their scholarly contributions; (ii) the government of India is devising policies to attract their graduates back from the U.S. by creating newer economic opportunities for their returnees; and (iii) there is limited research investigating the choices that influence them to return to India.

To examine why India-born scientists and engineers leave the U.S, it is important to understand the environmental and social factors such as satisfaction and research productivity of this group and compare it with U.S. born scientists. Satisfaction improves the well-being of employees (Gruneberg, 1979; Oshagbemi, 1997) but more importantly, retention of faculty members (Rausch, Ortiz, Douthitt, & Reed, 1989; Johnsrud & Heck, 1994). Other factors that impact return are examined as well (family/cultural, economic, and political).

2.0 RETURN MIGRATION: A VIEW FROM THE LITERATURE

King (2000) conceptualized return migration in several ways: occasional return, seasonal return, temporary return, permanent return, and circular return. The reasons he provided for return are retirement, failure to assimilate in the host country, problems with acculturation in the destination country, being unsuccessful in the emigrating country, acquiring the desired wealth, innovate and to serve as change agents in the birth country. Increasingly, migration is seen very differently from what was once believed to be a one-way phenomenon (Gmelch, 1980). With the

advent of globalization and the rapid development of transportation systems and communication technologies, scholars have focused their attention on *transnational migration*, which is a process by which immigrants forge and sustain simultaneous multi-stranded social relations that link together their societies of origin and settlement (Schiller, Basch, & Blanc, 1995).

Current theories of transnational migration are greatly focused on the economic impacts on the home countries, while social, cultural and political impacts have recently started gaining momentum (Itzigsohn, Cabral, Medina, & Vázquez, 1999; Smith, 2001; Duany, 2002; Guarnizo, 2003; Portes, 2003; Portes, Escobar, & Radford, 2007; Waldinger, 2008). However, several of these studies examine transnational migration among Latin American and Caribbean migrants with traditional and social ties to the U.S. There is emerging literature on high skilled return migration among European Union nations (Casey et al., 2001; Ackers, 2004, 2005; Fontes, 2005, 2007; Gill, 2005), but not in the U.S.

The scholarly literature on skilled migration has paid little attention to the fact that many foreign-born scientists and engineers from developing countries return to their home countries after having spent a number of years in the U.S. Skilled migration from developing countries to the U.S. has long been seen as a one-way process, or brain drain. If some skilled migrants entertained the idea of returning, it was considered unlikely or impractical. This, however, has been changing as globalization is radically transforming the way people move around the world (Levitt & Jaworsky, 2007). Yet, little is known about the way skilled migrants formulate their re-migration decisions. While emigration of scientists and engineers from developing countries to the U.S. can be explained by push-pull factors, their re-migration takes place despite more favorable conditions in the U.S. This suggests the return process back to their home countries is complex, usually driven by a mixture of social, economic, cultural and political factors.

2.1 Social Factors

2.1.1 *Success in Academe*

Productivity is generally thought of as the production of some output. In academe, the number of peer-reviewed journal articles is an important measure of faculty productivity. However, many have argued that it is not the only measure (Zamarripa, 1993; Xie & Shauman, 1998; Bellas & Toutkoushaian, 1999). Zamarripa (1993) conducted a study to measure the research productivity of scientists in a research center, and found that though the number of publications in refereed journals was the most important criterion it was not the only one. He insisted on the use of other important measures in judging research productivity such as the number of: grants awarded each year, papers presented at scientific meetings, and graduate students working on research projects. When all these productivity indicators (journal articles, books, book chapters, and grants/patents) are taken, foreign-born S&E faculty members in the U.S are shown to have high levels of scholarly productivity (Levin & Stephan, 1999; Liu, 2001; Stephan & Levin, 2001; Corley & Sabharwal, 2007; Sabharwal, 2011b) when compared with native-born faculty.

