Globalisation, Information Technology Revolution and North South Migration
A Study of Asian Indian Software Professionals in the U.S.

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INTRODUCTION

Globalisation and subsequent economic restructuring in the developing countries have given rise to a boost in international migration flows, especially from the South to the North. Perhaps, the most significant single factor behind this new wave of migration is the dramatic revolution in the field of information technology which not only downsized the world into a 'global village' but also made the global relations 'supraterritorial'. The phenomenon of so called 'brain-drain' was first noticed as early as in 1960s and has been a contentious issue in the North-South debate ever since. India has always been a potential contributor to the brain drain from South to the North. Migration of skilled persons from India has assumed increased importance in recent years reflecting the impact of globalisation, revival of growth in the world economy and above all the explosive growth in the information technology sector. Just as the Middle East has crude oil and South Africa has diamonds, India's most precious natural resource is its abundant technically skilled population. India has the second largest assembly of English speaking scientific professionals in the world, second to U.S. No wonder India became a leader in the global IT revolution. Indian software industry has been rated as the most efficient and cost effective in the world (World Bank 2000). As a result, countries across the globe virtually queued up to recruit software professionals from India. Lured by the stories of better economic and professional opportunities in the foreign countries, a large chunk of India's best brains were lost to India in the last few years. North America (U.S.A and Canada together) account for as high as 61 per cent of Indian software professionals going abroad. This paper tries to examine the macro economic implications of the large scale migration of highly qualified software professionals on the Indian economy. It also attempts to explain the working and living conditions of Indian software professionals in the U.S.

INDIAN SOFTWARE INDUSTRY: A BRIEF ACCOUNT

The growth in the Indian software industry over the last two decades, especially since 1991, has been so dramatic that today India has a leading place in the IT map of the world. From a mere US $ 150 million in 1991-92, it has grown to US $ 5700 million in 1999-00 and to US $9300 million in 2003-04. No other Indian industry has performed so well against global competition. Table 1 below portrays the remarkable growth of IT industry in India.

Table 1 Indian Software Industry 1995-2004 (US $ Million)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
Domestic software market	490	670	920	1250	1700	2450
Software Exports	734	1085	1750	2650	4000	6300
Total	1224	1755	2670	3900	5700	8750

Source: National Association for Software and Services Companies (NASSCOM) Report

It is clear from the table that software exports dominated over domestic market as early as 1995-96. Today, India exports software and services to nearly 100 countries around the world of which more than 60 per cent is to North America alone. The industry contributes to over 7.5 per cent of the overall GDP growth in India and accounts for 35 per cent of the country's total exports. The above figures clearly elaborate the significance of the industry to the national economy.

SIGNIFICANCE OF THE STUDY

The subject of 'brain drain' has always been a hot issue in the South-North debate. There are several studies that deal with the migration of 'knowledge of workers' from India to the Western countries, especially to the United States of America (George 1997; Gardner 1988; IAMR 1968; Agarwal and Winkler 1984; Jensen 1988; Khadaria 1999 etc). But, most of these studies focus on the 'loss' factor in the brain drain. But, how the loss from brain drain could be countered by new potentials and sustainable possibilities for 'gain' for India is largely overlooked in almost all studies except that of Khadaria. The present paper assumes significance in this context. It is an attempt to examine (a) whether the reversal of 'brain-drain' is happening in the case of software and (b) whether it possible for the software emigrant to give back or send back human capital to India. This question is directly linked to the broader question of why India's best brains in software are attracted by U.S and emigrate and indirectly to the question of their working and living conditions in the U.S which is perhaps, the most potential factor behind the decision to migrate. The overall outcome is the content of the present paper.

OBJECTIVES OF THE STUDY

The basic objective of the present paper is an enquiry into the working and living conditions of Indian software professionals in the U.S. It tries to examine how far the emigrant software professionals are contributing to human capital development in India and how far the brain drain from India to U.S is becoming a 'gain' factor for the Indian economy.

Conceptual Framework

This paper is with reference to the Indian software professionals in the U.S only and as such excludes all other categories of professional workers. It includes all categories of emigrants, H1-B workers, permanent residents and those who had become U.S citizens. The theoretical framework inherent in both neoclassical and new economics of migration addresses two basic issues only, viz., determinants of migration and consequences of migration. This paper, therefore, relies mostly on the concepts of political economy, emphasising on employment and economic forces and the resulting formation of class divisions in explaining the working conditions of Indian software professionals in the U.S.

