

**Social Networks and Institutions in Transnational Labor Markets:
The Circular Migration of Chinese and Indian Engineers and Professionals**

by

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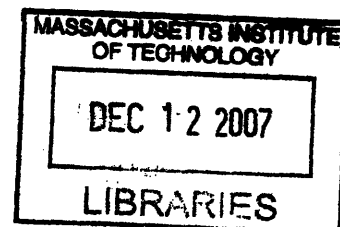
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by Fei Qin

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This dissertation examines the mechanisms of the circular migration of Chinese and Indian engineers and technology entrepreneurs. The study is based on a combination of quantitative and qualitative data – including a survey of alumni from one of the Indian Institutes of Technology, a survey of Chinese engineers in Boston, and in-depth interviews.

The study first looks into the post-migration settlement process of in the host countries and identifies significant changes in migrants' social networks at different stages of their careers. The study also examines the social processes that affect the decisions of migrant engineers to return to their home countries and their experience as returnees. In contrast to the conventional wisdom that often views the migration of highly skilled workers as highly individualized, the study finds that return migration is not a lonely journey. It is very often a group process instead of an individual process. Migrants establish various types of social ties and institutions during the migration and settlement process. They also draw heavily upon these networks and institutions when they return to their home countries.

Another key finding is that return migration is often associated with entrepreneurship. Returnees from overseas have a higher propensity to start their own businesses than either non-migrants or migrants who stay abroad. This pattern reflects the interaction between the opportunity structures in the home countries and migrants' individual characteristics. A mixture of opportunities and constraints that exist in China and India often leads engineers into entrepreneurship when they return. By starting their own business, returnees can create a niche for themselves in the existing structure of the home countries. In addition, returnee entrepreneurs who are successful often have returned in groups.

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This thesis is about the journey of people who traveled long distances in pursuit of their dreams. It is also about relationships, networks, and continuous collaboration that make the trip not a lonely one. The process of this research and my Ph.D. study at MIT are exactly like that. I could not have completed this research and my Ph.D. without the help of many people.

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Chapter One: Introduction

1.1. Bring Careers Back

International migration patterns have undergone fundamental transformations both in skill composition and in direction of migration flows during the past two decades. The explosive growth of the knowledge industries, particularly Information Technology and Bio Technology industry, and the resulted increase in labor market demand for diverse sets of skills have spurred mass migration of highly skilled persons, in particular engineers and other professionals (Martin,2003; Regets, 2001; etc.). The World Bank estimates that the stock of educated immigrants has increased by about 8 million between 1990 and 2000, and the percentage of skilled workers among immigrants increased from 29.8 percent to 34.6 percent. In 2000, the number of migrants with tertiary education living in the OECD countries amounted to about 20.4 million (Docquier & Marfouk, 2005).

The increasing mass movement of engineers and other professionals from developing countries to industrialized countries during the past two decades has rekindled the debate over highly skilled migration, which used to center around the notion of brain drain. The brain drain phenomenon used to be widely investigated in the 1960s and 1970s both in academic circles and by policy makers, and the out migration of skilled individuals is used to be viewed as a threat to economic

development in developing countries (Bhagwati, 1976; Nilan, 1970; Kao and Lee, 1973; Zweig and Changgui, 1995; Kekmati, 1973).

Recent empirical studies have suggested that skilled workers' migration from developing countries to industrialized countries is shifting from a one-way brain drain to a two-way brain circulation (Saxenian, 1999, 2002; Kapur, 2001; Martin, 2003): Migrants return to their home countries and bring back financial capital, knowledge, skills, and business connections with them. The so called brain circulation has attracted increasing attention from mass media, academics, and policy makers, and is coming to the forefront of migration research topics.

The two-way flows of skilled labor have provoked many spirited discussions on the highly skilled migration in today's context. A lot of efforts have been devoted to estimating the magnitude of the migration flows and evaluating the impacts on home and host countries' development (Kapur, 2001; Pellegrino, 2001; Martin, 2001; Saxenian 2002). Although there is a widespread belief that liberalizing the transnational movement of skilled labor, if properly managed, could result in a win-win situation for the sending countries, receiving countries, and migrants themselves, how exactly this potential can be realized is still not adequately understood. The existing academic research and policy discussion on the migration of highly skilled workers usually take place at a high level of aggregation. There is very limited discussion of the intervening labor market processes and the literature has not developed a rich understanding of the inner dynamics of these migration flows. Questions such as who exactly returns, returns for what, and under what

circumstances are likely to be more complex than acknowledged in the existing literature.

The purpose of this dissertation is to understand the micro processes of the so-called “brain circulation” by bringing migrants’ careers back to the analysis. In particular, this study investigates the labor market processes that connect highly skilled migration to the career outcomes for migrants – what is the interplay of individual decisions, social processes, and institutions in migration and return migration. I suggest that migrants’ interactions with other players in the system and their responses to the opportunity structures in the host and home countries, which vary at different phases of migrants’ careers, are key to understanding the mechanisms of circular migration.

1.2. Dissertation Context: Highly Skilled Migration from China and India

On the receiving end, the United States absorbs the largest number of highly skilled personnel, while on the sending end, China and India are the two largest sending countries of educated migrants. According to data from National Science Foundation, foreign-born individuals account for 37.6% of those with doctorate degrees. And 42.5% of all college-educated foreign born in science and engineering occupations reported arriving in the United States after 1990 (NSF, 2006), with a significant proportion from China and India. Highly skilled personnel from China and India entered the U.S. primarily through two channels – through a student visa or an employment visa, neither is not characterized as “migration” in legal terms in U.S.

immigration law. In fact, what the law defines as “immigrants” – legally admitted “aliens,” who enter on green cards and have the right to stay in the United States indefinitely, are only a very small part of the story of skilled migration from China and India to the U.S.

1.2.1 Migration for Education

The internationalization of higher education has contributed significantly to the growth in the migration of highly skilled labor. According to NSF, the number of individuals with higher education degrees who lived outside their home countries grew by 9.5 million from 1990 to 2000. The international higher education markets are dominated by a few countries both at the supply side and at the demand side. Nearly one-third of the overall 2 million students who were enrolled in higher education institutions outside their home country were enrolled in U.S. universities. As shown in Figure 1, among 3.1 million foreign-born Science & Engineering degree holders in the United States in 2003, 14% were from India and 9% were from China. Those percentages are even higher at more advanced education level, with China and India providing 21% and 14%, respectively, of foreign-born holders of science & engineering doctorates (300,000 in total) in the U.S. (NSF, 2006).

1.2.2. Migration for Temporary Employment

Temporary employment visas are the second major channel that highly skilled Chinese and Indian professionals and engineers are recruited to the U.S. The H-1B visa program provides visas for up to 6 years for individuals to work in occupations requiring at least a bachelor's degree (or to work as fashion models). India and China has ranked the top two countries sending H-1B professionals to the U.S. since the H-1B program was launched.

1.2.3. Return Migration

Since the late 1990's, sending-country governments, including China and India, have initiated programs tapping on their overseas talent. The flows of migration and return migration are largely influenced by the economic conditions in the host and home countries. While there is less fluctuation in the economies of the developed host countries, tremendous changes have taken place in the home countries.

Both China and India have become increasingly important players in the global high-technology competition. The Chinese government has declared education and Science & Technology to be the strategic engines of sustainable economic development for the nation. Fragmentary data on India suggest that it is also seeking rapid technological development focusing on knowledge-intensive service sectors and biotechnology. The growth in the technology sectors in the two countries presents increasing opportunities for their technologically savvy emigrants.

Migration and return migration are usually hard to measure because labor flows are usually not strictly recorded or tracked in many developing countries,

including China and India. The magnitude of return migration is even more difficult to determine since return migration usually occur in a variety of forms, very often without involving any change in legal migration status. In China, only the return of her citizens who went overseas for advanced education with financial supports from the government are tracked. The official statistics announced by the Chinese government shows that 80% of these students returned to China in the past decade (Wang, 2002), which is much higher than in the 1980s. Although the figure could be seriously biased as an indicator of the scope of return migration to China, because the government-funded students are obliged to go back to China immediately after completion of education overseas while self-funded students are not constrained by similar contracts, it at least provides a quantitative measurement of return migration and shows that return migration does take place. Statistics on the return migration of Indians are very scarce, except for some newspaper and magazine stories about the high-profile success of some Silicon Valley's Indian entrepreneurs. Despite the glorious account of the brain circulation, empirical evidence on the return migration of non-superstar engineers and professionals are very fragmented. One of the goals of this dissertation is to collect systemic data on migration and return migration among the alumni one of the Indian Institutes of Technology – a group, in many ways, representative of the elite engineering population in India.

1.3. Dissertation Overview

1.3.1. Conceptual Framework

The theoretical approach adopted in this study integrates three important fields of inquiry – labor economics, economic sociology and industrial relations research. This multidisciplinary work lies at the intersection of these three fields. A large body of economic literature has been devoted to understanding the movement of labor across national borders. Neo-classical economics view migration and return migration as a self-selection process, where potential migrants rationally calculate the cost and benefits of migration. Social and Institutional dimensions are often overlooked in this approach (Warren & Peck, 1980; Borjas & Bratsberg, 1996; etc.). On the other hand, the new economic sociology literature addressing social networks and social capital offers sophisticated tools for analyzing the formation and impacts of social networks in the migration process (Granovetter, 1973; Barley, 1989; Portes and Sensenbrenner; etc.). In addition, the industrial relations literature provides well-developed theories in understanding institutions and systems of labor markets (Piore 1979; Kochan et al. 2001; etc.). I also incorporate theories of careers and entrepreneurship.

Although a large body of literature has been devoted to understanding the movement of highly skilled labor across national borders, there has yet to be a comprehensive theoretical model to analyze the process of migration. The existing migration theories are based on concepts of distance, ideas of push and pull factors. Two bodies of theories have dominated the discussion on why people migrate across national borders. Neo-classical economics view migration and return migration as a self-selection process, where potential migrants rationally calculate the cost and benefits of migration. Individual's response to monetary incentive is the key to this approach – people move to find employment and remuneration more appropriate to

their formal education and training. There is little room for the role of institutional and other factors that lead to imperfections in the labor market (For example, Borjas, 1987; Borjas, 1994). The second group of works, under the framework of the push-pull model (for example, Goss & Lindquist, 1995), emphasize the economic, social, and political conditions in the host and home countries and policy interventions.

These conventional approaches focus on either the individual endowments of migrant groups or the economic contexts (As illustrated in figure 2). These theoretical frameworks do a fairly good job in explaining the migration of highly skilled migrants across national borders at the aggregate level and when migration is one-shot. Yet the static model is no longer sufficient in explaining the continuous and dynamic migration flows when migration becomes a circulation. Why do we observe a reverse of the migration under certain circumstances? The existing approaches attribute them to the changes in the economic environments in the home countries and host countries or individual attributes such as the skills and human capital of migrants. What missing here are the changes that happen to migrants, socially and institutionally, during the migration and settlement processes. In this dissertation I propose to understand migration through the lenses of careers of migrants and connect the career with the system. The new approach I am proposing here is based on distinguishing specific career paths and their relationships with labor market processes and institutions.

Through a career perspective, the basic philosophy guiding this dissertation are two fold: First, migration is a dynamic process. A career consists of a sequence of jobs held by an individual and related to each other by the acquisition of skill and experience. Roth (1963) interpreted a career as “a series of related and definable stages

or phases of a given sphere of activity that a group of people goes through in a progressive fashion (that is, one step leads to another) in a given direction..." The concept of career is most relevant in a dynamic migration system. Findley (1979) defines the career path within a migration system as the route taken by the migrant through the sequence of jobs, occupations, and locations. Studies of the migration settlement process of low wage workers (Piore, 1979; Sessan, 1995; Waldinger & Lichter, 1997; Waldinger, 2001; Waldinger & Der-Martirosian, 2001) have shown that migrants' decisions about where to work, and what at, are affected by constraints and influences which operate at particular moments in time. In the case of circulation migration where migration is a continuous process composed by a sequence of jobs or activities held by individuals who move across geographic locations, the outcomes of migration are largely shaped by the interactions between the career paths of individual, the nature of the job, and the structures and institutions of the labor markets.

Second, migration is a group process. The collective nature of careers has been well articulated by sociologists:

As social beings, persons are defined less by their uniqueness than by their membership in a category of actors that populate the same setting (Goffman 1961)

Careers ... were not solely of the individuals' making. The options they foresaw and the choices they made were always limited by contextually defined possibilities. ... Careers were pieced together from the string of alternatives and the set of interpretive resources offered individuals at any point in time by the collectives to which they belonged. (Barley, 1989)

The collective nature of careers suggests, in contrast to the conventional wisdom which views the geographic mobility of highly skilled labor as a highly individualized and purely economic action, we will also need to understand migration as a social process, which may affect individuals' decisions to migrate or return and their experience as migrants and returnees.

This new approach is illustrated in Figure 3. It allows us to understand migration as a dynamic system incorporating a mixture of individual behavior vs. social behavior and a combination of formal vs. informal institutions. There are two key ingredients of this theoretical framework: First, individual migrants are embedded in a web of social relations and institutions. Second, the interactions between individual decision making/behavior and institutions vary at different career phases and hybrid mechanisms existing in the migration process. Under some conditions individuals make decisions as instrumental individuals and other times as social beings. Similarly, under certain circumstances migrants pursue informal social networks as opposed to more formal institutions. This model is illustrated in the chart below.

1.3.2. Research Methods

This research is based on a combination of original quantitative and qualitative data that were collected through surveys, in-depths interviews, and participatory observations. I designed and implemented two surveys of Chinese and Indian engineers and a semi-ethnographic study in China (Beijing, Guangzhou, and Shanghai),

India (Bangalore, Chennai, and New Delhi), and the U.S. (Boston). The survey data contains over 3,000 observations (approximately 200 for the earlier Chinese survey, and 3,000 for the later Indian survey), and more than 200 variables capturing, in great details, information on migration history, educational attainment, work experience, and social networks. The qualitative data includes over 120 semi-structured interviews with migrants and returnees and various institutional actors involved in the migration processes.

1.3.3. Structure of the Dissertation

The dissertation is organized into three main empirical chapters, each of which constitutes an independent paper. While the paper papers are closely related and all focus on the dynamics of the circular migration, they provide distinct insights on different aspects of the phenomenon. I conclude the dissertation with a brief summary of my main findings, my contributions to the literature, and my agenda for future research. The three empirical papers are outlined below:

Paper 1

My first paper examines the impacts of social networks on important labor market outcomes for highly skilled Chinese immigrants in the post migration settlement process in the host country. Using data from a survey and interviews with Chinese professionals in Boston, the study investigates social networks and job search

outcomes in two phases of a migrant's career: the first professional job in the U.S. and the most recent job. In contrast to what is assumed in the conventional assimilation view that co-ethnic networks channel migration at the outset but disperse afterwards, the paper finds that: among highly educated Chinese migrants, the initial migration is usually *not* channeled by interpersonal networks; however, networks are created among migrants post migration, and the exposure to co-ethnics is sustained over time. Such co-ethnic networks provide important information bases and supporting mechanisms that are valuable throughout a migrant' career, particularly in job search.

Paper 2

My second paper examines how social processes affect the decisions of Chinese engineers in the U.S. to return to China and their experience as returnees. The analysis is based on three pieces of data: quantitative data from a survey of a group of Chinese engineers in Boston regarding their plans to return, qualitative data from in-depth interviews with both returnees in China and migrants who are still in the U.S., and qualitative data from interviews with various types of institutional actors involved in the return migration processes. The study finds that return migration is often associated with entrepreneurship. This pattern reflects migrants' perception of the opportunity structure in China. A mixture of opportunities and constraints that exist in China often leads engineers to return for technology entrepreneurship. Moreover, in contrast to the conventional wisdom that often views the migration of highly skilled workers as a highly individualized process, the study finds that return is not a lonely journey. It is very often a group process instead of an individual process.

Returnees/potential returnees draw heavily upon the ties with other migrants that have been established during the migration process. The decision to return is often not made by isolated individuals, but made collectively by the group of people who go back to China as a team. In addition to interpersonal ties, various types of voluntary migrant associations serve as important intermediaries between migrants' communities and gatekeepers in China.

Paper 3

My third paper provides a systematic analysis of the circular migration of elite Indian engineers by analyzing a unique data from a survey of the alumni of Indian Institute of Technology in Kharagpur. In this study, graduates from I.I.T.-KGP are classified according to whether they have overseas experience or not. The paper examines three related questions: (1) What the employment patterns are like for I.I.T. alumni who work and live overseas? (2) Who returns to India? and (3) How well returnees are doing in India? The results suggest that differences in overseas educational attainment, work experience and social networks largely shape the decision to return to India: Overseas education is negatively associated with return migration; those who have better access to instrumental co-ethnic networks are more likely to move back to India; those who work for large organizations are less likely to move back to Indian than those who work for small and entrepreneurial companies. A look into the return migration process shows that returnees rely heavily on the ties with other I.I.T.ians whom they knew from college and ties with family members in

the settlement process. They also develop and capitalize on new professional/work-related ties with co-workers in India once they move back. Finally, a comparison between the labor market performance between returnees and non-migrants shows a significant premium in earnings associated with migration experience. Returnees show a higher tendency to start their own business than both migrants who stay in the host countries and non-migrants.