2.1.2 *Satisfaction with Opportunities to Advance*

Lack of proportionate representation of Asian immigrants in positions of authority and decision-making can be a result of challenges confronted in cultural and structural assimilation. The former indicate the absence of requisite qualifications (e.g., language deficiencies) or lack of candidates (e.g., not seeking managerial positions); while the latter is indicative of organizational barriers (e.g., racial prejudice), thus influencing career advancement of Asians in S&E organizations. Many of the human-capital immigrants, mostly from Asian countries, come to the

U.S. through student visas and assimilate via school-to-job, and in the process experience unimpeded socio-economic mobility as suggested by several scholars who consider this group as a model minority and thus problem free (Suzuki, 1989; Hoy, 1993; Kao, 1995; Cheng, 1997). Critics of this model argue that this group continues to confront inequities in income and upward job mobility when compared with their Caucasian counterparts (Bell, Harrison, & McLaughlin, 1997; Wong et al., 1998; Tang, 2000; Woo, 2000; Suzuki, 2002; Varma, 2006, 2008).

Basti (1996) performed a detailed case study on two foreign-born faculty employed at a research university. One of the foreign-born faculty members was a prolific researcher, but expressed concerns about her satisfaction at work. The professor published 12 books and authored over 60 articles; in addition she is an editor of a journal and president of a professional association. Although, she has remarkable scholarly achievements she expressed dismay with her salary, tenure process, and collegiality at work – all of which are important factors that impact faculty job satisfaction. In another study of foreign-born faculty across disciplines and nationalities, Liu (2001) found Asian faculty had to work extra hard to constantly prove their capabilities as researchers, teachers, and colleagues.

Other factors than can lead to dissatisfaction and serve as motives for return can be societal barriers such as stereotyping and prejudice and internal barriers such as lack of mentoring, biased rating and testing systems, lack of access to networks, counterproductive behavior by colleagues, and a working climate leading to isolation (Wu, 1997; Fletcher, 2000; Varma, 2002, 2004, 2006). Asians make up 4% of the U.S. population, but more than 12% of its scientists and engineers (NSB, 2010). Despite their over-representation in S&E, Asians do not reach a level in which they participate in policy and decision-making responsibilities (Tang, 1993, 2000; Wu, 1997; Woo, 2000; Varma, 2002, 2004). Asians are confronted with a bamboo-ceiling, a term recently used to

refer to Asians who despite academic successes are unable to rise to high ranking positions (Hyun, 2005). There is the old notion of Asians as foreigners, outsiders and strangers (Fletcher, 2000). Typically, Asians are seen as good at programmed decisions (e.g., routine repetitive decisions that are learned in advance), rather than non-programmed decisions (e.g., unpredictable, creative, quick and risky decisions that are not formalized). Such perception generates frustration among Asian scientists and engineers on the lack of career opportunities available to them after they join the workforce (Mervis, 2005).

2.1.3 Assimilation

The touchstone theory of assimilation was proposed by Gordon (1964) who identified seven stages of assimilation that are not mutually exclusive: acculturation, structural assimilation, marital assimilation, identification assimilation, attitude receptional assimilation, behavioral receptional assimilation and civic assimilation. Gordon hypothesized that structural assimilation is the key, and once it is achieved the rest follow. This is to say that prejudice and racial discrimination will attenuate once structural assimilation is achieved. Building on Gordon's work, Gans (1973) proposed straight-line assimilation, which suggests that with each passing generation the process of assimilation is solidified. Portes and Zhou (1993) suggested a theory of segmented assimilation – with a focus on the socioeconomic status of an individual/group. Alba and Nee (2003) argued that institutional and political changes in the form of civil rights legislation and immigration laws have made the assimilation process easier for the new wave of immigrants and their families. However, they recognize that migrants do not necessarily all assimilate upward; varying rates of assimilation occurs based on the social networks and various forms of human, social and financial capital that the migrants bring with them. Return migrants are individuals unable to assimilate in the host country owing to their low earnings and education

levels in the host nation (Massey, 1987; Borjas, 1989). Overall, individuals well integrated in the migrating country are less likely to return.