Data and Methodology

The study is based mainly on primary data colleted from 300 Indian software professionals in the U.S. Secondary data from the U.S Immigration and Naturalisation Service records are also used wherever necessary. Primary data were collected by researchers themselves during the period April to August 2004 on the basis of a well structured pre tested questionnaire. Out of the 300 Indian software professionals surveyed, 182 were contacted personally and the rest through telephone, e-mail and surface mail.

Conventional sampling techniques could be used only to a limited extent. Four states having the largest proportion of Indian software professionals were selected in the first round. These were California, New York, New Jersey and Massachusetts. 100 respondents each from these four states were served with the questionnaires either personally or though friends or through Indian Association officials. But, however, fully completed and returned applications were 92 from

California, 78 from New York, 66 from Massachusetts and 64 from New Jersey, thus making a total of 300. A lot of Indian friends readily co-operated with the data collection process which was perhaps the most tedious part of the study. Apart from the general questions relating to the living and working conditions, there were additional questions relating to their personal and professional ties with India and their perceptions about contributing to human capital development in India. Our five month long stay in the U.S, gave us ample opportunities to have first hand information about the life of Indian software professionals in the U.S. The questionnaires were taken back to India once the field survey was over. They were then edited and coded. The coded data were then rectified for all coding errors and the data analysis was done in accordance with the stated objectives of the study.

INDIAN IMMIGRANTS IN U.S

India happens to be amongst the earliest and the largest of all contributors to the emigration flows to the U.S and Indian emigration to U.S has a history of at least 150 years. But, the earliest migrants were mostly illiterates labourers. But, the 1965 amendment of U.S Immigration Act drastically changed the structure and volume of migration flows to the U.S. The new act brought large numbers of ambitious, hardworking and highly skilled persons from various parts of Asia, particularly from India to the U.S. "Almost a hundred thousand Indian engineers, physicians, scientists, professors, teachers and their dependents had entered the U.S by 1975 (Jensen 1988).

But, the dramatic increase in the Indian immigration to U.S occurred after the 1990 amendment of the U.S Immigration and Naturalisation Act which was clearly aimed at raising the human capital capabilities of the U.S by filling its current and future requirements of technical/professional workers. The major break through in information technology and the globalisation process that was sweeping the world across both gave an impetus to this new migration flows. Thus, during the 8 year period 1992-2000, 120,000 computer professionals from India entered the U.S. The centrality of Indian software professionals to U.S labour market needs was becoming all the more clear as in 1998 alone 42.0 per cent of the 65,000 H-IB visas issued were to Indians of which 80 per cent were software professionals.

As a result of the large scale boom in the migration of software professionals, the India population more than doubled in the last 10 years and according to the U.S Census of 2000, there are 1.7 million Asian Indians in the U.S. Nearly three fourth of the new migrants (since 1990) are software professionals. It is not the numbers that is important, but the quality of Indian software professionals is also rated as the best in the industry. The quality of Indian software professionals became imminent after showcasing their value by helping U.S multinationals debug computer networks in time for Y2K. The significance of the Indian software industry is very much apparent from the fact that today 21 companies worldwide that hold the Carnegie Melon Software Engineering Institutes' highest ranking, 12 are from India (Kripalani and Clifford 2000). The success stories of the Indian software professionals especially from the famous Indian Institute of Technologies (IITs) in the U.S are legendary. It is reported that Indian or Chinese CEOs are running one fourth of the firms in the Silicon Valley and that of the 100 wealthiest people in the U.S. Hi tech industry, 5 are Indians (Economist 2002). Many of the Indian software professionals who entered the U.S labour market as developers subsequently became entrepreneurs and created world class companies such as Hotmail, Juniper networks, Sycamore networks, Cirrus Logic, Smart Modular, etc. Indian software companies like Infosys, Wipro and Tata Consultancy have established their global presence by providing world class products ranging from browsers used on new generation wireless phones to E-commerce websites. No doubt, India is one of the IT super powers of the world and can definitely be a role model for developing countries of a knowledge based economy.