Figures

Figure 1

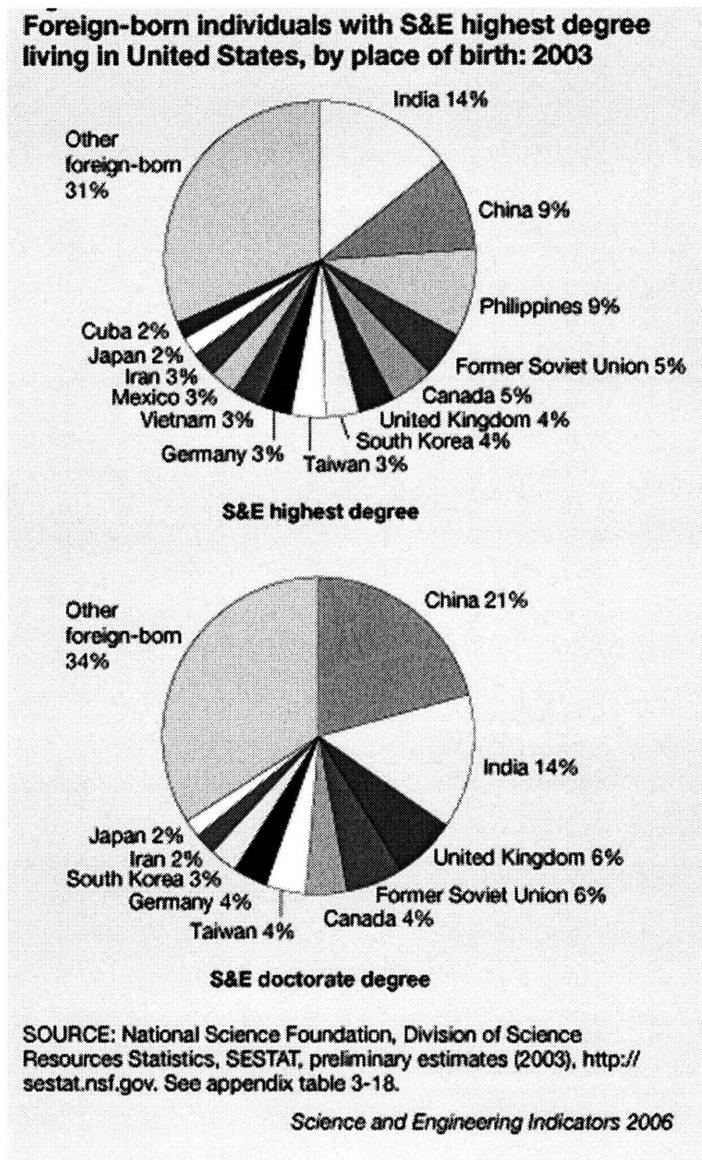
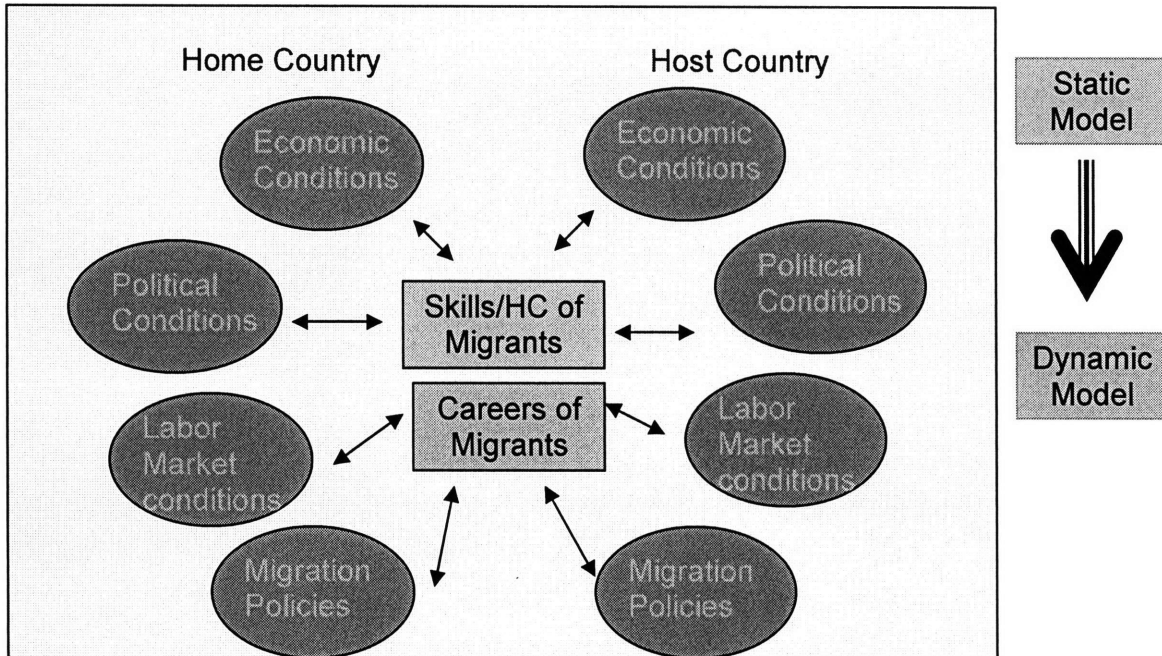


Figure 2 Bringing Careers Back in



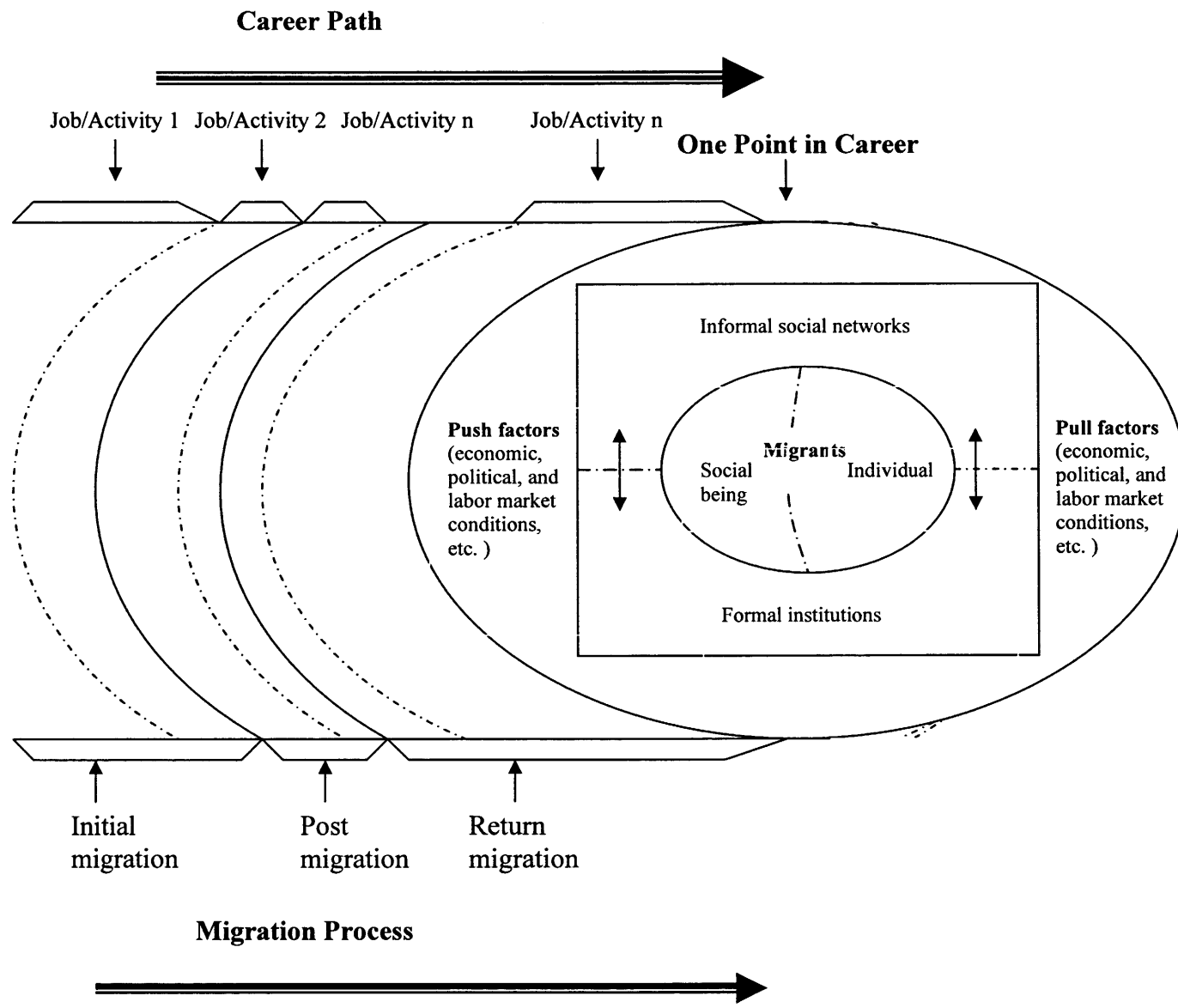


Figure 3 Migration System

Chapter Two (Paper 1)

Social Networks in Non-Network-Based Migration:

A Case of High-Skilled Chinese in Boston

2.1. Introduction

A vast body of research has explored the relationship between social ties and labor market outcomes. The key notion of this stream of work is that the opportunities of social actors are largely constrained by their connections with other actors (Granovetter, 1985). People gain access to intangible resources, or social capital, through membership in interpersonal networks or social institutions and utilize these resources to improve their economic position in society (For example, Jacobs, 1961; Loury, 1977; Bourdieu, 1986, Coleman, 1988; Putnam, 1993)¹. In particular, personal contacts are effective means in connecting people with jobs (Granovetter, 1974; Lin, 1982, 1990; Fernandez and Weinberg, 1997).

The idea of social capital and the emphasis on social networks have been applied to the analysis of a variety of social settings and labor force groups, with immigrant communities being one of the most frequently used example. Sociologists have suggested that migrant communities represent one of the clearest examples of how contextual factors can affect individual economic action, hence are very suitable to

¹ Both economic and sociology literature address “social capital.” There has not been a consensus on the definition of social capital. Putnam (1993) defines social capital as networks. Here I refer to Laumann and Sandefur’s (1988) definition that social capital “consists of the collection and pattern of relationships in which she is involved and to which she has access.” In the migration literature that interpersonal networks are usually viewed as a source of social capital (see Espinosa and Massey, 1997).

illustrate social embeddedness (Coleman, 1988; Portes and Sensenbrenner, 1993). In fact, the relationship between ethnic ties and migrants' careers in the host society has always been an important themes in the migration literature. Studies on ethnic enclaves and ethnic niches have found that co-ethnic ties, in particular family and kinship ties, are the major channels through which new migrants enter certain occupational niches (Waldinger, 1996; Sessan, 1996; Zhou, 1990; Waldinger and Der-Martirosian, 2001). Research on post-migration settlement also suggests migrants' adaptability to job needs in the host country is significantly constrained by the social roles that migrants assume and the community settings in which they are embedded in (Piore, 1979; Menjiva, 2000).

However, prior studies on social networks and job outcomes, which is often described in the chain migration model, or network-based migration, have primarily focused on low-waged migration (Piore, 1979; Portes, 1995). In the case of network-based migration, where migration to the destination country is promoted or facilitated by previously obtained co-ethnic ties, the process of migration is often entangled with the process of job search in the host country. There is very often an underlying assumption that contacts have been built up before migration, and they are merely transferred from the sending country to the receiving country. Under this assumption, migrant networks pre-exist to the initial migration and are implicitly considered to be static in the later phases of migration. Other researchers, such as Faist (2002), also noted that the accounts of how migrant networks come into existence were absent from the framework of chain migration.

Very little attention has been paid to the evolvement of networks and labor market outcomes of highly skilled migrants who are often characterized by the absence of networks upon their arrival. This gap in the literature is rather surprising, given that the influx of highly skilled migrants into the industrialized economies, such as the U.S., has been one of the most prominent trends in contemporary immigration. A significant proportion of the high tech labor force in the U.S. today is composed of migrants. The current state of theory on the higher end of the migration stream is far from adequate in term of explaining the nature of the social networks in which highly skilled migrants are embedded after arrival, and the roles these networks play in their various phases of their careers.

The new highly skilled immigration has a very salient group characteristic: in many cases, the initial migration is not channeled by interpersonal ties, but rather based on through formal institutions and individual efforts, for instance, through the admission of education institutions (usually entering the U.S. with a student visa or a visiting scholar's visa) or direct recruitment of the companies in host country (entry with a temporary employment visa)². As a good illustration of the scope of migration through institutions of higher education, the number of student visas issued by the U.S. jumped from 65,000 to 315,000 from 1971 to 2000 (see Borjas, 2002). However, migrating through formal means does not necessarily mean being unconnected to co-ethnic communities afterwards. I argue that, although migrating, in the first place, involves few networks, once immigrants come to the host country, they form networks.

² This is not saying that no network involved in these migration at all. Instead, "non-network-based" means that personal networks are not the major or primary channel as compared to the standard network-based migration.

In this case, questions are critical regarding how social networks among migrant groups come into existence, how these networks change over time, and what roles these networks play in various stages of a migrant's career.

Taking a dynamic view towards the evolvement of immigrants' social networks and their adaptation to the labor market in the host country, this chapter develops testable hypotheses on the pattern of the social networks for non-network-based migrants and the linkages of social embeddedness to labor market outcomes. In doing that, the study extend the existing analytical framework and approach in the literature about low skilled migration to the scenario of highly skilled migration, offers insights into how post migration adaptation operates among higher socioeconomic classes, and explore whether there is any difference across different levels in the occupational ladder.

The case is chosen as the migration and settlement of highly skilled³ Chinese in Boston. Anecdotal evidence has shown that many high-skilled Chinese immigrants are employed in the high tech sector in the U.S. The trend became even more prominent in the 1990s, when the great demand for computer engineers and bioengineers led to special the passage of legislative measures facilitating immigration among these professions. Being the hub of academic institutions and with a cluster of high tech companies, Boston is one of the major destinations where highly educated and highly skilled Chinese immigrants have gravitated to.

³ There is no a clear definition on "highly skilled migrants." In some cases it is measured by educational level, in others it is measured by occupational categories. This study focuses on migrant professionals and engineers who have college or equivalent education.

Using data from a survey of highly skilled Chinese engineers in Boston, and interviews and observations in Chinese professional and engineering communities in Boston, this study first looks at the changes of the composition of migrants' social networks' over time and the forces that shape the internal dynamics of the networks. The study then moves to examine the connection between the acquisition of social networks and the method for job search in two post-migration career phases – the first professional job in the U.S. and the most recent job. Finally the study investigates the consequences of social networks and job search mode on wages.

2.2 Theoretical Framework

The conceptual framework of this study is composed of three interrelated parts in addressing three questions. First, what are the patterns of social networks among migrant engineers and professionals and how do these patterns change over time? How is that influenced by the group characteristics of the migrants?

Prior studies have suggested that migration and settlement must be understood as social processes that relate to communities instead of individuals (Piore, 1979, Sassen, 1995; Waldinger, 1996, 2001). Yancey, Ericksen, and Juliana (1976) argue that “ethnicity” is not a category, but rather an emergent phenomenon that continues to develop with the changing position of groups and individuals in the host society. In this sense, the migrant networks that are based on common ethnicity should not be viewed as static.

Researchers have been divided into two camps on how change happens to immigrants - in their own customs, habits, and preferences, as well as in their relationships with co-ethnics. The theory of assimilation assumes that immigrants stick together at the outset. In the early stage of migration, proximity to co-ethnics promotes continued interaction within the ethnic circle and is crucial to new migrants' upward mobility in the host country. Over time, the search for opportunities leads to dispersion of the co-ethnic networks. This traditional perspective views ethnic ties as "culturally based vestiges of older forms of social organization," which are "bound to whither as immigrants respond, in individualistic fashion, to options that arise as integration deepens" (see Alba and Nee, 1997, for a review).

In contrast, a more recent literature on sociology of immigration outlines a different trajectory. In the new approach, contacts between migrants are viewed as constituting an important source of social capital. Exponents of this social capital perspective argue that immigration is a social process and is eased by the connections that link settlers to newcomers. Concentration, not dispersion, is beneficial, not only because network-dense communities provide an informational base and support mechanisms (Waldinger, 1996), but also because co-ethnic communities engender codes of conduct and mechanisms to sanction those who violate norms, which entails a "parallel movement up the socioeconomic ladder in the host society" (Portes and Sensenbrenner, 1993).

However, this approach is, traditionally, limited to the network-based nature of migration and employment systems which lead to immigrants' clustering in highly dense residential area and specific economic activities, in most cases small businesses

in ethnic niches. Most of the work in this vein has focused on the concentrations characterized by high levels of immigrant self-employment or ethnic entrepreneurs (Waldinger and Der-Martirosian, 2001).

Applying the new sociology of immigration perspective to the scenario of non-network-based migration, what trajectory are we going to observe? In a network-based migration system, seedbed newcomers arrive and find jobs with help from the very beginning. The process of migration and employment is eased by connection to settlers. By contrast, in the case of non-network-based migration, individuals move to the host country with little or no family support or few or no prior contacts in the same migration cohort. The number of co-ethnic ties available to the new migrants is limited, which forces the migrants to reach out to other members in the host society, which include not only natives, but also co-ethnics who have come to the host country in either the same or earlier migration cohorts.

In his analysis of migrants who are self-employed, Waldinger et al. (1993) conclude that ethnic strategies emerge from the adaptations migrants make to the resources available to them, building on the characteristics of their group. For low-skilled migrants, Piore (1979) suggests that co-ethnic community development coincides with migrants' transition to a permanent attachment to the host society, which occurs later in the settlement processes. The central notion of his thesis is that as migrants become more permanently attached to the host society and move to more stable employment, more social structure grows up around them. "A longer stay is often accompanied by a more intensified need for community." Consequently the rudiments of community development emerge when migrants move to a stable and

permanent settlement. In this dynamic perspective, immigrant communities are, to a considerable extent, the product of migration processes.