2.2 Economic Factors

Several economic theories attempt to explain return migration. The *disappointment theory* suggests that individuals who return to their countries of origin are among the least successful in the emigrating countries (Borjas & Bratsberg, 1996; Reyes, 1997). The *target income theory* proposes that individuals emigrate in the hope of amassing wealth and return home once they have reached their target (Massey, et al., 1993; Borjas, 1994). The *circular migration theory* posits that a great variety of movement, usually short term, repetitive or cyclical in nature, but all having in common the lack of any declared intention of a permanent or long-lasting change of residence (Zelinsky, 1971). Economic stimuli for return migration tend to involve push factors in the country in which the migrant is living, such as economic downturn or unemployment, or pull factors from the country of origin, such as economic development and higher wages.

Though the U.S. has been offering better economic conditions, namely high wages and a higher standard of living compared to developing countries to attract migrants, many Asian countries, including China, India, South Korea and Taiwan, have seen spectacular economic growth in the last two decades. Governments of these countries are devising policies to attract their graduates back from the U.S. (and elsewhere) by creating newer economic opportunities for their returnees and the nation (Saxenian, 2002). The Taiwanese government established the National Youth Council in the early 1970s to track migrants in a database, advertise jobs overseas, and provide travel subsidies and job placement to returnees. The National Science Council and Ministry of Education have been recruiting migrants as professors and visiting lecturers for the country's growing universities. In 2009, China launched the Thousand Talents

Programme that aims to offer top scientists grants of one million Yuan (about \$146,000) along with generous lab funding (Engardio, 2009). India, on the other hand, has not been as aggressive as other Asian countries, but its booming economy (8.5% GDP growth rate in 2010) has become rather attractive to migrants living abroad (Wadhwa, 2009). In 1991, India opened its doors to foreign investment in a series of economic reforms leading to economic liberalization, privatization, deregulation, increased foreign trade and remittances (Aneesh, 2006). It is trying to emerge as a “soft power,” a term introduced by Joseph Nye, by relying on information technology (IT) and other emerging technologies. The University Grant Commission, a government body that accredits and funds institutions of higher education in India, recently reported receiving hundreds of applications from PhDs of Indian origin for faculty positions (Chronicle of Higher Education, 2009).

Most economic theories, however, have not examined return migration from social, cultural and political standpoint, and are thus limited on the phenomenon of return migration. Since some immigrants do return to their home countries, differences in their behavior are a consequence of the different economic, social and political situations they face in the host and home countries. The changes in global economies have given rise to a new form of migration that crosses borders termed as “flexible citizenship,” a label made popular by Ong (1999). According to her, an understanding of the political, economic and social factors is central to transnational migration.

2.3 Family/Cultural Factors

Return migration may involve family or life cycle factors such as finding a spouse, having one’s children educated “at home” in their native language, extended family networks, desire to serve the country, or retiring. Migrants may return home to look after aging or ailing parents (King, 2000). Close family ties and cultural loss experienced by immigrants in the U.S. can play

an important role in the decision to return to their home country (Chacko, 2007; Haour-Knipe & Davies, 2008). Strong family and cultural values serve as “pull” factors for return migrants who might feel culturally alienated in the U.S. In a study of German guest workers, Constant and Massey (2002) found that return was strongly influenced by family, social and economic factors.

These studies, however, have not established a link between family/cultural and immigration factors. For instance, young males dominate the temporary visa category. Their spouses hold H-4 visas, which allow them to stay in the U.S. as dependents of H-1B visa holders; however, it does not allow them to work even though they may be qualified to work in specialty occupations. This adds to the frustration since spouses are unable to use their education and training in the U.S. (Varma & Rogers, 2004) - a phenomenon recently termed as “brain waste” (Ozden, 2006). Back home, spouses can have a job and be independent.