A BRIEF PROFILE OF THE SAMPLE

The brief profile of the sample respondents discussed in this section is generated from the primary data collected for this purpose.

As a general rule, the Indian immigrants are a group whose education, hard work and professional commitment have placed them in a better status in U.S society compared to other immigrant groups and even U.S citizens. The following table clearly demonstrate this.

Table 2 Asian Indians Vs Americans

Characteristics	Indian	American
Percentage in Professional Jobs	30	13
Percentage of Graduates	57	20
Percentage Using Internet	69	43
Average annual Household Income	$ 88,000	$51,000

Source: U.S Census Bureau, Forrester Technologies Report, 2000, Centre for Immigration Studies, Washington D.C

More or less the same picture emerges from the present study too. Most of the respondents were young, ambitious and hardworking. Table 3 gives the distribution of the respondents by age.

Table 3 Distribution of Sample by Age

Age Group	Male		Female		Total	
20-25	8	(3.2)	7	(12.9)	15	(5.0)
25-30	46	(18.7)	14	(25.9)	60	(20.0)
30-35	89	(36.2)	14	(22.2)	101	(33.6)
35-40	77	(31.3)	9	(16.6)	86	(28.6)
40-45	18	(7.3)	8	(14.8)	26	(8.6)
45-50	6	(2.4)	4	(7.4)	10	(3.3)
50-55	2	(0.8)	-		2	(0.6)
Above 55	-		-		-	
Total	246	(100.0)	54	(100.0)	300	(100.0)

Nearly 22 per cent of the male respondents and 39 per cent of the female respondents were below the age of 30. About 90 per cent of the males and 77 per cent of the females were below the age of 40. There were no males or females above 55. This is indicative of the fact that migration of software professionals is a new phenomenon in the India-U.S migration process.

Educational status of the sample appears to be excellent in the sense that all the respondents have minimum graduation. Table 4 gives data on this.

Table 4 Educational Status of the Sample

Educational Category	Male		Female		Total	
Below Graduation	-		-		-	
Graduates	16	(6.5)	3	(5.5)	19	(6.3)
B. Tech.	126	(51.2)	24	(44.4)	150	(50.0)
M.S./M.Tech./M.Sc./M.C.A	84	(34.1)	20	(37.0)	104	(34.6)
Ph.D.	8	(3.3)	2	(3.7)	10	(3.3)
Others	12	(4.9)	5	(9.4)	17	(5.6)
Total	246	(100.0)	54	(100.0)	300	(100.0)

Half of the respondents, 51.2 per cent of males and 44.4 per cent of females, are B. Tech. degree holders. Nearly 35 per cent have post graduate qualification (34 per cent males and 37 per cent females) and a very small percentage have PhDs. This endorses the macro level perceptions about the educational status of Indian community in U.S.

The labour market profile of the sample respondents given Table 5 goes well with the picture that emerges from Table 4. The fact that the Indian software professionals are performing brilliantly in the U.S is evidenced from the figures given for senior level positions.

Table 5 Occupational Profile of the Sample

Occupational Category	Male		Female		Total	
Programmers/Developers	101	(65.4)	36	(66.6)	197	(65.6)
Team Leaders	36	(14.6)	8	(14.8)	44	(14.6)
Project Managers	26	(10.6)	8	(14.8)	34	(11.3)
Vice President	9	(3.7)	-		9	(3.0)
CEO	8	(3.3)	1	(1.8)	9	(3.0)
Other Top Managerial Positions	6	(2.4)	1	(1.8)	7	(2.3)
Total	246	(100.0)	54	(100.0)	300	(100.0)

Even though majority of the respondents in both sexes were at the entry level as programmers/developers, the senior level positions were also well represented, though the proportion of women in the higher levels were relatively very low or nil. Those at higher levels told us that they had their climb through different stages and in this process they had either acquired the 'permanent resident' status (Green Card holders) or citizenship in the U.S. But, still a good majority of the sample respondents were on H-1B visas. The distribution of the sample on the basis of visa status is given Table 6.