An analogy can be made to the immigration of professionals. In the case of highly skilled immigrants who come to the U.S. for advanced education, new migrants arrive through the admission system of U.S. graduate schools. The majority of the prospective students have never been in this country before, nor do they have any relatives or friends here. When they arrive, they leave most of their contacts behind, with few connections in the new land, either with co-ethnics or with natives. The lack of social capital does not appear as a prominent problem during the new migrants' school life, until they enter the job market. Although possessing a rich stock of human capital, the immigrants have very limited resources, particularly informal networks, that they can mobilize for job search. The environment forces migrants to seek support and build their social networks. During this process, social structures emerge because of they can help migrants solve new problems.

In a conceptual framework for how economic embeddedness constrains individual actions, Portes and Sensenbrenner (1993) suggest that the particular circumstance of "foreignness" often explains the rise of social capital among immigrants. Networks connecting co-ethnics allow for rapid transmission of information about job openings and opportunities for business start-ups. In terms of job hiring, in particular, networks also provide useful information on the workplaces culture and environment with regard to race and ethnicity. Furthermore, Waldinger (2000) suggests that, once established, the social organizations and social relations of the immigrant community tend to operate with an independent effect and lead to self-

reproduction and persistence. For the same reason, the web of ties linking immigrant professionals and engineers to one another is likely to create information fields and mobility channels in durable ways. The process of adaptation to the host economy, particularly the job market, creates the seeds out of which a new ethnic social structure grows, and this development is intensified over time.

I argue that a skilled migrant's exposure to co-ethnics is not likely to decrease over time, but in some cases may increase, for two *more* reasons. One is *need*. The awareness of the importance of informal networks may not become clear until migrant students finish the graduate school and start to look for jobs. There is a time lag between noticing the need and intentionally building a network. A development of co-ethnic ties, linking those with great degree of commonality, is expected to be observed after a migrant enters labor market. The other is *availability*. Newcomers who come to study face many constraints. In their earlier years in the U.S., the majority of international students live close to the university campus; therefore, for many of them, their lives are confined to school and campus. The composition of social contacts they have is determined to a large extent by the demographic composition of the students and faculty at the school. Given this situation, access to co-ethnics, especially more established ones, is very limited. For the migrant, the situation changes after the launch of the job career, when more choices are available regarding residential location and the group of people to socialize with. As a result, there are more chances to be exposed to co-ethnics in the later phase than in the initial state in the job market. Thus, I posit:

Hypothesis 1: For a skilled immigrant who comes through non-network-based migration, the proportion of co-ethnics in his social network is *not* likely to decrease in the later phase of his career, compared to the earlier phase of his career.

The next step is to investigate the relationship between the social networks and job outcomes. The connection between the structure of social networks and labor market outcomes has long been recognized. Earlier research has found that information which leads to action is more likely to move through chains of personal contacts than through mass media or impersonal routes (for example, Lee, 1969). In his seminal work on professional workers, Granovetter (1974) finds that personal contacts are of paramount importance in connecting people with jobs. He also suggests that weak ties between acquaintances, which are characterized by the flow of nonredundant information, provide individuals with better access to job information. In addition to nonredundant information, Lin (1982, 1990) suggests that resources that are embedded in weak ties present advantages over strong ties in facilitating job acquisition and status attainment: power, wealth, and prestige possessed by others can be accessed through weak ties that link persons of different status.

The economics literature provides further explanations and evidence on the importance of personal ties as sources of employment information. Researchers have argued that job seekers rely heavily upon social networks for job search (Rees and Shultz, 1970; Corcoran, Datcher, and Duncan, 1980; Rees and Gray, 1982). Based on his analysis of the youth cohort of the National Longitudinal Survey, Holzer (1988) demonstrates in a model of multiple search methods that contacting friends and

relatives generates a job offer with relatively high probability. Researchers also find evidence that job referrals tend to occur among persons with similar attributes (Rees, 1966; Doeringer and Piore, 1971; Heneman et al., 1980).

Immigration researchers suggest that a similar effect may result from the way that immigrant networks develop, as described by the chain or cumulative migration theory (MacDonald and Macdonald, 1964; Massey, 1990; Massey, Goldring, and Durand, 1994; Greenwell, 1997). In the case of chain migration, previous migrants smooth the way to finding employment for their family members and social contacts: social networks influence how a job is obtained in the host country. Empirical research has provided supporting evidence for such an effect. For example, in their study of Mexican immigrants, Aguilera and Massey (2003) found that having more distant family members with current/past U.S. migration experience greatly increased the odds of getting a job through a friend or relative.

Beyond the scope of chain migration, studies of immigrant settlement also suggest that, even after accounting for factors such as individuals' skills, national origin, and other demographic characteristics, the processes by which immigrants find jobs and attain certain wage levels largely depend on their membership in highly localized community social networks (Caces et al., 1985; Boyd, 1989; Sassen, 1995). Granovetter (1974) proposes that the major motivation for the passing of job information is reciprocity. Migrant networks feature reciprocity and bounded solidarity, as well as enforceable trust (Portes and Sensenbrenner, 1993), which entails flows of job information and employment opportunity through these networks.

Piore's (1979) theory about low-skilled migrants within the framework of labor market dualism offers some further implications for the underlying mechanisms linking co-ethnic networks with labor market behavior. Settlement brings the migrants into competition and conflict with the native population for job opportunities, which occurs later in the settlement processes for low-skilled migrants, as they develop a more permanent attachment to the host society and hence begin to seek employment of higher social status, job security and better career opportunities. For highly skilled migrants, the onset of competition and conflict could happen even earlier, and the conflicts may be more intense, given that from the very beginning they are penetrating into the occupations and industries that are also desirable for natives. Piore also argues that co-ethnic workers usually share the same attitude toward the labor market, which should be equally true for highly skilled migrants.

Therefore, I would argue that for high-skilled immigrant professionals, the way they find a job should also be constrained by the social networks in which they are embedded. Co-ethnic networks, once in existence, can provide them with useful job information: where to locate the job opening, what the workplace environment is like for immigrants, what the wage level is, etc. More important, the network composition of high-skilled immigrants migrating through non-network channels is likely to be different from that of those coming through chain migration. In chain migration, or network-based migration, one's contacts with co-ethnics are more likely to be dominated by family and close friendship ties, or "strong ties," which are characterized by high contact frequency and emotional intensity. In contrast, in non-network-based migration, there are fewer strong ties available for migrants in the

destination country. Instead, their social networks with co-ethnics are more likely to involve weak social ties developed after moving to the host country and in a variety of social settings (Bagchi, 2001). In addition to non-network-based migration feature, the social network structure of high-skilled professionals is particularly characterized by weak ties. Prior research has shown that communities with high proportions of professionals may have social networks with relatively more weak ties, and hence labor market advantages resulting from weak social ties will be available mainly in professional communities (Portes, 1995). Compared with strong ties, such weak ties connect one to people from a more varied set of social positions. Therefore, the social network effects on job searching mode, which are documented in the labor market adaptation of migrants coming through chain migration, should also be identified among migrants who initially come through *impersonal* means, as long as they successfully acquire co-ethnic contacts in the host country. This effect should be even more prominent because of the nature of the ties they possess.

Thus I propose that those who have more access to co-ethnic communities are more likely to get job information through these co-ethnic ties.

Hypothesis 2: The use of co-ethnic networks in job searching is positively related to the fraction of co-ethnics that a migrant socializes with.

Given the dynamic feature of the social networks for migrants under non-network-based migration, the evolution of the social networks will be reflected in their job searching behavior. Since a new migrant tends not to sever ties with co-ethnic

communities, the utilization of co-ethnic networks in job search will not likely to be weakened, even if not intensified, as he has a longer residence in the host country.

Based on Hypothesis 1 and Hypothesis 2, I expect:

Hypothesis 3: The odds of using co-ethnic networks to find jobs are *not* likely to decrease in the later stages of a skilled migrant's career.

Social networks, by affecting the way a job is acquired, may further influence the quality of the job. Wage is one of the most important indicators of job quality. Social networks have been recognized in the sociology literature as effective in assisting network members to secure higher paid jobs. Prior research has generally asserted that the use of personal contacts results in better jobs, measured both by wage and by job satisfaction (Granovetter, 1974; Fernandez-Kelley, 1995; Aguilera, 1999). According to Granovetter (1974), information secured through personal contacts is of greater detail and higher reliability than that available by other means. Other researchers provide additional explanations for this positive relationship: some positions are only publicized within informal networks; some often become available prior to their advertisement. So friends and relatives can identify high-paying jobs once they are available and share the information with potential job applicants (Grieco, 1987). Moreover, not only do employees prefer personal contacts in job search, employers also benefit from informal hiring through social networks, by locating job applicants who are more productive and better prepared for company culture (Granovetter, 1985; Fernandez and Weinberg, 1997; Fernandez, Castilla, and Moore, 2000).

Labor economists have also examined the relationship between job search mode and wages as well as the underlying mechanism. A match-quality explanation argues that workers who find their job through personal contacts have superior information on match quality, and hence earn high starting wages due to self-selection (Wanous, 1980). On the referrers' side, Rees (1996) and others have suggested that people will refer only well-qualified applicants, since their own reputation is at stake. In an adverse-selection model, Montgomery demonstrated that workers who are well connected might fare better than poorly connected workers, and firms hiring through referral might earn higher profits. (Montgomery,1991). In general, the literature suggests that social capital can positively affect wages, both by providing migrants with a privileged source of information, and by providing employers with a reliable screening device.

Studies in migration contexts often echo this argument. Most studies on migrant wages have found social capital to have positive effects on U.S. wages, although the return differs between men and women (Donato, Durand and Massey, 1992; Donato and Massey, 1993; Hagan, 1994; Philip and Massey, 1999). Aguilera and Massey (2003) find that social connections to people with previous or current migrant experiences have positive effect on Mexican immigrants' U.S. wages, both through a direct effect of improving the efficiency and effectiveness of the job search, and through an indirect influence on sector of employment.

The beneficial effects of using social ties in job searching should also be observed among skilled immigrants who find their jobs through co-ethnic ties. To be more careful about such an argument, it is necessary to pay attention to the particular

nature of ethnic networks before proceeding with a hypothesis. The majority of the studies in the network and immigration literature point to the beneficial effects of social capital. Nevertheless, some authors point out the downsides of social embeddedness. Portes and Sensenbrenner (1993) have criticized the bias of the instrumentalist analysis of social capital toward emphasizing its positive uses, and called attention to the double-edged nature of immigrant networks. They argue that the solidarity and enforcement capacity of ethnic networks that gives rise to appropriable resources for individual use can also restrict the scope of individual expression and the extent of extracommunity contacts. However, such adverse effects are often identified in inner city “ghettos,” such as Chinese in San Francisco’s Chinatown in the 1970s (Nee and Nee, 1973), and Puerto Ricans in the Bronx (Bourgois, 1991). In those cases, residence and employment are often highly concentrated in a few small and often isolated geographic areas or neighborhoods, where the immigrant communities often feature rigid norms regulating business and social life and constraints on members’ access to outside opportunities, thereby blocking the upward mobility of the groups. In contrast, the ethnic network of highly skilled professionals is more loosely structured, and in general no downward leveling norms are put on individual action and receptivity to outside culture. Therefore I expect that ethnic networks do not impose negative effects on skilled migrants’ earning potentials, and the general pattern of the relationship between using contacts in job searching and wages will be observed.

Hypothesis 4: The use of co-ethnic networks in finding a job will positively affect the wages associated with the job for skilled immigrants.

2.3. Data and Methods

2.3.1. *Pre-Survey Qualitative Research*

The field study upon which this paper is built started in April 2003. The data I have collected include qualitative data from participatory observation and two rounds of interviews and quantitative data from a survey.

I chose as my research setting the places Chinese skilled migrants frequent in Boston. First were three major Chinese associations - New England Chinese Information Networking Association (NECINA), Sino-American Pharmaceutical Professional Association (SAPA), and Overseas Chinese Entrepreneurs Association (OCEAN). Second were companies where Chinese employees are located, for example, Nortel, Alcatel Communications, and Oracle. Last, social places where Chinese immigrants gather regularly, such as Acton Chinese Language School, Chinese churches, etc.

Following a grounded theory approach, my initial purpose in data collection was exploratory, with a focus on the social ties and information exchanges within the community and the career path of individual immigrants. From April to November I attended most of the activities of NECINA and SAPA and some of OCEAN's, including conferences, outings, seminars, and happy hours. I also sat in on their monthly operation meetings, talked to their officers, and regularly socialized with their members. I visited and conducted interviews in the companies and other research sites mentioned above. There were two rounds of interviews. In the first round I started to

identify whether particular patterns exist regarding Chinese skilled immigrants' career path, educational attainment, and networking. In the second round I focused more on the utilization of ethnic networks in job searching. In total 56 interviews were conducted.

2.3.2. The Survey

This paper primarily focuses on the quantitative analysis⁴. The data used to test the hypotheses are from a survey that I conducted in November and December 2003 on a group of highly skilled Chinese professionals in Boston.

In order to reach a sufficiently large sample of highly skilled Chinese immigrants, I started again from professional associations. I took this sampling approach because the commonly used databases, such as CPI and census data, do not contain sufficiently detailed information on the immigrants with which we are concerned in this study. In addition, there has not been a large-scale survey on Chinese immigrants that is comparable to the Mexican Migration Project survey (See Aguilera and Massey, 2003). The association where I chose to gather my initial survey data was A-Association, one of the premier Chinese professional associations in Boston. A-Association was founded in mid-1990s. Certain features make it a desirable survey setting in which to gather the data I need for this study: First, the majority of the members are first-generation immigrants from Mainland China, while a small proportion are from Taiwan, Hong Kong, or other parts of the world. Second, almost

⁴ It would require a separate study to display the processes of the community development and what exactly happens in these settings, which would rely more on the qualitative data.

all of the members are highly skilled professionals. Finally, members' affiliations cover a fairly wide range of local companies, which guarantees that the key variables will not be skewed by the recruitment method or wage level of certain employers - a problem that an alternative sampling scheme might bring if data were gathered from a few companies that hire a fairly large number of Chinese employees.

The survey was pre-tested several times, not only to find the best wording for the questions, but also to identify the preferred way of distributing the survey to promote response rate. I chose the form of web-based survey, considering that the targeted people are used to working with computers and that it is also the most convenient way for them to fill in and submit the answers. Since the questions concern detailed information of a person's immigration background, education background, career trajectory, and social networks, the survey was designed to be anonymous and it was guaranteed that the information would be kept confidential. The survey was launched on the A-Association official survey website. The A-Association operation team forwarded an email by me to its members in early November, requesting participation in the survey and including the link to the survey website. Members were asked to click the survey link, answer the questions, and simply click "submit." This procedure guarantees that no personal identification information of the respondents, such as email addresses, was disclosed, other than the IP addresses that were tracked by the web survey software. A follow-up reminder message was sent out one week later.

I was aware that this approach might generate selection bias problems if those individuals who are A-Association members were systematically different from the

general population of highly skilled Chinese immigrants. To address this problem, I supplemented the A-Association sample with a smaller sample of Chinese migrants who are not members of A-Association. The same survey was distributed to the Chinese employees in 4 local companies.

To examine whether the A-Association sample is systematically different from the others, I first performed a series of t-tests to compare every variable of concern between the two samples. None of the variables was significantly different across the samples (the p-values of the t-statistics are all greater than 0.3). A probit regression scheme was further employed that demonstrated that the concern regarding the sample selection could reasonably be ignored. A selection indicator MEMBER was created representing whether a respondent is an A-Association member or not. For each of the proposed models, the indicator was regressed on all the variables in the model⁵. None of the variables is significantly related to the indicator. Moreover, the p-values of all the three likelihood ratio statistics are larger than 0.5, suggesting that the variables are jointly unrelated to the indicator. The examinations reveal that the characteristics and behaviors of A-Association members do not differ much from those who do not have an A-Association membership.

The questionnaire was divided into six sections. The first section covered a series of questions about the individual's most recent job. One category of questions regarded job searching. Respondents were asked to provide detailed information on how they found their most recent job: through formal channels or personal networks; if through a friend or acquaintance, is the person Chinese or not; in addition, when and

⁵ For the underlying mechanism, see Woodridge, 2002, Chapter 17.

how did the respondent know the friend or acquaintance, etc. A second category dealt with the composition of individuals' social network and evaluations of a series of obstacles they faced when searching for the job. Another category included questions on the characteristics of the job, such as occupation, industry, year, wage, and the proportion of Chinese in the workplace.

The second section consisted of the same questions about the respondents' first professional job in the U.S. The third section collected information on individuals' education background both in the home country and in the U.S. The fourth section included a series of questions on immigration history ranging from mode of entry and current immigration status to plans for return migration, etc. The fifth section covered a variety of questions on the respondents' work experience in the home country and involvement in entrepreneurial activities. The last section collected basic demographic information.

2.3.3. Variables

I derived indicators of the various constructs in the conceptual models from the information collected from the survey.

Job Search Mode: Two polytomous dummy variables MODE_F and MODE_R are created, representing the search mode for the first job and the most recent job, respectively. MODE_F/MODE_R is coded 1 if the first/most recent job was found through Chinese networks, 2 if the job was found through non-Chinese networks, 0 if through impersonal means such as employment agency, internet, newspapers, and

other media, or contacting the employer directly, etc. In addition, two pairs of dichotomous dummy variables, MODE_C_F and MODE_C_R, are constructed indicating job through Chinese network (1 for yes, 0 for no) in the first and most recent period, respectively; MODE_NC_F and MODE_NC_R represent job through non-Chinese network in the two periods.

Composition of Social Capital: The pair of social capital composition variables NETWORK_F and NETWORK_R describes the proportion of Chinese that an individual socialized with during the general period of searching for his first and most recent job. The index ranges from 0 to 5, with 0 indicating no Chinese at all in the social network, and 1 point being added for each additional 25%.