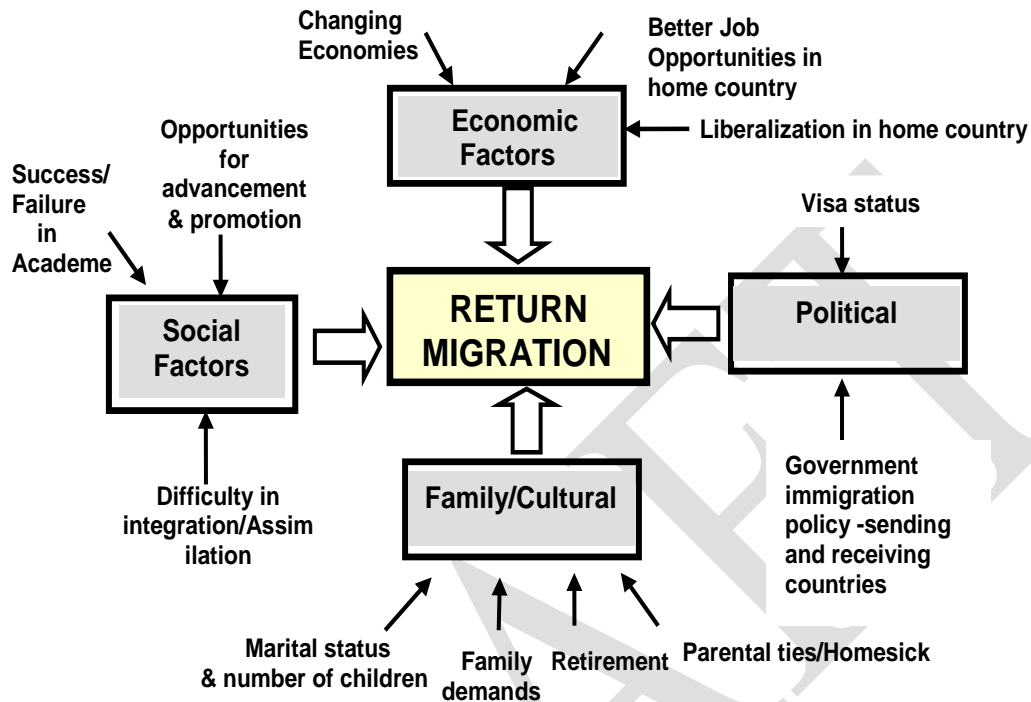
2.4 Political Factors

Political pushes behind return may range from limitations initiated by the host country (for example, non-renewal of visas from a given country), or even expulsion, to less direct restrictions, for example, on possibilities for changing jobs, bringing one’s family, or enjoying other citizenship benefits. Examples of political pull factors are policies to encourage and facilitate return on the part of the home country, such as tax benefits, social assistance and housing grants (King, 2000). Foreign-born faculty on temporary H-1B visas express the greatest fears with job security (Sabharwal, 2011a), making them the most likely group to return to their home country. In the U.S., the stay rates for temporary residents working in S&E fields has decreased by 10% in just four years from 91% in 2003 to 81% in 2007 (Finn, 2010). Faculty members on temporary visas are most vulnerable and likely to leave within the first five years of being in the country (Gupta, 2004).

To be able to stay permanently in the U.S., foreign-nationals have to acquire LPR (Legal Permanent Resident) status, adding to additional hurdles confronted by foreign-born scientists and engineers. Citizens of Indian and Chinese origin experience the longest delays in the processing of their permanent residency. An estimate suggests that there are more than half-million skilled individuals waiting to get permanent residency in the U.S. (Wadhwa, 2009). Currently, 2004 applications are being processed for immigrants from India (Simpson, Harrison, & Dixon, 2009). The massive backlog in acquiring permanent residency may be adding to the frustration faced by Indian scientists and engineers. Challenges with acquiring LPR status can serve as deterrents for faculty who would like to stay in the U.S. It should be noted that life cycle theories suggest that younger scientists are more productive over older cohorts, especially in rapidly changing disciplines like particle physics, computer sciences and geology (Fulton & Trow, 1974; Kyvik, 1990; Levin & Stephan, 1991). There may be greater return among Muslim and Sikh faculty members who faced backlash post 9/11. Figure 1 depicts a comprehensive model on return migration.