Table 6 Sample Respondents by Visa Status

Visa Category	Male		Female		Total	
H-1B Visa	153	(62.1)	34	(62.9)	187	(62.3)
Green Card	85	(34.5)	18	(33.3)	103	(34.3)
Citizenship	8	(3.4)	2	(3.7)	10	(3.3)
Total	246	(100.0)	54	(100.0)	300	(100.0)

Most of the respondents, 62 per cent of males and 63 per cent of females were on H-1B visa popularly called as the 'hi-tech' visa. A good proportion of these temporary visa holders later adjust their status as 'permanent residents' or 'green card holders'. But very few opt to be citizens.

An overall index of the economic conditions any person is the average income. The distribution of the sample by average monthly income is given in Table 7.

Table 7 Distribution of the Respondents by Average Monthly Earnings (US $)

Income Class	Male		Female		Total	
Below 1000	-		-		-	
1000 – 2000	-		-		-	
2000 - 3000	48	(19.5)	7	(12.9)	55	(8.3)
3000 - 5000	146	(59.3)	40	(74.1)	186	(62.0)
5000 – 7000	28	(11.4)	4	(7.4)	32	(10.7)
7000 – 10000	16	(6.5)	2	(3.7)	18	(6.0)
10000 and Above	8	(3.3)	1	(1.9)	9	(3.0)
Total	246	(100.0)	54	(100.0)	300	(100.0)
Mean	4487.80		4268.50		4448.30	

The average monthly earnings come to $ 4448.30 ($ 4487.80 for males and $ 4268.50 for females). This indeed is a very good figure because the average monthly earnings of even other professional categories are much less than this except for doctors. More than 20 per cent reported an average monthly income of above $ 5000. A small proportion of the respondents had their spouses also working, thus raising the household income to a much higher level. All the CEOs and VPs reported a monthly income of above $ 10,000. U.S. Census data clearly indicate the better economic status of Indian immigrants which is all the more true in the case of software professionals. There is no doubt that software professionals are the highest paid category in the U.S. labour market.

The better economic status of this category is further endorsed by the fact 64 per cent of the respondents had more than one car, 69 per cent had own apartment/house and 43 per cent had an own house in India too. All these factors are sufficient to demonstrate that the software professionals from India in the U.S are economically very well off compared to their counterparts in India and U.S.

INDIAN IMMIGRANT TIES WITH INDIA

Unlike the earlier group of migrants, the new group of software professionals appear to have strong ties with India and many of them were moving frequently between India and U.S for official work.

This kind of a close interaction with India was lacking in the case of many of the first generation migrants (Devi and Pillai 2002). As high as 85 per cent of all respondents visited India once in a year, 80 per cent brought their relatives to U.S for a visit, 69 per cent were active in their alumnae association back in India and 43 per cent had professional collaboration with India. 86 per cent maintained close contacts with friends and relatives through internet and 42 per cent helped friends to come to U.S seeking a software job. The above statistics not only indicate the intensity of the group's relation with India, but also their contribution to the development of human capital in India. The Alumnae Association of The IIT Kharagpur in U.S celebrated the Silver Jubilee of their alma mater by gifting a computer and $1000 to all the freshers in that year. Several such instances are reported in media in India.

GENDER AND FAMILY RELATIONS AMONG THE SOFTWARE PROFESSIONALS

Indian women in IT sector appeared to be a very heterogeneous group. At least 3 categories are identifiable (Devi 2002). The high profile successful entrepreneurs, the software professionals on H-1B visas and the dependent wives of male H-1B software professionals on H-4 visas. We met women in all the three categories. Among the high profile entrepreneurs comes women like Vani Kola (CEO Right Works), Radha Basu (former GM of Hewlett Packward and current CEO of Tyoga systems), Lata Krishnan (Founder and CEO of Smart Modular company) and Jayasree Ullal (VP of CISCO). They made it to the top through exceptional perseverance, hard work and enthusiasm. Majority of the second category, 58 per cent, were unmarried but were above the age 30. Some of them were on contract and had to relocate to different parts of U.S according to client location, which was given as a valid reason for not getting married. But a good proportion (26 per cent) of the unmarried deliberately postponed marriage because of their professional aspirations. Among those married, nearly 20 per cent were without children and had delayed children again due to their professional ambitions. However, a very high proportion of women, 48 per cent expressed the general concern that "on the professional ladder after a certain point, it is gender and ethnicity that matters (Devi and Pillai 2002).