Human capital: Given the highly skilled nature of the subjects in this study, and that a big proportion of people come to the U.S. for advanced education and many do not have work experience in the home country, I develop a series of indicators that capture more detailed information on the stock of human capital than the standard indicators in the studies of immigrants' job search and wage determination. Education attainment is divided into two categories: the home country education and U.S. education. Each is measured in two ways: years of schooling and degree level. Dummy variables are also constructed to indicate whether or not the respondent had a master's or doctoral degree at the time of job search, whether or not the respondent had work experience in the home country, and whether or not the respondent had switched to a different field after migration. I believe these variables provide important work experience information that may lead to variation in the performance in the U.S. labor market.

Wages: Yearly wage is collected in the form of interval data and then converted to the real wage (in 2003 dollars) and logged to account for a skewed distribution.

Controls: A series of variables regarding immigration experience and status are controlled. Three dichotomous dummy variables – VISA1, VISA2, and VISA3 – represent the situation that the respondent came to the U.S. through a student visa, through an employment visa, or through other means. Given the fact that a great proportion of the respondents are currently permanent residents (Green Card holders) or U.S. citizens, another dummy Immigration Status is constructed to capture whether a person is a permanent or temporary immigrant in terms of legal status. The two variables of U.S. experiences measure the number of years between the respondent's migration to the U.S. and his first or most recent job.

2.3.4. Descriptive Statistics

Table 1 summarizes the basic demographic characteristics of the sample. The age of the respondents ranges from 23 to 55. Over 95% of them entered the U.S. after 1980 and the majority came with a student visa. Most of the respondents had accomplished college education before migration, with 37% having a master's degree in home country, and 11% having a doctoral degree.

In Table 2, I present the characteristics that vary across the two job search stages. There is a dramatic change in immigration status. When searching for the first job, the majority were temporary visa holders, whereas when searching for the second job, around thirty percent became U.S. citizens and another thirty percent got a green

card. As expected, most people have received advanced education in the U.S. By the time before the most recent job, about seventy percent had got a master's degree and over a quarter had got a doctorate.

2.3.5. Regressions and Tests

To measure the effect of the composition of social network on the job search mode for each career stage, I first use a multinomial logistic regression – regressing the polytomous job search mode variable for the first job on the social network variables, controlling for a set of human capital variables, immigration variables, and basic demographic variables. I then conduct a conditional (fixed-effect) logistic regression to determine how much of the variation of the job search mode across the two periods can be explained by the change in the social capital composition. In addition, two t-tests are performed to compare first job and most recent job. One is to determine whether the proportion of Chinese in an individual's social network is significantly greater in the most recent job stage (NETWORK_R) than in the first job stage (NETWORK_F). The other is to examine whether the odds of finding the job through Chinese networks are significantly greater in the most recent job stage (MODE_C_R) than in the first job stage (MODE_C_F).

To examine the relationship between job search mode and wage earned, I employ an interval regression. The logged real wage is regressed on the two job search mode dummies MODE_C_R and MODE_NC_R and a group of control variables.

2.4. Results and Discussion

2.4.1. Composition of Social Capital

The cross-tabulation of the fraction of co-ethnics in one's social network when searching for the first professional job versus the most recent job is provided in Table 3. The table shows the transition pattern of social capital composition across the two job searching periods. For sixty-six percent of the respondents, the level remains the same, which is indicated in the cells located in the diagonal line of the table. Thirty percent experience an increase in the proportion, shown in the upper-right triangle. For very few people, only 4 percent of the respondents, the proportion of Chinese in their social network declines from the former period to the latter, which is shown in the lower-left triangle.

The t-test comparing the proportion of Chinese in the two stages provides further evidence on the transition pattern (see Table 4). The average proportion in the second job stage is significantly greater than that in the first job stage. The result is consistent with what is predicted by the conceptual model: Contrary to what traditional assimilation theory claims, highly skilled Chinese migrants do not depart from their co-ethnic networks over time. Instead, the trend appears exactly the opposite.

2.4.2. Job Search Mode

Table 5 presents the result of the multinomial logistic regression determining the effects of the theoretical and control variables on the odds that Chinese migrants got their first professional job in the U.S. through different channels. The left column in Table 5 provides the effects on the likelihood of getting the job through Chinese networks. The right column shows the effects on the probability through non-Chinese networks. The comparison group is the chance of finding the job through non-network channels.

A significant relationship is observed between the proportion of co-ethnics in a Chinese migrant's social circle and the odds of getting the job through co-ethnic networks: The higher the fraction of Chinese that an individual socializes with, the more likely that he finds a job through a Chinese friend or acquaintance. This offers support for the hypothesis on the connection between composition of social capital and job search behavior.

It is also interesting to note that education in home country plays a strong positive role on the probability of job search through co-ethnic network. A possible explanation is identified through my interviews. The majority of the respondents had completed high school education in China before migration. The variation lies in whether the respondent has a higher degree. The shorter the time an individual is enrolled in the Chinese higher education system, the more likely he is to adopt the American culture and customs after migration, and the easier it is for him to integrate into the non-co-ethnic networks.

In addition, if a person enters the U.S. with a visa other than student or employment visa, the likelihood of finding a job through a Chinese network also increases. The reason is rather evident: those who fall into this category are primarily the spouses of student or employment visa holders. Although they follow almost the same education and career trajectory as others after coming to the U.S., they are likely to rely more on Chinese networks in their earlier careers.

In unreported regressions, I also assess the effect of age, gender, and dummies of the chronicle periods when the job searching was conducted. None of them contribute significantly to the prediction of the job search mode.

To gain some insight into the relationship between the composition of social capital and the job search mode across the two job searching periods, I next consider the results from the conditional logistic regression (see Table 6). A variable MODE capturing whether the job is found through Chinese networks in either stage is regressed on the proportion of Chinese in social circle and a group of controls. The coefficient of social capital composition is significant at the 0.1 level (p-value 0.07), indicating that the change of the fraction of Chinese in social circle to some extent explains the discrepancy of the likelihood of finding job through Chinese network between the two periods. Also, note that being a permanent resident or citizen has a significant positive effect on the odds of finding the job through Chinese networks, suggesting that the fact of “naturalization” does not drive people away from their co-ethnic networks, as usually assumed in the literature. On the contrary, those who become permanent immigrants capitalize on their co-ethnic network much better.

Furthermore, a t-test is performed to compare the job search mode between the two stages. The results are reported in Table 7. The discrepancy is fairly large, with the mean of the odds of utilizing Chinese networks in searching for the most recent job significantly greater than the mean in searching for the first job. In general, therefore, there is evidence to support hypotheses 2 and 3, that the job search mode is determined by the composition of social capital, and neither the proportion of co-ethnics in an individual's social networks, nor the probability of finding a job through co-ethnic networks, decreases in the later stage of a career.

Having established some findings concerning the use of Chinese networks in job finding, in order to gain a better understanding of the nature of these networks, I further trace under what circumstances these contacts are developed. The respondents were asked, if they found their jobs through Chinese contacts, where and how they happened to know the contacts. Table 8 shows that the majority of the contacts used in job finding are established after migration (close to 80% for the first professional jobs and approximately 90% for the most recent jobs), which offers further evidence for our interpretation of the network evolution pattern for highly skilled migrants. In addition, for those who found their first jobs through Chinese contacts, in most cases the contacts were former schoolmates or colleagues, while personal connections outside of school or workplace, which are dominant in the chain migration scenario, play a negligible role in finding U.S. jobs. Congruent with expectation, with new contacts

emerging, even the use of the old school or colleague contacts fell sharply in searching for the most recent jobs⁶.

2.4.3. *Wages*

Finally, Table 9 reports the results of the interval regression model that displays the effects of job search mode on the wages earned in the first job, controlling for human capital, immigration, and demographic variables. In general, finding the job through personal networks plays a positive role in determining wages, lending support to Hypothesis 4. That relation is particularly significant for jobs found through Chinese networks, and the impact is quite substantial, since the magnitude of the coefficient is fairly large, given that the wage variables take a logged form.

In addition, pre-migration education and experience have great influence on wage earned in the first job in the U.S. Years of education in the home country yield significant positive returns in wages. At the same time, individuals who were trained or working in the same field in the home country experience a wage premium. This reflects another interesting fact: many migrants switched fields after coming to the U.S., although the majority had higher education in the previous fields before migration. The data here indicate that a discrepancy does exist in wage levels between those who consistently work in the same fields before and after migration and those who are newcomers to their fields. In terms of U.S. education, higher degree is associated with higher wage level.

⁶ I also have the data for what types the contacts are for all the cases where that jobs are found through personal contacts in general, not only Chinese networks. Not surprisingly, it is evident that if a respondent finds his U.S. job through a contact, this contact is more likely to have been made after migration.

The effects of a variety of control variables, such as age, starting year of the job, and evaluation of obstacles faced in the job market, are also examined in unreported regressions, and are found to have no bearing on real wage potential.

2.5. Conclusion

This paper has sought to explore the dynamics of social networks and employment in the host country for highly educated migrants, which is either neglected or abstracted in the migrant network literature. Increasing highly skilled migration represents one of the most prominent features of the changing labor market in the era of globalization. This particular historical moment makes it crucial to understand the interlinkage between various dimensions of the migration and settlement processes as the evolution of social networks and the development of individual careers. This study is also an endeavor to break down the analytical divide between the labor market adaptation of low-skilled migrants and high-skilled migrants.

Based on previous qualitative studies and drawing upon theories on social capital formation, job searching, and wage determination, I have developed hypotheses and proposed explanations on how group characteristics shape the composition of a skilled migrant's social network in different phases of his life after migration, how the possession of co-ethnic networks affects the searching mode for U.S. jobs in the beginning and later stages of a migrant's career, and furthermore, to what extent the use of co-ethnic ties in job searching affects job quality. The three pieces all

together provide some insight into the particular pattern by which highly skilled migrants adapt to the host country labor market.

A series of tests and regressions have been conducted on the survey data on a sample of Chinese immigrants in Boston. For the most part, the hypotheses were sustained. The analysis shows that the trajectory of social network development for Chinese professionals contradicts the conventional notion that because highly skilled migrants have more socioeconomic advantage in the labor market than their lower skilled counterparts, they are more likely to diverge from their co-ethnic circle and assimilate into the social structure in the host society. I find that although these highly educated people do not come to the U.S. through networks, the co-ethnic networks emerge after migration and stay persistent over time. Indeed, co-ethnic networks play an important role in disseminating job information. Both the proportion of co-ethnics in a migrant's social network and the odds of finding a job through co-ethnic ties are higher for the most recent job than for the first professional job in the U.S. The study further demonstrates that jobs found through co-ethnic networks are associated with higher wages, which confirms prior research that social capital has a positive effect on earnings. In summary, the results suggest that co-ethnic networks constitute a crucial resource for achieving mobility in the U.S. labor market. In other words, participation in such social systems translates into improved labor market outcomes.

These findings must be interpreted in light of the fact that the sample was drawn from a small geographic area. Data on highly skilled migrants that is equivalent to the Mexican Migration Project Survey is still not available. However, this study calls attention to the theoretical and empirical importance of the social networks among

highly skilled migrants on careers. To see whether the pattern identified in this study is universal, one direction of further step would be to identify a sample that has a broader coverage.

Furthermore, when measuring job outcomes, wage is not the only important benchmark. This is especially true for migrants. As Piore (1979) suggests, migrant labor market behavior can be better understood in terms of the specific non-wage attributes of the jobs available to migrants and the meaning attached to those attributes. Another way to extend the study is thus to examine other job quality variables, such as job satisfaction and social status attached to the particular jobs, in order to better understand the socioeconomic advancement of migrants in the host country.

Finally, it is also necessary to have a better qualitative understanding of the processes through which the ethnic networks are created and maintained and of the mechanisms by which job information is disseminated through these networks.

Tables

Table 1: Sample Demographic Characteristics

	Mean	S. E.
Age	37.35	6.53
Gender (male=1)	0.73	0.45
Years of schooling in home country	17.44	2.20
Whether have working experience in home country	0.72	0.45
Whether worked in the same field in home country	0.44	0.50
Mode of entry		
Student visa	0.66	0.47
Employment visa	0.13	0.34
Others	0.15	0.36

Table 2: Variables Associated with the First Job and Most Recent Job

	First job		Most recent job	
	Mean	S.E.	Mean	S.E.
US experience	3.43	3.24	8.24	5.99
Age	30.49	4.94	34.73	6.30
Immigration status (Whether permanent resident or citizen)	0.04	0.20	0.75	0.44
Master degree in U.S.	0.54	0.50	0.70	0.46
Doctor degree in U.S.	0.17	0.37	0.26	0.44

* For the descriptive statistics of the social capital composition and job search mode in each job stage, please refer to Table 3, 4 and 7.

Table 3: Cross-Tabulation “Proportion of Chinese in Social Circle When Searching for the First Job” versus “Proportion of Chinese in Social Circle When Searching for the Most Recent Job”

Proportion of Chinese socialized with when searching for the first job	Proportions of Chinese socialized with when searching for the most recent job					
	None	Less than 25%	25%-50%	50%-75%	More than 75%	Total
None	0 (.00)	4 (.40)	3 (.30)	2 (.20)	1 (.10)	10 (1.00)
Less than 25%	0 (.00)	6 (.37)	4 (.25)	5 (.31)	1 (.06)	16 (1.00)
25%-50%	0 (.00)	1 (.06)	6 (.38)	4 (.25)	5 (.31)	16 (1.00)
50%-75%	0 (.00)	2 (.08)	0 (.00)	17 (.71)	5 (.21)	24 (1.00)
More than 75%	0 (.00)	0 (.00)	2 (.04)	0 (.00)	46 (.96)	48 (1.00)
Total	0 (.00)	13 (.11)	15 (.13)	28 (.25)	58 (.51)	114 (1.00)

* Row proportions are indicated in parentheses.

Table 4: Comparison of the Composition of Social Network between the Searching Period for the First Job and the Searching Period for the Most Recent Job (N=114)

Proportion of Chinese in network	First job	Most recent job
Mean (S.E.)	2.73 (0.13)	3.12 (0.10)
t-statistics*	4.32	
p*	0.0000	

* Under the null hypothesis that the average proportion for the first job is greater than that for the most recent job.

Table 5: Multinomial Logistic Regressions of the Fitted Relationship between Selected Variables and the Search Mode for the First Professional Job in the U.S.

Predictor	MODE_F=1 (Job search through Chinese network)	MODE_F=2 (Job search through non- Chinese network)
Fraction of Chinese in social circle	0.441* (0.195)	0.281 (0.212)
Years of education in home country	0.328** (0.117)	0.009 (0.123)
Years of U.S. experience	0.062 (0.065)	-0.108 (0.116)
Entry with employment visa	0.426 (0.658)	-1.695 (1.168)
Entry with visa other than employment or student visa	1.517** (0.578)	-0.147 (0.840)
Master Degree in U.S.	-1.053* (0.483)	-0.178 (0.514)
Doctor Degree in U.S.	-0.062 (0.622)	1.334* (0.674)
Number of observation		145
Pseudo R ²		0.12
LR Chi2 (14)		33.04**
Log-likelihood value		-117.72

Key: ~ p<0.10; * p<0.05; ** p<0.01; *** p<0.001
Standard Deviations are provided in the parentheses.

Table 6: Conditional (Fixed-Effect) Logistic Regression of the Fitted Relationship between Selected Variables and the Job Search Mode

Predictor (At the time of job searching)	Coefficient
Fraction of Chinese in social circle	1.712 ~ (0.974)
Immigration status	1.988* (0.972)
Master's degree in U.S.	1.754 (1.612)
Doctoral degree in U.S.	-3.526 ~ (2.064)
Age	-0.148 (0.194)
Number of observations	60
Pseudo R ²	0.509
LR Chi2 (5)	21.15***
Log-likelihood value	-10.22

Key: ~ p<0.10; * p<0.05; ** p<0.01; *** p<0.001
Standard Deviations are provided in the parentheses.

Table 7: Comparison of the Likelihood of Finding the Job through Chinese Network between the First Job and the Most Recent Job (N=114)

Likelihood	First job	Most recent job
Mean	0.178	0.339
(S.E.)	(0.035)	(0.044)
t-statistics*	3.348	
p*	0.0005	

* Under the null hypothesis that the likelihood of finding the first job through Chinese networks is greater than that for the most recent job.

Table 8: Type of Chinese Contacts Used to Find the First Job and the Most Recent Job

Where and how the contact was first made	Percentage of all who found their jobs through Chinese networks	
	First professional job (N=39)	Most recent job (N=30)
China, alumni or colleague	20.00	2.56
China, personal connections	3.33	5.13
U.S., alumni or colleague	33.33	33.33
U.S., personal connections	23.33	35.90
U.S., Chinese association	13.33	17.95
Other: Canada, alumni	6.67	2.56
Other	0	2.56
Total	100	100

Table 9: Interval Regression of the Fitted Relationship between Selected Variables and the Logged real Wages (in 2003 Dollars) for the First Professional Job in the U.S.

Predictor	Coefficient
Find the job through Chinese network	0.156* (0.078)
Find the job through non-Chinese network	0.048 (0.096)
Years of education in the home country	0.055*** (0.017)
Worked in the same field in home country	0.170** (0.064)
Years of U.S. experience	-0.015 (0.011)
Age when finding the job	-0.017** (0.006)
Master degree in U.S.	0.070 (0.073)
Doctor degree in U.S.	0.154* (0.080)
Number of observation	135
LR Chi2 (8)	36.53***
Log-likelihood value	-191.41

Key: ~ p<0.10; * p<0.05; ** p<0.01; *** p<0.001

Chapter Three (Paper 2)

Not a Lonely Journey: The Return of Chinese Engineers from the U.S.