3.0 DATA AND METHODOLOGY

We conduct a case study of Indian faculty because they make up 15% of the foreign-born faculty members at U.S. four-year colleges and universities (Sabharwal, 2011a). Research exclusively focused on the experiences of India-born S&E faculty is rare. For instance, existing studies on return migration to India have primarily examined transnational migration patterns among technical staff with ties to the Silicon Valley in the U.S. and India (Saxenian, 2002; Chacko, 2007). To close the existing gap in the literature, we focus on re-migration among academics, a group different from technical staff in industry.

Figure 1: A Conceptual Model on Return Migration

To test the proposed model, we employ a combination of data one is the 2003 *Survey of Doctorate Recipients* (SDR) conducted by the National Science Foundation. This dataset was chosen because it has a large sample size and is highly recommended for data sampling. It has rich information on demographics, citizenship, nationality, educational background, employment, wages, scholarly activities, and job satisfaction. The unit of analysis for this study is the individual academic scientist; hence respondents with non-academic jobs are filtered before beginning the analysis. For this filtering process, academics are counted as those faculty members working in a four year college or university during the reference week of October, 2003. The data analysis is further limited to: 1) full-time faculty and 2) faculty employed in science and engineering disciplines – biological, agricultural, and environmental life sciences,

computer and information sciences, mathematics and statistics, physical sciences, and engineering. Individuals reporting psychology, social sciences, and health as the field of their first S&E degree were eliminated. The un-weighted N for India-born scientists and engineers is 185 and the weighted³ N is 5317. The analysis uses weighted data.

The second data source is a pilot study with return migrants conducted in 2010. Given that there is little information on the subject, the qualitative approach to gaining in-depth knowledge is useful from a scientific point of view. Increasingly, scholars are recognizing the value of qualitative research (e.g., *NSF's Workshop on Scientific Foundations of Qualitative Research* by Ragin, Nagel, & White, 2004). Preliminary data was collected through in-depth interviews with more than half dozen subjects to gain an understanding about contextual factors, details and complexities of choices that lead to return migration.

4.0 RESULTS

In the absence of any large scale systematic data on India-born scientists and engineers who leave the U.S, this study utilizes data on India-born scientists currently employed in four-year academic institutions in the U.S. Comparisons are made between India born and U.S born scientists and engineers mainly to examine differences in social factors like success in academe, satisfaction with opportunities to advance, and work responsibilities. Other demographic variables such as: gender, marital status, age, rank, tenure, type of institution and discipline employed, years of experience, salary are also examined.

^{3 3} Weighting of the data was based on the responses obtained. “The first step of the weighting process calculated a base weight for all cases selected into the 2003 SDR sample. The base weight accounts for the sample design, and it is defined as the reciprocal of the probability of selection under the sample design. In the next step, an adjustment for non-response was performed on completed cases to account for the sample cases that did not complete the survey” (NSF, 2006, p.154). For more details refer to: <http://www.nsf.gov/statistics/nsf06320/appa.htm#weights>

Results from Table 1 suggest that majority of the U.S and India born scientists are male, married, tenured, working in a research university and are in supervisory status. A greater percentage of India-born scientists report research and development as their primary activity (53.0% vs. 39.7%) and have children living with them when compared with U.S born scientists (54.6% vs. 48.8%). About one-third of India-born faculty members are in Engineering discipline, the percentage is about half among U.S. born faculty. A lower percentage of India-born faculty members are in a supervisory role when compared with U.S born faculty members (58.4% vs. 65.7%).