The third category of women appeared to be a frustrated group. They were highly qualified but not permitted to work either due to the immigration laws or due to the professional aspirations of their male husbands. Many of the professional women on H-4 visas confessed that they had high aspirations on proceeding to the U.S, but on arrival soon realised that their career and professional aspirations were disillusionment. The dominant Indian ideology that the 'male is the bread winner' still prevailed even among the Indian emigrants in U.S. Thus, the conclusion was that the gender

and family relations among Indian software professionals in U.S took to two diametrically opposite stands, either the women were forced to be 'home makers' witnessing their husbands professional success or were forced to believe in the general labour market assumption that 'the ideal worker' has no family.

MACRO ECONOMIC IMPACTS OF MIGRATION OF SOFTWARE PROFESSIONALS

There are both positive and negative impacts of migration of 'knowledge workers' on the Indian economy. Most of the studies on 'brain drain' usually highlight the negative impacts only. While the loss of best brains, on which the government had invested a good amount of money, will adversely affect he human capital development of India, it might turn out to be a positive factor in the long run through return of human capital. The large scale migration of software professionals have many positive effects on the level of welfare in India through monetary remittances, incentives through emulation and above all return of better human capital.

Going to the negative aspects, it is already reported that IT companies are feeling the pinch of acute shortage of qualified software engineers and programmers. According to the US Bureau of Labour Statistics, American IT companies in U.S will face a short fall of IT professionals to the extent of nearly 0.3 million by 2008. With the mad scramble for Indian IT professionals it is almost certain that the large scale migration of IT professionals from India to U.S will continue unabated in the coming years too. The NASSCOM study has predicted that the software job market in India will remain tight and difficult as India will require 2.2 million IT workers by 2008. Even with attractive propositions like competitive salary and stock options, the Indian IT firms are finding it difficult to face the global competition. Experts point out that if the paucity of right software professionals continues, it will affect he growth prospects of many more companies and sectors in India (Iype 2000).

It is refreshing to note that, in spite of the grim prospects of labour shortage, India's IT Diaspora is feeding money and ideas back to the country. The supply of venture capital funding for Indian IT companies is also showing strong year to year growth. From nothing in 1998, it increased to $ 3 billion in 2003.

One significant positive impact which is clearly evident from the present survey was that all the CEOs and VPs in the sample reported that they had either set up their own subsidiaries in India or were outsourcing work to India on contract basis. This benefited the Indian economy to a great extent by creating jobs. Second, the high levels of skills that Indian companies and corporates developed as a result of working overseas began to be supplied to domestic customers. Today, the government and corporates in India have access to world class expertise in IT at extremely competitive rates (Srivastava 2004).

Yet another significant phenomenon that is noteworthy in the context of positive impacts is the reverse 'brain drain' which is occurring in the recent past. The change of mind set among bright Indian expatriates has been dramatic. Many of them returned to India with plans to set up their own IT firms or to work in Indian IT firms like Wipro, Infosys, Tata Consultancy which had become globally competitive by offering its employees several attractive options. The dynamism that the IT revolution has unleashed in India in fact led to this kind of reversal in the brain-drain. It also led to the emergence of new class of millionaires at the global level and in India. The value of tech stocks has been dramatic and stands at nearly $ 50 billion as on date. IT firms like Wipro and Infosys have been listed in the world stock markets giving a boost to their business profile and the morale of their employees. The country today has nearly one lakh cyber cafes and 3 million internet users. It is also remarkable that MIT is considering India as the site for its next media lab with plans to invest as much as $ 1 billion over 10 years, thanks to the brilliant Indian software community in Silicon Valley or MIT itself.

Finally, many of the Indian cities, e.g., Bangalore, are going global with world class facilities ranging from Mc Donlads' and Pizza Huts to international banks ravaging its streets. This Silicon

Valley of India which has housed all major international IT companies like IBM, Intel, Oracle and Microsoft is also the pet destination for a large number of returnees from U.S.

CONCLUSION

The software professionals from India in the U.S have been aptly labelled as a group of 'frenetic proficians'. They have been held in high esteem by the U.S society as hard working earnest and ambitious. Even though the loss of such brilliant brains has serious negative impact on human capital development in India, they are contributing in several other ways to compensate for this loss. Today India has a significant place in the global IT map. Just as the 1980s were the Asian Tigers' decade; the 1990s china's, the IT revolution will make this decade India's.

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