3.1. Introduction

This paper looks into the mechanisms underlying the return migration of Chinese engineers from the U.S. Although it focuses on a particular migration stream, it does so in the context of a much broader debate in public policy and scholarly literature on the geographic mobility of highly skilled labor.

The increasing mass movement of professional and technical workers from developing countries to industrialized countries during the past two decades has rekindled the debate over highly skilled migration, which used to center around the notion of brain drain. Highly skilled migrants are usually defined as having tertiary education. The World Bank estimates that the stock of educated immigrants has increased by about 8 million between 1990 and 2000, and the percentage of skilled workers among immigrants increased from 29.8 percent to 34.6 percent. In 2000, the number of migrants with tertiary education living in the OECD countries amounted to about 20.4 million (Docquier & Marfouk, 2005). Many have emigrated from former communist countries that re-entered the world economy after the Cold War. Although the mass emigration from mainland China only started after 1978 when China launched the “open door” policy (Zhang, 1992), over 800,000 mainland Chinese have gone abroad to study (Wang, 2004). China now takes the second place among sending countries of skilled immigrants to the U.S.

Recent empirical studies have found that skilled workers' migration from developing countries to industrialized countries is shifting from a one-way brain drain to a two-way circulation (Saxenian, 1999, 2002; Kapur, 2001; Martin, 2003)⁷. These workers either repatriate or build extensive ties to their home countries and bring back financial capital, knowledge, skills, and business ideas with them. As a good example of such a trend, overseas Chinese contributed over 70% of the foreign direct investment in China between 1985 and 2000 (World Bank, 2005).

The purpose of this study is to understand the micro processes of the return migration of Chinese engineers – what is the interplay of individual decisions, social processes, and institutions in return migration. I analyze this question by connecting the *career* with the *system*. I suggest that migrants' interactions with other players in the system and their responses to the opportunity structures in the host and home countries are key to understanding the mechanisms of return migration.

The paper proceeds as follows. The first section reviews the theories of international migration. I suggest that while the human capital approach that dominates the discussion of international migration has contributed substantially to our knowledge of the variation of migration behavior across skill categories, it offers limited implications for the differentiation among a homogeneous group of people with regard to human capital characteristics. Building on the literature of the micro-processes of low-wage migration, the paper develops two-fold arguments: First, migrants' decisions on returning reflect the interplay of their individual characteristics

⁷ The circulation of migrants through the United States is not unprecedented. For example, a large share of unskilled immigrants before the First World War later returned home. But circular migration has rarely been observed among skilled migrants from developing countries to industrialized countries.

and the opportunity structure in the home country. A mixture of opportunities and constraints that exist in China affects migrants' decisions to return and their careers after they return, which often leads those with an engineering background to return for technology entrepreneurship. Second, the decision to return is also affected by a web of social relations where migrants are embedded. The return migration of highly skilled workers is not necessarily an individualized action, but is supported by a whole set of social infrastructures.

The second section describes the multiple types of data collected for the analysis, including quantitative data from a survey and qualitative data from fieldwork in the U.S and in China. A survey of Chinese engineers in Boston serves to identify whether there are any systematic patterns with regard to who decide to return and under what circumstances. Data from semi-structured open-ended interviews with migrants in Boston and returnees in Beijing, Guangzhou, and Shanghai, as well as a variety of institutional actors, are used to understand the mechanisms underlying these patterns.

The next three sections reports the findings from data analysis. The analysis starts from migrants' decisions on returning to China, by looking into a range of factors that are often neglected in prior studies, such as entrepreneurship experience and social embeddedness. The survey data yields some interesting results that depart from the conventional wisdom. The key findings are two fold. Firstly, among a group of Chinese engineers who have very similar educational background, plans to return are not correlated with the length of time in the U.S. Instead, migrants with higher earnings in the U.S. and less difficulty with their professional and technical skills are

more likely to consider returning. A close look at their work experience shows that the decision to return is highly associated with entrepreneurship. Secondly, contacts with co-ethnics in and outside workplace are highly associated with the decision to return to China.

A clearer explanation emerges from the interviews that ground the qualitative dimension of this study. The self-selectivity of return migration reflects migrant engineers' responses to the particular opportunity structure in the home country. A mixture of opportunities and constraints that exist in China creates different niches for returnees, which often leads those with an engineering background to technology entrepreneurship. The paper then explains why this opportunity structure comes into existence.

The next step of the analysis probes further into the return migration processes. In contrast to the conventional wisdom that depicts the migration of highly skilled labor as highly individualized, the study finds that return to China is not a lonely journey: very often the decision to return is not made by isolated individuals, but it is a collective choice made by the group of people who go back to China as a team. The connections among team members are established in the process of migration, usually in the U.S., among people who have had little previous contact in China. It is also facilitated by a set of formal organizations, which emerge in the migration process for both cultural and instrumental purposes. The Chinese government responds to the immigrants through these organizations, rather than directly to them as individuals when they return to China. This yields a very different picture of the Chinese

government from the conventional view of the State as a distinct bureaucracy independent of civil society.

The paper concludes by suggesting future directions to move this study forward.

3.2 Theories and Arguments

Two bodies of theories have dominated the discussion on why people migrate across national borders. The economic approach centers around the human capital characteristics of migrants (Borjas, 1987, 1994; Borjas & Bratsberg, 1996). At the center of the economic approach is individual's response to monetary incentive – people move to find employment and remuneration more appropriate to their formal education and training. There is little room for the role of institutional and social factors. These models suggest that return migration is not random (Warren & Peck, 1980; Borjas & Bratsberg, 1996; etc.). There are three perspectives about the selectivity of return migration. The negative-selection argument claims that those who are less successful in the host country labor market have a higher tendency to return. Return migration is an outcome of unfulfilled expectations in the host country, and those who could not make it are forced to leave. The key prediction is that returnees are disproportionately drawn from the less skilled and less successful of their arriving immigrant cohort (DaVanzo & Morrison, 1981; Lam, 1986; Blejer & Goldberg, 1980; Beenstock, 1996; Cohen & Harverfeld, 2001). The second perspective views return-migration as a result of the realization of pre-determined saving goals (Stark & Bloom,

1986). The third theory incorporates both motives for return migration. It treats the discrepancy in the expected returns on skills between source countries and host countries as the most important determinant of the direction of migration flows (Borjas, 1990; Ramos, 1992; Borjas & Bratsberg, 1996). Empirical studies have shown mixed evidence for these theories – negative selection was identified among certain migrant groups (Blejer & Goldberg, 1980; Beenstock, 1996; Cohen & Harverfeld, 2001) and positive selection was found among others (Jasso and Rosenzweig, 1990).

These models are very helpful to explain why migration decisions differ among a heterogeneous population with regard to the aggregate measurement of human capital characteristics. But they are less helpful for us to understand why, among a group of people with similar education background, some return but others do not. Today's labor market is characterized by an increasingly high degree of labor division, and the types of skills are most diverse in the highly skilled labor force. Great variations exist in specialization among those at the same general skill level, as usually measured by years of schooling in the human capital model. The more education a person receives, the more likely she is to be specialized in one field. Consequently, the rewards for skills are not likely to be identical at the same level of schooling, particularly in developing economies where certain types of skills are in a greater demand than others. While there remains a huge gap in engineers' salaries between China and the U.S., anecdotal stories have shown technology-based entrepreneurial activities can be as rewarding in China as in the U.S.

Moreover, it is more than skill that matters. Researchers studying how individuals get jobs in firms have suggested that studying individual characteristics or

market-level aggregates, like wages, is not enough; we must understand the organizational or occupational structure through which individuals move and how the types of jobs available at given wages match the skills of individuals looking for work (Baron and Bielby, 1980; Reskin and Roos, 1990). In our case where individuals decide whether to participate in a national labor market, the match between a person's skill and the opportunity structure that she faces could be key to mobility. Researchers who study the causes of brain drain in 1970s and 1980s also have suggested that economic, social, and political conditions in the host and home countries, as well as policy interventions, are important to understand the international mobility of skilled workers (Bhagwati & Hamada, 1974; Bhagwati, 1996; Bhagwati & Wilson, 1989; Goss & Lindquist, 1995). Therefore, identifying which types of skills are most rewarding requires a careful examination of the opportunity structures in specific countries, which are often shaped by labor market institutions and policies, in addition to social and economic conditions.

Social embeddedness is another important theme in the migration literature (Portes & Sensenbrenner, 1993). Prior research in this vein has suggested that networks between existing and potential migrants can reduce information and psychological costs involved in migration and enhance new migrants' employment opportunities. Empirical evidence on the migration of low-waged workers has shown that "chain migration" is often promoted, facilitated, and perpetuated by social networks (MacDonald & MacDonald, 1964; Boyd, 1989; Massey, 1990; Massey, Gonzalez, & Durand, 1994). Meanwhile, studies on low-wage workers' host country labor market adaptation, in particular research on ethnic enclaves and ethnic niches, have also found

that the rate of entrepreneurship among migrant groups is much higher than that of natives, because opportunities for new migrants to find a regular job in the host country are restricted. The lack of access to regular jobs often leads migrants into ethnic enclaves or certain occupational niches (Zhou, 1990; Waldinger, 1996). It is also suggested that co-ethnic ties, in particular family and kinship ties, are the major channels through which new migrants enter ethnic enclaves or ethnic niches (Piore, 1979; Sessan, 1995; Waldinger & Lichter, 1997; Waldinger, 2001; Waldinger & Der-Martirosian, 2001).

Within the migration context, the literature on labor market processes and migrants' careers has primarily focused on the migration of low wage or low skilled workers. When it comes to the return migration of highly skilled workers, the literature has yet to develop a strong social and institutional component. Building on the literature of the micro-processes of low wage or low skilled migration, the central arguments of this study are two fold. First, a mixture of opportunities and constraints affects migrants' decisions to return and their careers after they return, which often leads those with an engineering background to return for technology entrepreneurship. Second, the return migration of highly skilled workers is not necessarily an individualized action, but is supported by social infrastructures, which include informal networks and formal institutions. Prior studies have shown a very clear picture of social networks in low wage migration. The standard picture of that process is: migration takes place in social networks. Those networks are important to the migration process itself and to finding jobs in the host country. In the early stage of migration they are key to success. But in the later stages they become a trap. Migrants

that are successful break out of these networks and integrate into the mainstream society. The story about highly skilled migration which emerges from my research is almost the mirror image of the received wisdom about low-wages migration. In an earlier study of the settlement processes of Chinese engineers in Boston (Qin, 2005), I find that people migrate as individuals and find their initial jobs through formal contacts, such as those contacts established through universities. But as they stay, they gradually form social ties, and these ties become increasingly dense, and are critical to successful upward mobility in the U.S. In this paper I argue that these networks also matter in return migration. The ties with co-ethnics help migrants make decisions about going back to China and facilitate their movement when they actually return.

3.3 Data and Methods

The empirical studies of return migration usually use large-scale datasets, very often national census data. These data, although good in representativeness, provide only rough measurements of skills and labor market experiences.

In order to capture both the individual, and the social and institutional dimensions of return migration, this study collected data through multiple methods, including a survey, in-depth interviews, and participatory observations. Around two hundred Chinese engineers in Boston were surveyed regarding their plans to return to China. The survey collected systematic information on migrants' plans of return, education and work experience, and career trajectories, etc. In-depth interviews were conducted with Chinese engineers in Boston, returnees in three major destination cities

of return migration – Beijing, Guangzhou, and Shanghai, and a variety of institutional actors, such as employment agencies, migrant associations, companies, and governments. The data collection also involved participatory observations by the author attending a number of formal and informal activities of the major Chinese professional associations in Boston and Chinese government-initiated events related to return migration in Boston, Beijing, Shanghai, and Guangzhou from 2003 to 2005.

3.3.1 The Survey

Subscribers of two major associations of Chinese engineers were surveyed regarding their decisions to return to China. I selected those who were first generation immigrants from Mainland China. The final sample includes 150 observations. By looking at both migrants who may return and those who may not return, we are able to avoid the bias of sampling around dependent variable. This bias is often seen in return migration research where only those who already returned are studied. The survey gathers information around the following five key variables:

Dependent Variable – the Plan of Return to China

This variable is constructed based the question “do you plan to move back to China in the next 5 years?” Respondents are asked to choose from *yes*, *no*, and *have not decided*.

Explanatory Variables and Controls

In addition to the two variables that are usually used as explanatory variables in return migration analysis – skills and wages, we also collect data in other dimensions that may also lead to the variation in return decisions but have rarely been analyzed in the literature.

Education and Work Experience: Educational attainment includes both home country education and host country education. So does work experience.

Entrepreneurship Experience: Entrepreneurship is one of the key explanatory variables. Instead of asking respondents to evaluate their own interest in entrepreneurial activities, the survey asks them to state whether they have been involved in entrepreneurial activities.

Ratio of Co-Ethnic Colleagues in Workplace: This variable is included to measure social embeddedness in a migrant's workplace. Respondents are asked to roughly estimate the proportion of Chinese colleagues in their immediate work environments.

Ratio of Co-Ethnic Friends Outside Workplace: This variable is included to measure social embeddedness outside a migrant's workplace. Respondents are asked to roughly estimate the proportion of Chinese friends with whom they socialize after work.

Challenges Faced in the Current Career Stage: In this category are a set of variables measuring the obstacles that migrants face in their careers, including language, culture difference, social and communication skills, professional and technical skills, immigration and visa policies, and discrimination. Respondents were asked to evaluate each of these possible obstacles with a score ranging from 1 (not important) to 5 (most important).

Immigration Status: A dummy variable of immigration status is constructed to capture whether a person has permanent residence in the U.S., either with citizenship or a Green Card. Most of the respondents without permanent residence status in this case are holders of H1-B visa, an employment-based visa for skilled workers.

3.3.2. Interviews and Participatory Observations

Interviews were carried out with three types of people and organizations: a) thirty-five interviews with Chinese engineers in Boston about their plan to return to China and the preparation for the potential move, b) thirty-two interviews with returnees from the U.S. in Beijing, Guangzhou, and Shanghai, and c) interviews with institutional players involved in return migration, including twelve migrant professional associations, five returnee associations, three alumni associations, two recruitment agencies, and six companies, as well as government agencies such as the Chinese Service Center for Scholarly Exchange, the Ministry of Science and Technology, and the Ministry of Education.

The interviews with individual migrants/returnees lasted for one hour on average, which covered the complete career history since college graduation and the stories behind each move. Emphasis was placed upon pre-migration and post-migration education and work experience, the motivation of return, the means of obtaining job and business information in China, and the comparison between pre-migration and post-migration career performance and job satisfaction. The interviews of the institutional actors were carried out at multiple levels within the organizations.

From 2003 to 2005 the author attended most of the activities of the major Chinese professional associations in Boston, such as New England Chinese Information and Network Association (NECINA), Sino-American Pharmaceutical Professional Association (SAPA), and Overseas Chinese Entrepreneurs Association (OCEAN), including conferences, meetings of operation teams, and informal social events. On-site and telephone interviews were conducted with relevant organizations in China in 2005 and January 2006.

3.4. Who Returns?

Table-1 summarizes the basic demographic characteristics of the sample. The age of the respondents ranges from 23 to 55. Over 95% of them entered the U.S. after 1980 and the majority came with a student visa. All had completed college education before migration and the majority of them received advanced education in the U.S. – about 70% received a master's degree from a U.S. university and over a quarter received a doctorate from a U.S. university.

The high ratio of advanced education attainment in the U.S. reflects another important trend associated with the increasing skilled migration– the internationalization of higher education (Iredale, 2001). Data from the National Science Foundation (2001) shows that from 1988 to 1996, Chinese students earned 7.5% of all science and engineering doctorates offered by U.S. universities (16,550 out of 219,643). In our sample, there is an interesting feature of the initial purpose of migration. Most people came to the U.S. for education instead of employment. The tradition among

Chinese to pursue advanced education abroad has occurred for a number of reasons. A western degree is not only necessary for employment in certain high skilled professions in the U.S., but also highly valued in China and often viewed as a ticket to better employment after returning to China, whether in domestic companies or in multinational companies. In this case, migration to the advanced countries is frequently a planned move in order to accumulate human or material capital.

Figure-1 presents the distribution of return migration plans. It shows a great variation within the group: One third of the respondents plan to return to China in the next five years. Another one third plan to stay. The rest have not decided yet.

In the discussion of migration and return migration, legal immigrant status has often been used as an approximation of the permanent or temporary nature of migration. However, in today's more globalizing labor markets for highly skilled professionals, the flows of labor are more fluid than ever before, and the distinction between permanent and temporary residency has lost its prominence in predicting the actual duration of migration. From Table-2 we can see that permanent resident status (Green Card or citizenship) does not necessarily mean that the migration is permanent, and temporary residence status (mostly H1-B visa) does not necessarily mean that the migration is temporary either. It is worth noting that the labor flows are so dynamic that return can be reversed too. In fact, people often seek permanent residence not because they plan to stay in the U.S. for the rest of their lives, but precisely because they plan to return and want to keep the option of working in the U.S. in the future. The pursuit for permanent residence is also related to the fact that a significant proportion of return migration involve entrepreneurship. Due to the high risk of

entrepreneurial activities, permanent residency in the U.S. is often regarded as a backup if the return does not turn out a success.

Figure-2 shows plans to return by income level. Although the percentage of respondents who have a plan to return does not vary significantly across income levels, the percentage of those who decide not to return is much lower in the higher income categories. For those who earn less than \$60,000 a year, almost half plan not to go back to China in the next five years, while for those who earn more than \$100,000 a year, only about a quarter plan not to return.