Literature suggests that return migrants are among the unsuccessful individuals unable to assimilate in the host country (Cerase, 1974; Gmelch, 1980; Borjas & Bratsberg, 1996; Reyes, 1997). One way to assess success in academia is to examine research productivity, which we do by examining the annual number of peer-reviewed journal articles and books published, annual number of papers presented at conferences, percentage of patents and grants received. Results in Table 2 suggest that on average, India-born scientists and engineers publish greater number of journal articles and books, present one paper more than U.S. born at conferences every year, and are more likely to be named as inventors on patents and granted federal grants.

Table 1: Differences in various academic characteristics of U.S and India-born Scientists and Engineers

	India-Born Scientists and Engineers N = 185	U.S Born Scientists and Engineers N=4882
Demographics		
Female	17.8%	24.4%
Married	85.4%	81.2%
Age (mean years)	47.2	48.3
Children living with parents	54.6%	48.8%
Rank		
Professor	43.8%	38.5%
Associate Professor	20.0%	23.9%
Assistant Professor	23.2%	21.8%
Instructor/Lecturer	1.6%	3.0%
Other Rank	11.4%	12.6%
Tenure Status		
Tenured	59.5%	53.7%
On Tenure Track but not Tenured	21.6%	18.9%
Not on Tenure Track	7.0%	9.8%
Tenure not Applicable	11.9%	17.6%
Primary Activity Research and Development	53.0%	39.7%
Primary Activity Teaching	30.3%	39.7%
Institution Type		
Research I/II Universities	55.1%	50.3%
Doctoral I/II University	12.4%	10.4%
Comprehensive I/II University	15.7%	18.1%
Liberal Arts I/II University	2.7%	8.4%
Other	14.1%	12.9%
Academic Discipline		
Biology	25.9%	46.7%
Computer and Information Sciences	14.1%	3.1%
Mathematics and Statistics	9.7%	9.6%
Physical Science	17.3%	25.1%
Engineering	33.0%	15.5%
Salary (Mean)	\$92,273	\$83,659
Years of Experience (Mean)	16.79	17.5
Supervisory Status	58.4%	65.7%

Table 2: Success in Academe - Annual Research Productivity of U.S and India-born Scientists and Engineers

	India-Born Scientists and Engineers	U.S Born Scientists and Engineers
Annual number of Articles published	2.25***	1.58
Annual number of Books published	.16***	.10
Annual number of Conference presentations	3.12***	2.02
Percent Named as a Patent inventor	18%***	13%
Percent Granted a Federal Grant	61%***	56%

Note: All differences are significant at *** $p < .001$

For those with highest degree granted in or before 1998, Annual Number of Articles Published = (Total Articles Between 2003 and 1998) / 5 years. For those with highest degree granted after 1998, Annual Number of Articles Published = (Total Articles Between 2003 and 1998) / (2003-Year of Highest Degree).

Alongside comparing research productivity, this study also examined the satisfaction of India and U.S born scientists and engineers on various work measures. Results in Table 3 suggest that India-born scientists and engineers on average are less satisfied with their jobs than U.S. born faculty. Further, India-born scientists also report lower satisfaction on measures of intellectual challenge, location, level of responsibility, and salary. These differences are statistically significant at a 95% level of significance. There are no significant differences between the two groups in the opportunities presented for advancement and benefits offered. Satisfaction with degree of independence, job security and contribution to society are higher among India-born faculty members than U.S faculty. The results are indicative of challenges and successes of India born faculty members in comparison with native-born.

Table 3: Mean differences in job satisfaction of U.S. and India-born Scientists and Engineers

Work Satisfaction Measures^{a,b}	India-Born Scientists and Engineers	U.S Born Scientists and Engineers
Overall Job Satisfaction	3.44**	3.47
Opportunities for advancement	3.04	3.05
Benefits	3.28	3.27
Intellectual Challenge	3.51***	3.60
Degree of Independence	3.73***	3.70
Location	3.41*	3.43
Level of Responsibility	3.45***	3.56
Salary	2.96***	3.01
Job Security	3.54***	3.40
Contribution to Society	3.63***	3.58

^aResults are in response to the following question “Thinking about your principal job held during the week of October 1, 2003, please rate your satisfaction with that job’s”

^bPossible responses: 1 = very dissatisfied; 2 = somewhat dissatisfied; 3 = somewhat satisfied; 4 = very satisfied.

*** $p < .001$, ** $p < .01$, * $p < .05$

Results from a Pilot Study

The SDR data is only able to examine the social factors specified in the model. The results of the pilot study conducted via e-mail with 15 return migrants currently working at higher education institutions in India identified other themes, namely economic opportunities, social

milieu, visa issues, and family/cultural values. Preliminary findings are briefly presented below. The results presented here are limited since the authors are currently seeking funds to conduct a large scale study that examines factors leading to return migration among Indian faculty in S&E.

The reasons for return that respondents gave were somewhat mixed. Some pointed out social and cultural reasons (to care for elderly parents or raise children within the Indian environment), while others noted issues of discrimination in the U.S. and a desire to serve India. Overall, respondents were satisfied working in India. On a scale of 1-5, with 5 being very satisfied and 1 being the least satisfied, approximately three-fourths were either very satisfied or satisfied in their current job in India. Generally, they believed that opportunities for growth are tremendous. As one respondent stated:

India of today is experiencing MASSIVE social, political, economic and ethnic churning of multiple social identities, probably unprecedented in world history. Simply put, transitions that were more gradual elsewhere are taking place at breakneck speed here. Also, the sheer scale of this transformation is mind boggling. These changes are manifest at almost all levels of personal as well as professional experience, virtually on a day to day basis. You have to live here and experience it to really know what I mean. Neither I, nor I am sure, anyone else in my position 20 years ago, could have anticipated these turn of events.

Overall, several respondents indicated some form of bias they faced while in the U.S.; though such issues are sensitive in nature and cannot be captured in an e-mail exchange. Generally, they felt a bias against people who spoke English with an accent or looked different, regardless of how well they performed technically. One respondent generalized: "If you come from a foreign culture, you are going to be at a disadvantage. At some stage you will not be able to compete

with others who are native of the country.” Another respondent did not want to stay in the U.S. permanently as he did not like being referred to as an “alien,” while a few believed that they “did not fit in.” One respondent echoed: “I realized during my ~10 year stay in USA that you never really become a part of the community; you always feel that you are an outsider.” A few respondents also expressed frustration with the visa process. One said: “My application for green card submitted soon after returning to India (sic) to go back to USA was rejected.”

Several respondents decided to return to India because of social and cultural reasons. However, it was interesting to note the specific reasons varied by the time of return. Senior faculty who returned to India several years ago cited taking care of the elderly as the most common reason, while recent returnees are lured by the opportunities for growth available in India. As one junior faculty pointed out: “I want to do my bit in shaping the academic/research environment in India and contribute to the growth of Indian Science.” A senior faculty noted: “My daughter was still very small and it would have been very difficult to return at a later date, moreover I wanted my children to be brought up in an Indian environment.”

5.0 DISCUSSION AND CONCLUSION

The current study examines factors that lead to return migration among India born scientists and engineers. Existing studies on immigrants have focused on the question of, “Why did they come to the U.S.?” There is seldom a study that examines the question of, “Why scientists and engineers leave the U.S.?” Lack of systematic data on return migrants makes it challenging to investigate this topic. Yet, payoffs are high, as noted later in this section.