Furthermore, prior studies have suggested that people's decisions on migration are not only affected by material returns, but also by non-pecuniary factors such as identity and sense of self-fulfillment (Zhang, 1992). In the survey, the respondents were asked what proportion of those that they worked with on a daily basis were Chinese. This is an important indicator of the degree of assimilation in the host country labor market. In contrast to the conventional wisdom that migrants less integrated into the host society tend to return, the data shows no evidence of such a negative selection (Figure-2). Among those who work in a nearly-all-Chinese workplace, about sixty-five percent decide to stay in the U.S. and only ten percent consider going back. On the contrary, for those who are the only Chinese workers in their workplace, only twenty percent decide to stay in the U.S. and one third plan to return to China in the next five years.

Although this pattern looks counter-intuitive at first glance, it reflects the importance of social embeddedness. It is well established in migration literature that

co-ethnic networks and communities serve an important function in providing cultural and emotional support to immigrants in the host societies. This is particularly true for those who did not leave China until college graduation and thus had been deeply influenced by the Chinese culture and values. A posting in one of the most popular overseas Chinese internet bulletin boards, where thousands of Chinese professionals and graduate students in the U.S. share information and exchange ideas everyday, described how they felt about working in a place lacking people similar to themselves.

“Do you know when was the moment I finally made up my mind to go back (to China)? That was one of those afternoons during the tea time when my colleagues were having great fun making some ‘American jokes’ and I was the only one who had nothing to say. This was not the way that I want the rest of my life to be, even that I could earn much more if staying here. The feeling of loneliness in a crowd is unbearable.”

This posting elicited 121 responses expressing similar experiences and feelings.

To estimate the effects of all of the factors that we have discussed above simultaneously, an ordered logistic regression model was conducted to examine the determinants of the decision on return migration. The results are presented in Table-3.

Among the quantitative findings, some are consistent with the conventional view. The results point to a positive selection story. Among this group of Chinese engineers, it is not those that could not make it in the U.S. who are forced to leave. Instead, those decide to go back to China are doing well professionally. There are two pieces of evidence. One is the positive relationship between income and the propensity

for return. The other is the fact that those with less difficulty in professional and technical skills are more likely to consider returning. This result is consistent with the optimal residential location plan argument.

However, other findings reveal some patterns that are quite distant from the conventional wisdom. Among these findings, most surprising ones are the following. Firstly, age and migration duration are not crucial in predicting the intention to return. Instead, entrepreneurship is critical. Those who have tried to start up their own business are more inclined to return. Our explanation is that this reflects the interplay between migrants' individual characteristics, especially work experience and career orientation, and the specific opportunity structure that exists in China.

Secondly, people with smaller fraction of co-ethnics among their immediate colleagues are more likely to consider returning. This pattern demonstrates the importance of social embeddedness and corroborates the story mentioned earlier; despite the greater potential for assimilation that such an environment might have, it appears that among skilled workers the shortage of meaningful interpersonal ties with co-workers and the feeling of cultural alienation predominates. In at least one sense, migrants' employment relations are embedded in their social relations: controlling for things like income and skills, such workers still positively value opportunities to interact with others with the same background. On the other hand, the decision to return is positively associated with the proportion of Chinese friends in one's social circle (outside workplace). Contacts between migrants have been proved, in previous migrant studies, as constituting an important source of social capital, which provide information bases and supporting mechanisms for migrants' initial migration and

settlement in the host country. The result here indicates that, when migrants return, co-ethnic networks also matter.

3.5. Technology Entrepreneurship - Creating Their Own Niche

A clear explanation of these findings has emerged from the qualitative material. My interview data reveals that migrants' decisions to return actually reflect their perceptions of the opportunity structure that exists in China. Migrants are usually well informed of what opportunities and what constraints are out there if they return. One of the interviewee spoke to this point.

"Thanks to the internet technology, all kinds of information are available in cyber space. I read Chinese news everyday. I also call my friends who already returned to find out how things are going there."

Prior to mid-1990s, very few Chinese migrants returned. Since the second half of the 1990s, the continuing rapid growth in the economy has aroused a "new Chinese dream" among overseas Chinese and started to attract them to go back. A mixture of opportunities and constraints that exist in China has created different niches for returnees. For those with an engineering background, the niche is often technology entrepreneurship. Unlike academics and the expatriates of multinational companies, many returnees with an engineering background go back to start their own business instead of getting a salary-earning job. This happens for a variety of reasons.

The gap in technology between China and the U.S. has become both a constraint for returned engineers to find employments in domestic companies and an edge for them to start on their own. The high tech boom in the U.S. in the 1990s, especially in information technology sectors, has attracted a significant number of Chinese engineers into these fields, where they have worked with the cutting-edge technologies. The skills they possess are often too specialized or too advanced for the existing industry structure in China. There is very little place in the existing structure for the returnees to use their skills. It occurs very often that returned engineers find themselves hard to get jobs suitable for their skills.

Mark Li is one of those who returned to China with the hope to use his technical skills. Mark went back to China after obtaining a Master's Degree in Math and CS and worked 6 years for a big database company in U.S. His first job back in China was a project manager in a software company. However, he quit after one and a half years.

"Being the only returnee in the company, you were given unreasonably high expectations, for example, to achieve something big within a few months. However, what you could do was so much determined by what was already there and whom you were working with. You were simply not in the position to do that."

Then he realized that what he could use was actually his language skill and the understanding of the culture and market overseas, so he joined an import and export company and planned to start his own import and export company in a couple of years, after having accumulated enough business connections.

Some other returnees have managed to use their technical skills and successfully created a space for themselves in the economy by starting their own businesses. The skills and technology returnees possess are not widely diffused in China. In many cases, returnees are in the position of becoming technology leaders. As a well-known example of returnees' leadership position, China's high-speed internet infrastructure was built under the lead of a group of returnees from overseas. In a study by Vanhonacker, Zweig, and Fung (2005), they also find that technology brings people back: eighty percent of the returnee entrepreneurs in their study have a technology that is new for China, giving them a significant competitive advantage in the domestic market.

In addition to the constraints and opportunities generated by the development stage of China's high tech industry, returnees also become entrepreneurs to bypass certain social constraints. John Yang explained why he chose to start up his own firm instead of working for big companies.

"There are a lot of politics in large companies here. Perhaps I should call it the Chinese corporate culture. It is not bad, it is just different. I left China in my early 20th. I spent more than 20 years in the U.S. I thought I didn't change but actually I did, in many ways – the way I think and the way I interact with my colleagues. It took me such a long time to adjust to the American culture. At the age of 46, I don't think it is worth doing it again. I'd rather make it simple, to be my own boss, and concentrate on the real valuable stuff."

Consistent with this story about constraints and opportunities, the central, provincial, and municipal governments in China have launched a whole set of policies encouraging returnees' entrepreneurship activities. These policies range from

tax exemption and free office space to direct investment of government funds. There are more than a hundred entrepreneurship parks solely for returnees across China. In the Zhongguancun Science and Technology Zone in Beijing alone, over 6,000 companies were founded by returnees from overseas.

Interviews with government authorities have revealed two primary reasons why they favor technology-based entrepreneurship among returnees. First, it is the best way to ensure that the technology and skills that returnees possess could be effectively transferred. Second, China is a labor-surplus country. Even in engineering, each year thousands of domestic-trained college graduates have difficulties in finding jobs. Under this circumstance, someone who can create employment is much preferred by the government to someone who competes for employment.

These patterns are in line with some observations of researchers who study labor market processes outside of the migration context. Prior studies have shown that the macro-structural characteristics of organizational environments, i.e. a firm's product and output market, influence the outcomes in the labor market (Brittain & Wholey, 1991; Fujiwara-Greve & Greve, 2000). Researchers have also found that firms' locations within the social structure of an industry mediate the relationship between macro-level characteristics of industries and individual careers (Phillips & Sørensen, 2003). Here, too, we see that, when Chinese engineers return to China, the structure of the industries and the positions of various types of firms in that structure affect returnees' careers.

3.6. Return Is Not a Lonely Journey

The interviews further show that migrants or potential returnees do not respond independently to the opportunities and constraints that exist in China. Return migration is very often a group process than an individual process. They draw heavily upon the social ties that they have established during the migration process. Most of these ties are developed post migration.

Social networks have been demonstrated to be critical in facilitating the initial migration, as manifested in the chain migration of low skilled workers (MacDonald & MacDonald, 1964; Massey, 1990; Massey, Goldring, & Durand, 1994; Greenwell, Valdez, & DaVanzo, 1997). In addition, sociologists studying labor market processes have shown that informal social networks are not only important in connecting job seekers to potential employers (Granovetter, 1974; Lin, 1982, 1990; Fernandez & Weinberg 1997; Yakubovich, 2005), but are also critical for the job performance of individuals in workforce (Burt, Hogarth, & Michaud, 2000).

However, their importance in return migration has rarely been discussed, particularly for the migration of highly skilled professionals and entrepreneurs. Skilled migration is usually regarded as a highly individualized action where individuals respond to the opportunities arising in different geographic locations independently. What we have found here about the return of Chinese engineers shows a pattern very distant from the individualistic fashion – they return in teams. Different from academia returnees and expatriates of multinational companies, those who return to start their own businesses usually do not go back alone, but often go back with business partners.

Fifteen out of the twenty-four of returned entrepreneurs that I interviewed returned with a partner or a group of partners.

Founded in 2001, STM is now a leading IC design company in China. Its founding team consisted of about 30 returnees from the U.S. The CEO P. Hu is very proud of their team:

“At the beginning we had around 15 people who were mostly old school buddies or former colleagues. All of us had been in the U.S. for many years and had been waiting for the right time to come back. We often got together talking about the potential move. Later on, friends brought in friends and our team grew to more than 30 when we finally decided to return. You can’t imagine all the different kinds of difficulties and challenges we have encountered in this journey (to return and start a company). Without a strong team, it would have been impossible to get this far.”

The size of the return group varies from dozens to only a few people. However, the cases all share a common feature that return is a well prepared move, where allies are formed among those with similar migration experience, sharing the same “New-China-dream,” but with diversified managerial and technical skills. The connections among team members are established in the process of migration, usually in the U.S., among people who had little previous contact in China.

3.7. Voluntary Ethnic Associations as Intermediaries

Not only do informal ties play an important role in return migration, but also formal organizations. It has been well established outside of the international

migration context that labor market institutions and the relationships among these institutions at the workplace, community, and national levels largely shape the labor market dynamics and the individuals' career and job outcomes (For example, Kerr, 1994; Kochan, Osterman, Locke & Piore 2001). Here we find that return migration is also facilitated by a set of formal organizations, both in China and in the U.S., that have developed in the process of migration. Return to China is a process where multiple stakeholders are actively involved and closely connected to each other. Various types of voluntary ethnic associations have become active players in this process and they play two critical roles in return migration: First, they connect the overseas Chinese communities with the key stakeholders in China, particularly government bodies at different levels, and represent migrants in collective interactions with gatekeepers in China. Second, they provide a wide range of assistances to potential returnees and offer channels through which potential returnees can share information and resources.

The motives that govern these organizations are both cultural and instrumental. They may reflect spontaneous tendencies among immigrants, although they do not reflect the kinds of family ties which are often emphasized in discussions of Chinese culture. When people return to China they tend to draw more heavily on these new ties established in the process of migration than on family ties. But if these dense networks reflect in part the spontaneous outgrowth of certain cultural features of the migrants, they are definitely encouraged by the Chinese government, which fosters these organizations and then responds to the immigrants through these organizations, rather than directly to them as individuals when they return to China. This yields a

very different picture of the Chinese government from the conventional view of the State as a distinct bureaucracy independent of civil society.

The Chinese business world is traditionally dominated by “Guanxi,” the Chinese word for relationships or connections. Relations in reciprocity with various players in the society are extremely important for success, either for a business or for a career. This becomes rather difficult for fresh returnees, who have been almost uprooted from the social contexts in China for quite some years. To restart, they need not only the right information, but also the acquaintance with various gatekeepers.

Voluntary ethnic associations come to play the role of the intermediaries between migrants and the gatekeepers in China, mainly government agencies, for two reasons. Chinese government finds these associations to be effective channels to reach overseas communities and relies on them to screen potential returnees. The government has been very actively reaching out to their highly skilled emigrants. Each year hundreds of delegations comprised of representatives of various industries and government agencies are sent out to meet with overseas Chinese, with the objective to attract the “best and brightest” back to China. However, it is difficult for them to reach the migrants one by one or even get their messages delivered to the right people at the first place. Ethnic associations, which have already organized migrants by education and background, become a good resource that the stakeholders in China can tap on. Through the associations they not only can get access to a large number of migrants, but also can effectively single out the group that they want to talk to, such as bio-engineers or computer engineers. J. Lin, who is a member of several overseas Chinese

associations and recently co-founded a new association, commented on the values of these organizations.

“In this society (China), you have to make friends before starting to do business. If you come back alone, you may need to start making friends with a section chief (the lowest rank in the government bureaucracy) and it may take you a year to finally reach a bureau chief. However, if you come back with a 30person delegation of an overseas organization, suddenly you become visible and the mayor’s door is open to you. They are just busy and do not have time to deal with you one by one.”

This study identifies three types of associations that play an active role in the return migration of Chinese engineers: the organizations of migrants overseas, the organizations of the returnees in China, and the alumni associations of U.S. universities.

Overseas Chinese Associations: Chinese diasporas have a long tradition of forming associations to handle their community affairs, with the hometown associations in big cities’ Chinatowns as a typical example. The associations of the highly skilled new arrivals emerged in late 1980s and grew rapidly through the 1990s. These new associations are different from the older cultural and communal associations in many ways. Whereas the traditional Chinese associations primarily serve to maintain social orders inside the local Chinese communities and serve more cultural functions (Zhou, 1990), the new organizations are more career orientated. They often organize around occupations or industries. For example, the three most active associations in Boston’s Chinese professional communities are New England Chinese Information and Network Association (NECINA), Sino-American Pharmaceutical Professional Association (SAPA), and Overseas Chinese Entrepreneurs Association

(OCEAN). As shown in their names, each is an organization of migrants in a specific sector. Within these organizations, members usually divide themselves into subgroups focusing on more specialized fields. For instance, NECINA is an association of engineers in information technology (IT) industries. Within NECINA, there are 8 special interest groups (SIGs) in network infrastructure, telecommunication, wireless networks, content and media technologies, network software, information technologies, BioIT, and IT-related entrepreneurship.

Corresponding to the growing transnational practices in high tech industries, particularly in IT, these associations have also become increasingly internationalized. All of the above three are branches of some cross-regional umbrella associations that have members both in the U.S. and in China. Their members in China are mostly returnees who choose to stay in the loop so that they can be aware of what is going on in their fields in the U.S. Although the scope of coverage varies, all of these organizations have more or less created transnational networks of Chinese professionals by sector. These organizations keep tracking the trends and changes in their industries or occupations, actively gather and disseminate job and business information both in the U.S. and in China, and maintain close connections with the industry associations and policy makers in China. The development in IT has greatly facilitated the communication among the members. Blogs, yahoo groups, and online video conferences are all used to instantly exchange information between different locations.

Returnees' organizations in China: In contrast to the overseas Chinese professional associations that are based abroad and reach to the homeland of China,

the returnees' associations usually originate from China and reach out to the overseas diasporas. Although the current wave of return has only a history of about 10 years, the returnees have already started building very active associations among themselves. The most established one is the Western Returned Scholars Association. The membership in its Beijing branch alone increased from 300 in the mid-1980s to 11,400 in 2003. It also has branches in 14 foreign countries. Associations of this type have been successful in forming coalitions among highly skilled returnees. They have also worked actively in providing consultancy to government bodies regarding policies related to migration and return migration and are getting increasing influence in policy formation.

Alumni Associations of U.S. Universities: The associations of Chinese alumni of U.S. universities are quite different from the conventional alumni associations of U.S. universities. They are voluntary associations initiated and operated by Chinese alumni themselves. Their primary function is to maintain close connections among alumni rather than to the schools. Most of them are extensions of the Chinese Students and Scholars Associations (CSSAs) in universities. Almost every U.S. university with Chinese students has a CSSA, sometimes under a different name. CSSA's involvement starts from very early on after its member comes to the U.S. In 2001, students in Beijing who were admitted to the graduate school of MIT, not knowing each other before the admission, gathered and planned their trip to the U.S. together with the help of MITCSSA, and landed in Cambridge as a group of 28 people. Two others were refused U.S. visas before they got on the plane and the rest of the group shared their loss from the non-refundable group tickets as agreed beforehand. CSSAs also organize a number

of activities bringing members together and provide assistance throughout a student's school years, from free weekly shuttles for grocery shopping in Chinese supermarkets to career fairs co-organized with companies and government bodies from China.

The pursuit of collective action happens at the very beginning of the settlement process in the U.S, as the above anecdote illustrates, to cope with the uncertainties in a foreign environment. The bonds are formed at the outset and strengthened through the settlement processes, and are often well maintained after schools. When these former students come to the point of considering returning to China, once again, they find themselves face a lot of uncertainties – the home country, to some extent, becomes foreign to them due to the enormous transformations that have taken place when they were away. They often turn to the networks of old buddies, whom they have known from the start of their overseas journey, and with whom they share similar experience, to seek resources, mentorship, and partnership.

3.8. Conclusion

The increasing two-way flows of skilled labor across national borders, along with the internationalization of higher education and transnational practices in production, have started to transform the landscape of highly skilled labor markets in many ways. There is an increasing need to understand the mechanisms of labor flows and the emergence of new institutions in these transnational labor markets.

The data collected through multiple methods in this study enable us to capture the complexity of a particular labor flow – the return migration of Chinese engineers

from the U.S. The analysis shows that it is not the case that those less successful in the U.S. or with more difficulty to integrate choose to return. Instead, engineers whose skill sets and career orientations fit better into the opportunity structure in the home country are more likely to return. The return migration of Chinese engineers is often associated with entrepreneurship.

The study further shows that migrants are also deeply embedded in a web of social connections. The return migration of Chinese engineers is very often a group process instead of an individual process. The decision to return is often not formed by isolated individuals, but by a group of engineers who return together. New forms of ethnic associations have emerged and acted as important intermediaries between migrants' communities and the gatekeepers in China. The interactions between these different players largely shape the return flows, and collective actions often characterize the movement.

To what extent can we generalize the findings from this study to the circular migration between other countries? As an extension of this study, I have examined a second case, the circular migration of Indian engineers (Qin, 2007). This analysis is based on a survey of the alumni of Indian Institute of Technology, the leading engineering school in India. The survey data contains over 3,000 observations and covers three groups of alumni – those who work and live overseas, those who have returned to India from abroad, and a control group, those who did not migrate at the first place. In addition, the survey not only covers alumni in the U.S. and those who returned from U.S., but also a few hundred alumni who migrated to and returned from other countries, such as the U.K. and Australia. The data has shown some interesting

contrasts with what we have observed in the China case, which reflect variations in the opportunity structures and social structures that migrants face in these different contexts.

Figures

Figure-1 Plan for Returning to China in the Next Five Years

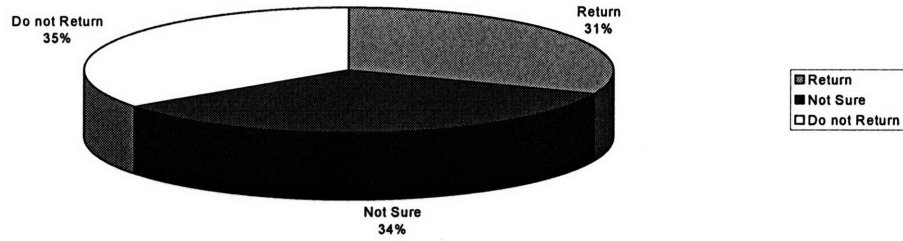


Figure-2 Plan for Return by Wage

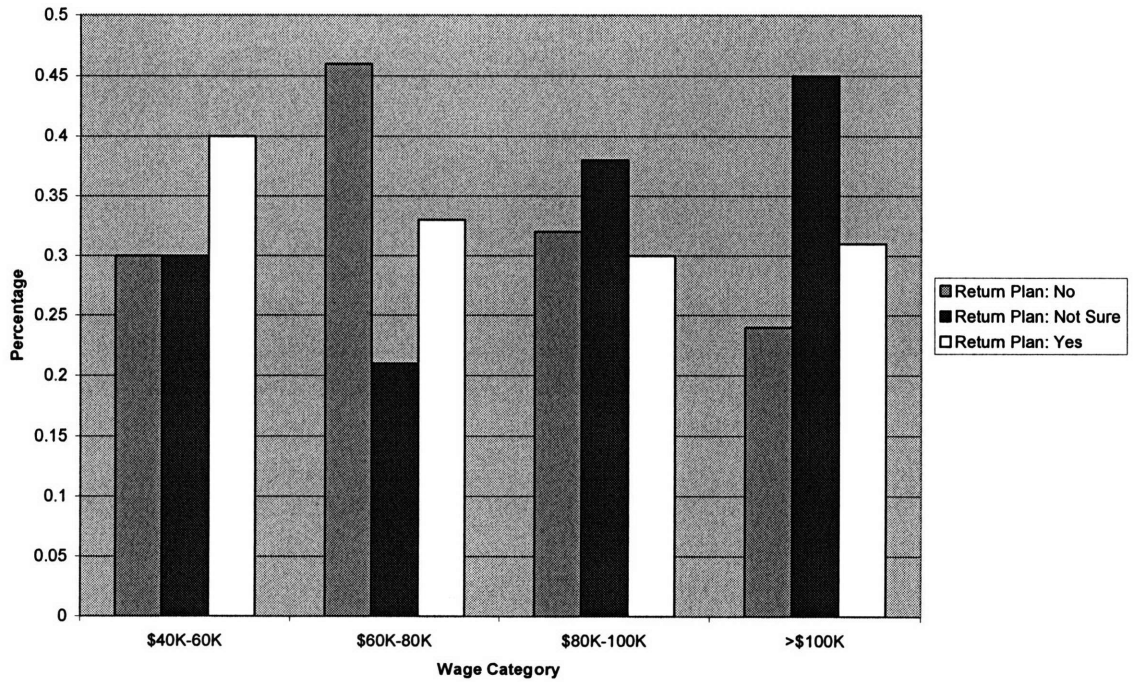
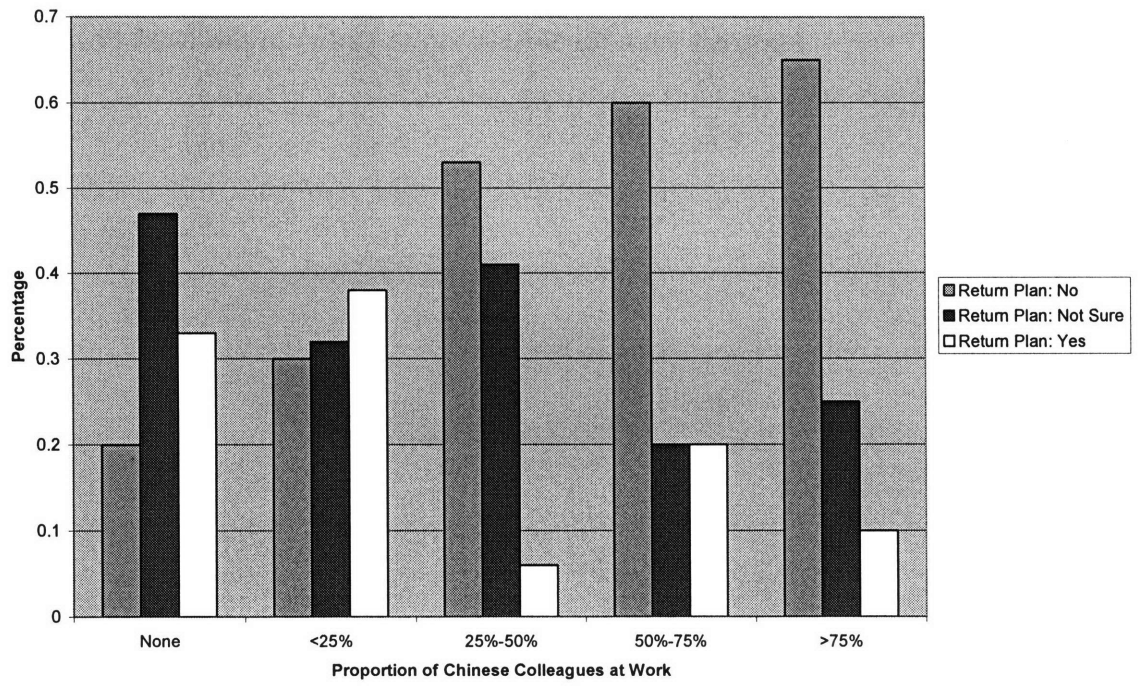


Figure-3 Plan for Return by Proportion of Chinese Colleagues at Work



Tables

Table-1 Sample Demographic Characteristics

	Mean	S. E.
Age	37.35	6.53
Gender (% male)	73%	45%
Years of schooling in China	17.44	2.20
Home country work experience (% yes)	72%	45%
Years in the US	11.2	5.79
Master degree in the U.S.	70%	46%
Doctor degree in the U.S.	26%	43%
Entrepreneurship experience	27%	45%
Immigration status (% permanent residence or citizen)	70%	46%
Current income (× \$10,000)	9.7	1.89
Whether or not found the current job through Chinese (% yes)	38%	49%

Table-2 Return Plan by Immigrant Status

Immigration Status	Return Plan			Total
	Not Return	Perhaps	Return	
Permanent	38 (.35)	37 (.34)	33 (.31)	108 (1.00)
Non-Permanent	14 (.33)	14 (.33)	14 (.33)	42 (1.00)
Total	52 (.35)	51 (.34)	47 (.32)	150 (1.00)

Row proportions are in parentheses.

Table-3 Ordered Logit Models of the Determinants of Return Decision

Predictors	Coefficient		
Ratio of Chinese at work	-0.642 ** (0.218)	-0.634 ** (0.22)	-0.652 ** (0.222)
Ratio of Chinese in social life	1.402 ~ (0.838)	1.461 ~ (0.853)	1.477 ~ (0.859)
Entrepreneurship experience	0.772 * (0.378)	0.87 * (0.386)	0.819 * (0.395)
Current income	0.230 ~ (0.126)	0.243 ~ (0.129)	0.231 ~ (0.133)
Immigration status	-0.28 (0.244)	-0.278 (0.248)	-0.345 (0.285)
(Log) Years of US experience	0.045 (0.15)	0.025 (0.151)	0.0229 (0.151)
Lack of professional and technical skills		-0.190 ~ (0.108)	-0.198 ~ (0.11)
Lack of Language skills		0.11 (0.127)	0.106 (0.128)
Lack of social and communication skills		0.064 (0.138)	0.0676 (0.14)
Age			0.023 (0.033)
Gender			0.074 (0.376)
Number of Observations	146	146	146
Chi2(11)/Chi2(9)/Chi2(6)	19.99 **	23.69 **	24.12 **
Pseudo R2	0.0624	0.0739	0.0753

Key: ~ p<0.10; * p<0.05; ** p<0.01; *** p<0.001
Standard Deviations are provided in the parentheses.

Chapter 4 (Paper 3)

The Journey to the West⁸: The Circular Migration of I.I.T. Alumni

4.1. Introduction

India has experienced a mass emigration of skilled personnel, in particular engineers, for many decades, and that has been amplified in recent years. The India-born population living in households in the US, one of the major destinations of highly skilled Indian migrants, has increased by almost 40 percent between 2000 and 2005 (US Census). The mass emigration of educated persons out of the country, usually referred to as brain drain, used to be interpreted as large economic loss of the country (Bhagwati, 1976; Sen, 1974; Desai et al, 2002).

Recently, the negative view of brain drain has started to shift to more positive one - the brain drain are turning into a brain gain when migrants return to India and bring back financial capital, human capital, and social capital. The promising accounts about brain circulation have received extensive media coverage (For example, Wall Street Journal, 1999) and have attracted increasing attention from academic researchers as well. Saxenian (2002, 2006) describes the return entrepreneurs as new "Argonauts" who develop strong transnational networks between diasporas and their home

⁸ The Journey to the West is the title of one of the Four Great Classical Novels in Chinese literature. The story is a fictionalized account of the legends around the Buddhist monk Xuánzàng's pilgrimage to India during the Táng dynasty in order to obtain Buddhist religious texts called sutras. Together with his three protectors in the form of disciples and a dragon prince who acts as Xuánzàng's horse mount, Xuanzang overcame tremendous hardships during the long journey and returned with the sutras.

countries. Yet the existing empirical work on the so-called brain circulation is usually limited to the high-profile successes of some Silicon Valley's Indian entrepreneurs.

Systematic analysis on the patterns and mechanisms of brain circulation is essential to our understanding of the phenomenon. This paper analyzes major patterns in the cycle of migration among highly skilled Indian engineers by exploring three related questions in the context of the circular migration of the alumni of one of the Indian Institutes of Technology (I.I.T.): (1) What the employment patterns are like for technologically educated Indians who work and live overseas? (2) Who returns to India? and (3) How well returnees are doing in India?

To shed light on the patterns and trends of circular migration for a sample of technically trained individuals, I draw upon a unique dataset composed of 3,127 alumni of the Indian Institute of Technology in Kharagpur (I.I.T-KGP). The survey was designed for this research and was implemented in 2006.

This data is well suited for the purpose of examining the questions of interest, not only because the I.I.T.ians play an important role in the technology and business life in India, but also because the alumni represent a group of people with relatively homogenous attributes at the outset but diverse career trajectories afterwards (with many having overseas experience), which enables us to isolate the effects of the migration-related variables. One of the key features of the I.I.T.-KGP alumni data is its wide coverage of alumni both in India and overseas, which allows comparisons between three groups – migrants, returnees, and non-migrants.

The findings of this study are three fold. First, the study identifies a strong relationship between return migration and migrants' connection with other Indians. Those who found their last job in the host country through an Indian contact are much more likely to move back to India. A further examination of the social networks of returnees shows that they maintain strong and close connections with their college classmates, or other I.I.T. graduates, and family members, who offer valuable support to their transition back to India. Second, the study finds that returnees are more entrepreneurial than either non-migrants or migrants who stay abroad. Finally, a comparison between returnees and non-migrants shows that, controlling for other factors, returnees, on average, have higher income than non-migrants. This result suggests that overseas experience does generate a premium.

This chapter proceeds as follows. In the first two sections I introduce the setting of this study and the features of the alumni data and describe the data collection methods. Through detailed descriptive statistics, the next section provides a profile of the alumni who have overseas experience – where they are and what jobs they take. The study next examines the association between return migration and a range of factors, including educational attainment, work experience, and social networks. At last, the study turns its attention to returnees' whereabouts after moving back to India and the comparison in labor market performance between returnees and those with no overseas experience.

4.2. Research Setting and the I.I.T. Alumni Survey

Indian Institutes of Technology were established to train scientists and engineers after India attained independence in 1947, under the urge for the future development as a technologically self-reliant country. The first I.I.T. was established in Kharagpur, Kolkata (previously Calcutta) in 1951. As the first of the I.I.T.s, I.I.T.-KGP assumes a unique symbolic role in India's history of technology education. Since its foundation, I.I.T. Kharagpur has played a key role for establishing the "I.I.T. brand name" around the globe by offering first-rate undergraduate programs in India. I.I.T. is officially recognized as an Institute of National Importance by the Government of India and has maintained its reputation as one of the best engineering institutions in India. It was ranked the #1 Engineering College in 2001, 2002, and 2003 by *India Today* (I.I.T.-KGP Newsletter, 2006).

Among all I.I.T.s, I.I.T. Kharagpur has the largest campus (2,100 acres), the most departments, and the highest student enrollment. Most importantly, I.I.T.-KGP claims the largest global alumni network of all the I.I.T. campuses. The alumni network includes 16 chapters in India and 13 chapters overseas, with over half of the overseas chapters located in North America. I.I.T. Kharagpur has appointed a dean for alumni affairs to manage liaisons with alumni. The institute organizes an annual alumni meet in each January. The graduates of I.I.T.-KGP are widely spread around the world. With a wave of "brain drain" starting in 1960s, many I.I.T.-KGP graduates went abroad. Although the school does not record how many I.I.T.-KGPians went abroad, as an illustration of the emigration of I.I.T.-KGPians out of India, the formal alumni network of I.I.T.-KGP actually was first established in North America.

With the leading position in engineering education in India and a good representation of the brain drain, I.I.T.-KGP offers an ideal setting to study the careers and international mobility of highly skilled Indian engineers.

4.3. Method and Data Collection

I.I.T.-KGP alumni association has put together a centralized alumni directory and updated it regularly. The directory contains the most up-to-date contact information of a fairly large amount of alumni. When an alumnus changes address, he/she can easily update the information on the web.

Empirical studies on migration and return migration usually use snowball samples, because of the difficulties in tracking the movement of people across countries. What makes our data unique is that it is a not snowball sample or “convenience” sample. I surveyed all the alumni who have valid contact information in the I.I.T.-KGP alumni directory.

Given that the survey candidates are located in different countries, web-based survey method is adopted in order to reach a large number of alumni in various locations simultaneously. An introduction email with the address of the web page containing the survey form was sent to the email addresses of 9,510 potential respondents. The data collection process began in June 2006 and ended in October 2006. 3,127 responses were received (with a response rate of 33%). After eliminating incomplete responses, the number of valid responses totaled 2,976.

The questionnaire is structured as a set of close-ended questions, in most cases with an optional open-ended question at the end. The survey consists of several broad question groups, which includes sections on migration history, educational attainments, and demographic information. Most importantly, the survey asks the respondents to fill in very detailed descriptions of the jobs they held at different phases of their careers, including questions regarding the characteristics of the organizations they worked for, their primary and secondary work activities, and their job search methods. I also ask a series of questions related to the “push” and “pull” factors that might be important in the decision to emigrate or return. It takes 20 to 30 minutes to complete the survey.

Considering that the alumni residing in different countries may have distinctive career trajectories, the structure of the survey is tailored to accommodate the situations of alumni in different locations. After a few general questions on demographic information, education at I.I.T.-KGP, and family background, the respondents are asked to choose from the three options – (1) I am living outside of India now, (2) I am living in India now, but previously have lived/worked outside of India for more than a year, and (3) I am living in India now, and have never lived/worked outside of India for more than a year. According to their answers, the respondents are divided into three groups – migrants, return migrants, and non-migrants – and directed to three different sub-surveys tailored to the situation of each group.

4.4. Whereabouts of I.I.T.-KGP Alumni

Based on the information we have about the study population, we are confident to conclude that the survey respondents are a representative sample of the study population. There are no statistically significant differences between the respondents and non-respondents with respect to the I.I.T. program from which they graduated and the year in which they graduated. Although we do not have the information of earnings of non-respondents, we observe wide variation in earnings among the respondents, which to some extent alleviate the concerns of upward bias that are associated with most data collected by survey method.