The results from the SDR data and the pilot study reveal the successes and challenges India-born faculty members are faced with in the United States. While these data are unable to track those who return, the results are indicative of factors that might prompt return migration. The

lower job satisfaction reported among India-born faculty members is concerning, given that satisfaction impacts retention rates (Rausch, et al., 1989; Johnsrud & Heck, 1994). Retaining these faculty members is important as a significant proportion of S&E departments around the nation have come to rely on their expertise. While past studies argue that individuals return due to unsuccessful careers in the host country (Cerase, 1974; Gmelch, 1980; Borjas & Bratsberg, 1996; Reyes, 1997), this might not be true in the case of Indian faculty members. The results of this study reveal that India-born faculty members are more productive than the U.S. born scientists. While these data are not reflective of the faculty members who actually return, the pilot study respondents are among successful returnees working in premier technological institutions in India.

India-born faculty members play an important role in the scientific, technological and economic growth of this nation through their scholarly contributions. Losing them in the form of reverse migration can add to the challenges faced by the scientific enterprise in the U.S. Yet, there is little scholarly work on return migration from developed to developing countries. The U.S. stores information on aliens entering the country legally, but does not track returnees. Existing studies on return migration tend to be quantitative, based on the U.S. Census, U.S. Immigration and Naturalization Services (INS) and other data, rather than on the returnees' situation and experiences. Further, U.S. immigration is viewed as a one-way process; where the immigrants come with the intention to permanently settle in the country, a process referred as "brain drain." Recently, there is a growing concern over an increase in return migration rates among foreign-born scientists and engineers. Retention of foreign-born faculty is important for institutions of higher education since these faculties not only enhance the work environment and diversity, but also serve as role models for foreign students who aspire to join the academy. The

cost of replacing these faculty members could be enormous, considering that institutions at a typical research university invest anywhere from \$300,000 to \$500,000 in start-up costs for an assistant professor, and well over a million dollars to attract and retain senior faculty (Ehrenberg, 2004).

Though it was rare for foreign-born scientists and engineers in the U.S. to cut their ties with their home countries completely, very few from developing countries returned to their country of birth. Increasingly, they are returning to their home country after acquiring education and/or training in the U.S., which have become highly desired assets in many developing countries (Saxenian, 2002). There is evidence that the returnees are among the most educated and successful (Zucker & Darby, 2007). This has led some to use the terms “brain circulation” (Saxenian, 2005), “brain gain” (Mayr & Peri, 2008) and “reverse brain drain” (Wadhwa, 2009). Because of this trend of return migration, some scholars are sensing a shift in the world’s balance of brainpower (Wadhwa, et al., 2007) that has perhaps resulted in the creation of a gap between the U.S. growing need for scientists and engineers and the country’s academic production of them.

A recent study conducted by Sabharwal (2011a) revealed that foreign-born faculty in S&E at all levels of citizenship (temporary, permanent and naturalized), despite their higher productivity rates, are less satisfied than native-born faculty after controlling for several demographic variables, institutional characteristics, language skills and geographic location. On average, foreign-born faculty were dissatisfied with opportunities for advancement, intellectual challenge, degree of independence, salary and benefits, level of responsibility, location, job security and contribution to society when compared with U.S.-born faculty. Additionally, this study found fewer India-born faculties in positions of administrative and supervisory authority as compared

with U.S-born faculty. The findings were in line with previous studies (Tang, 1993, 2000; North, 1995; Wu, 1997; Woo, 2000; Varma, 2002, 2004) that have shown foreign-born faculty to have lower representation in high power positions of authority and decision-making. The findings of the pilot study also are in line with Varma's (2006) study on India born migrants. The desire to be with family and the opportunity to give back were among the top reasons indicated by academics to return.

While there is concern about lost talent from the U.S., return migration can result in immense gains for Indian science in the form of economic gains, enhanced human capital, increased knowledge flows and skilled mobility, fostered collaborations and increased entrepreneurial activities (Regets, 2001; Beine, et al., 2003; Commander et al., 2004). Most importantly, in a technologically wired world, return migrants can serve as a bridge between the U.S. and India as they build upon their national resources and expertise toward furthering global systems for joint research. Future research can be expanded to include larger samples of faculty members from China, South Korea and Vietnam, which are the leading exporters of talent to the American scientific enterprise.

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