The long time horizon of the data allows us to observe migration patterns over years and examine temporal effects. Figure 1 shows the geographic distribution of alumni by graduation year. The percentages of migrants, returnees, and non-migrants in each cohort are fairly stable from 1980 to 2002, at the level of about 60%, 15% and 25%, respectively. They are more volatile in the cohorts of 1960s. In the graduate cohorts after 2002, the percentage of migrants drops significantly to around 30%, and the percentage of returnees drops to less than 5%. But the percentage of non-migrants increases to around 70%. A possible explanation for trend is that recent cohorts are just out of school and it takes a few years to go overseas after graduation. From Figure 2, we see that, on average, alumni spent 3.19 years in India after graduation before they went abroad. Thirty-seven percent of those who went abroad left India right after graduation and only 15% percent of those who went abroad left India one year after graduation.

Among the alumni who have overseas experience (live or work abroad for more than one year), education and employment are the primary reasons for the initial emigration from India, which is shown in Figure 3. Over half of the alumni went abroad with the purpose for education. One third moved abroad for employment. Only a small proportion (2%) went abroad for family reasons.

The pattern shown here is consistent with the fact that advanced education and temporary employment are the two primary channels that highly skilled Indians move abroad. Unlike in low-wage migration, the initial migration of highly skilled Indians is usually career-oriented. In the U.S., which is the largest destination country for highly skilled Indian migrants, the majority of the temporary employment for Indian migrants are H1-B-visa-based. Since 1996, India has been the top sending country of H-1B admits to the U.S. (DHS, 1996-2006). In terms of migration for advanced education, according to the Institute of International Education (IIE), India is the leading place of origin for international students in the U.S.

Figure 4 shows the proportion of each purpose for migration by graduation year cohort. Since the mid 1990s, there has been a continuous increase in the share of I.I.T.-KGP graduates who go abroad for education. Correspondingly, the share of graduates who go abroad for employment has dropped dramatically, while the share of graduates who out-migrate for family reasons remains the same across years. This trend is very much in consistence with the overall situation of the migration of highly skilled Indians: The number of student visas issued to people from India has more than doubled during the short time span of five years from 1996 to 2001 (DHS, 2001). This,

again, corroborates our claim that I.I.T.-KGP alumni are a good setting to study the brain circulation from India.

Related to the initial purpose of migration is the educational attainment from overseas (shown in Figure 5). Among all alumni who have overseas experiences, eighteen percent have a Ph.D. degree, ten percent have a MBA, and thirty-seven percent have a non-MBA master degree. Interviews with I.I.T. alumni in the U.S. show that in very rare occasions the students go abroad under the financial support from Indian government or companies. Most students cover the tuition and living expenses either by a scholarship from U.S. universities or a loan from a U.S. bank. Others are sponsored by their families. As a result, very few Indian students are obliged to go back to India immediately after graduation.

Most of the migrants did not go back to India right after completing their advanced education abroad but rather stayed for employment. To examine their labor market performance in the host countries, I look into multiple aspects of their employments, including industry, occupation, size of the organization they work(ed) work, primary and secondary work activities, job search method, and social environment of the workplace. Figure 6 to Figure 10 highlight the key features of their last/most recent overseas jobs along these dimensions. One of the most salient characteristics of I.I.T. alumni's employment is a high tendency in working for large and established organizations. Figure 6 shows that over 68% of the alumni worked in organizations with more than 1,000 employees.

My qualitative data suggest two major reasons underlying this pattern. Many interviewees in the U.S. indicated that they chose to work for large organizations because jobs providing H1B visa sponsors were more often found in large organizations, which was very important for migrants. *“When I got my Master Degree from XXX [a U.S. university] I was only looking for companies that could sponsor H1-B visas. As migrants we face more constraints [than natives]. We have to be pragmatic. The H1-B visa quota is so quickly filled each year. We have to rely on an employer which is capable of filing an application quickly enough.”* The other often cited reason for working in large organizations was because these were also the names known in India. As another interviewee said *“It sounds more glorious to work for IBM or Microsoft... But it is not purely vanity... You want your parents and relatives in India know that you are doing well in the U.S. Working for big names is a good signal of doing well.”*

I.I.T.-KGP alumni working overseas heavily concentrated in a few industries (Figure 7). Information technology accounted for the lion’s share. Over 40% of the alumni who ever worked overseas for more than one year have worked in IT industries. A close look at the IT industries shows that two third of the alumni concentrated in software industry, which is not surprising given Indians’ reputation in software service. The next biggest category of industry was education (13%). Interestingly, much fewer I.I.T. alumni went to industries that are very popular among highly skilled Chinese migrants, including bio technology industry and financial industry. They also had low tendency in working in traditional industries such as manufacturing.

To further explore the temporal changes in the career patterns associated with migration, I divide the sample into quartiles of graduation year cohorts and present industry distribution by cohort in Figure 8. The data show very dramatic shifts in the industry distribution over time. While the earlier graduation cohorts (1950s, 1960s, and early 1970s) heavily concentrated in manufacturing industry, the representation of I.I.T.-KGP graduates in manufacturing was much lower among the more recent cohorts. Similar patterns were observed in other traditional industries, such as mining and transportation or construction. At the same time, the proportion of graduates working in I.T. industries among the earlier cohorts was much lower than that among the later ones.

To get a better understanding of the type of work that the alumni engage in when they worked overseas, I also collected data on primary and secondary work activities. The results are shown in Figure 9. Twenty-two percent of the respondents reported computer application programming as their primary work activity. A significant proportion of the respondents were involved in managerial or supervising work. R&D, including basic research, applied research, and development, is another field that I.I.T. alumni gravitated into.

To obtain a more complete picture of migrants' employment and labor market performance in the host countries, it is not only necessary to know what jobs migrants held, but also important to understand how they were connected to these jobs. Such information on job search mode is captured by a question in the survey asking about how the respondent found the last/most recent job in the host country. The results are shown in Figure 10. A variety of methods were reported. Both informal networks and

formal means were used by I.I.T.-KGP alumni. It is worth noting that, except for contacting the employer directly without any intermediaries, friends, supervisors, or colleagues who were also Indians were the most useful contacts for the I.I.T.-KGP alumni to successfully get hold of their jobs. Approximately 18% of the respondents reported finding their last/most recent jobs through another Indian.

There are two possible explanations for this high proportion – either the networks of co-ethnics are most frequently used in job search, or these networks are exceptionally effective in matching the job searcher with a potential job. In contrast, only 9% of the respondents found their jobs through non-Indian friends, supervisors, or colleagues. Indian formal networks and informal contacts, together, contributed to almost a quarter of all the successful job matches. At the same time, impersonal means, including employment agencies and traditional and non-traditional media were also widely capitalized on by the alumni. In particular, over 12% of the alumni found their most recent jobs in the host country via internet. Different from what has been well documented for low skilled migrants that family and kinship ties (strong ties) are important in finding jobs (Greenwell, Valdez, B., and DaVanzo, 1997; Massey et al. 1998), these ties are less relevant in job search for I.I.T. alumni.

4.5. Who Returns?

Not all I.I.T. alumni who have worked overseas stay abroad permanently. Among the 1,969 alumni who have worked or lived overseas for more than one year, 332 have already moved back to India. Who returns? Under what circumstances do

they return? Are there any systematic differences between returnees and those who do not return? These questions are explored in this section.

As discussed earlier in this chapter, education and employment are the two primary purposes for the initial emigration of I.I.T.-KGPians. When I look into the relations between return migration and the initial purpose for going abroad, counter-intuitively, it appears that those who went abroad for education had a higher tendency to stay abroad than those who went abroad for employment (Figure 11). A closer look at the educational attainment of the respondents (Figure 12) shows that overseas education degree is negatively associated with return migration, regardless of the type of degree, be it doctorate, MBA, or non-MBA master degree.

For those who migrate to a foreign country directly for employment, one may expect them to incline to stay in the host country to work, because better employment opportunity is the very reason that they migrate in the first place. At the same time, for those whose initial purpose for migration was education, one may expect them to return once their education is completed. However, what the data show here is exactly the opposite. This pattern echoes an important theme that has been shown in the China case earlier in this dissertation, that host-country education at the post-graduate level is an important parameter in determining highly skilled migrants' labor market performance. Host-country education often gives a migrant the access to a wider range of employers and better career opportunities from a long-term perspective. Although I.I.T.-KGP offers world-class undergraduate education programs and the skills I.I.T.-KGPians possess are very much transferable across countries, the absence of host

country education still appears to be an obstacle for long-term career development in the host country.

Does the type of organization that I.I.T.-KGPians work for have an impact on their decision to stay abroad or return to India? I first look at the size of the organization (Figure 13). It appears that migrants working for large organizations (>1,000 employees) are less likely to return to India than people from smaller organizations. Large organizations are very often associated with stable career tracks and established internal labor markets, while smaller organizations are more likely to be entrepreneurial firms. There are two possible mechanisms underlay this pattern. Either those who self-select into entrepreneurial firms are more mobile and more responsive to opportunities emerging in other locations, or these firms shape the careers of those who work in them to be more fluid.

Next I look into the relationship between the type of industry and return migration (Figure 14). There was no significant difference between the industry distribution of returnees' last overseas jobs and that of the jobs held by non-returnees. Over 40% of the returnees worked in the IT service industries before going back to India. The percentage was almost the same for non-returnees. Alumni who worked in manufacturing or education were more likely to return to India. More than 18% of the returnees used to work in education and 13% used to work in manufacturing. At the same time, those who worked in financial industries had a much lower tendency to return to India.

With regard to work activities (Figure 15), it is interesting that those with researching or technical jobs, such as basic research, development, computer programming, are more likely to return, while those with jobs requiring more managerial or soft skills, including financial services, management and supervising, and public service and administration, were less likely to return.

In addition to the characteristics of the organizations that overseas alumni worked for, how they were connected to the jobs was also an important indicator of their labor market performance. To some extent it reflected the social capital that overseas alumni possess. As shown in Figure 16, there was a sharp distinction between continuing migrants and returnees in the way they found their last/most recent overseas jobs. While only 15% of continuing migrants found their last/most recent overseas jobs through contacts with other Indians, that percentage was much higher (27%) for returnees, which implies that people with more instrumental co-ethnic contacts are more likely to return to India. At the same time, while 10.6% of the continuing migrants found their most recent jobs through contacts with a non-Indian friend, colleague, or supervisor, that percentage was only 2.7% for returnees, which implies that people with more instrumental non-Indian contacts are more likely to stay in the host country. It is also worth noting that returnees and continuing migrants vary significantly in the usage of internet in job search in the host countries.

In Table 3 I report the result of multinomial probit regressions of return migration on a series of variables. Most of the patterns we observe in the two-way relations statistics still hold when other factors are controlled.⁹

Our findings are four fold. Firstly, entrepreneurship experience is positively associated with return migration. The association between entrepreneurship and return migration has rarely been examined in quantitative analysis of migration in the existing literature. The data shows that this association is very significant for I.I.T.-KGP alumni. This finding is consistent with what we have seen in the case of the return migration of Chinese engineers in the earlier chapter. In-depth interviews with migrants and returnees have revealed a deepening of the ecosystem for entrepreneurship in India.

Secondly, getting the most recent overseas job through an Indian contact is significantly positively related to return migration, which, again, is consistent with the findings from the earlier survey of the return migration of Chinese engineers. Job search methods have very often been studied in conjunction with social networks and social capital by sociologists, especially in the literature of migrants' labor market performance (Granovetter, 1974; Lin, 1982, 1990; Fernandez and Weinberg, 1997). How and through whom a person accesses job information and obtains a job often reflect the networks that he/she is embedded in and the social resources available to him/her. Here I use job search mode – whether through an Indian contact or not – as an approximate indicator of the overseas I.I.T.-KGPIans' instrumental co-ethnic networks.

⁹ There are some variations in the regression results by cohort (Table 6), which warrant further analysis as I continue to explore the data in my future research.

The data show that those who possess contacts with other Indians that are useful in job search are more likely to return to India.

Moreover, a first glance at the relations between the earnings of migrants and return migration shows some evidence for a negative selection for return migration. The log of the income, in the real term, of the most recent job in the host country is negatively associated with return migration. However, that relation is much weaker when other characteristics of the job are controlled.

At last, not to our surprise, permanent residence status in the host country (in the legal term) and the duration of migration are negatively associated with return migration. The longer a migrant stays in the host country, the more settled she/he is, the less likely that she/he may move back to India. The interviews with migrants revealed that family obligations were the most cited reasons for not moving back to India. As one of my interviewees mentioned *“Once you grow roots in this land, your children are going to school, your wife has a stable job here... It is so difficult to leave all these behind to start from scratch in India.”*

4.6. Back in India

In this section, I move to explore the process of return migration and returnees' labor market performance after moving back to India. What attracts people back? Who help them settle in their home country after being away for many years? What types of jobs they get? The existing literature on the return migration of highly skilled workers offers very little systemic analysis of the profile of returnees, except for stories of a very

limited number of “superstars.” The systematic analysis of labor market performance of I.I.T.-KGP alumni provided here can help us better understand the scope and substance of “brain gain.” Furthermore, this data also enable us to compare returnees and non-migrants who have no overseas work or education experience. Do returnees do better than those without overseas experience? Are there any differences in their careers?

4.6.1. Networks and Institutions Surrounding Returnees

In the earlier chapters of this dissertation I have showed that the process of return migration of Chinese engineers and their settlement in the home country involve extensive information gathering and relationship building. I find this is also true for I.I.T.-KGPians who move back to India from overseas. To re-integrate into the society of the home country, returnees need supports, not only financially but also socially. Where do the supports come from?

The survey data show that returnees maintain strong and close connections with their college classmates and family members, who offer valuable support to their transition back to India (Figure 19). In the survey I asked the respondents to name two important persons they talked to for advice on career-related issues in the past two years. Surprisingly, the most cited helpful contacts were not someone they knew recently, but their college schoolmates. Over 25% of the returnees named the most important person for them to seek career advice as someone with whom he/she had knew in college. Interviews with returnees further revealed that when people went

abroad, they actually maintain strong bonds with their college schoolmates – both those who stayed in India and those who also went abroad. When they returned to India, these contacts became especially valuable to them in their settlement and the development of their career or business. When I asked why the I.I.T. alumni contacts were so important even after they left the school for a long time, one person said “*You need someone who knows you well and who knows your situation well, who can easily put himself in your shoes. Although my old friends from I.I.T. live in different places, we are at the same ‘channel’ [channel in radio], Your concerns could very much likely be his concerns a while ago.*” Another one said “*For me, professional network is most important. I.I.T. network comes secondary. But they overlap. We have several hundreds people in our batch. We lived in a hostel. We did courses together. We live together for five years. It’s much a closer community... Most importantly, after these years we find we are all in similar lines of business.*”

The second biggest category is colleagues at work. This type of contact is often established after returnees move back to India. The third largest category is family members. In India, family origin is one of the most important determinants of social class and social status. Strong bonds in big families are one of the most salient features of Indian social structure. As one of the interviewees commented “*In this country, people know you by two things: your last name and the school you went to.*” Family and college are the most important settings where well educated Indians develop long-lasting social ties. Our data show this is not less true even for those who left the country and lived abroad for many years.

The qualitative data based on interviews also suggest that there are various types of networks and institutions surrounding migrants facilitating their movement

back to India, be it networks based on family and kinship ties or institutions such as schools, professional associations, or multinational companies. Returnees and potential returnees also have a great commitment to institution building. These transnational networks not only precondition and sustain return migration, but also arise out of or being transformed during migration. In addition, different types of informal networks and formal institutions interact with specific types of career pursuits.

Professional Associations

Migrants and Returnees have taking a leading role in founding and developing new professional associations in India. Some of the most active professional associations, including National Association of Software and Service Companies (NASSCOM) and the association of The Indus Entrepreneurs (TiE) were founded by returnees or migrants. The development in information technologies and transportation have made it possible for multiple and dense links to develop across national borders. Many of the associations have expanded dramatically after the new millennium and established a vast global network. These associations are critical for information sharing outside the big multinational companies, especially for those who work for, or intend to work for, small and medium firms. As mentioned in the earlier section, the ecosystem for entrepreneurship in India, albeit seeing big improvements recently, is still not a matured one. The dominance of large companies in the high tech industry makes it very difficult for small firms to survive, especially for firms founded by new returnees. There is very little assistance that small entrepreneurs can receive from the government. These professional associations come to undertake the role of service provider. For instance, NASSCOM organizes regular sessions for small

and medium-sized start-ups in Bangalore, where entrepreneurs get together sharing their experience in dealing with all kinds of issues they face in running their businesses, from where to reach overseas venture capital to how to successfully market a product that is new to Indians. When I asked one of the initiators and organizers of this series of events, she said *"We are doing the job that nobody else does. There is no model for us to follow. We are experimenting... Most importantly we are building a community. We are not experts in all these fields, but when we bring all these people together, you see how amazing it is! Count on government? Count on the big ones [big companies]? Nobody can help them [the small firms] unless they help each other. We just need to bring them together, and let them talk to each other."*

Family and kinship ties

In contrast to the China case, where family and kinship ties are peripheral to the careers of returnees, family and kinship ties are one of the most important sources for financial and social support for Indians who returned from overseas. Family ties often affect returnees' career choices. A Human Resource manager at a large India company commented on the important role that families play in job seekers' choices of where to work *"If parents don't know about the company or what their child is doing, they generally have a tendency not to support those roles... Sometimes we feel we are recruiting the family."*

Our analysis also indicates that return migration is usually a well-prepared move. The respondents were asked how many times they visited India during the three years before they finally moved back to India. Over 75% of respondents reported more than one visits (Figure 20).

4.6.2. A Migration Premium?

Going abroad, especially to industrialized countries, is very often perceived as a journey through which one can accumulate human capital, financial capital, and social capital. Yet very little hard evidence has been documented in the existing literature about the existence of a migration premium, largely due to the difficulty in measuring the *otherwise* situation. With a control group of alumni who stayed in India but have very similar pre-migration background as those who left, we are able to test whether migration experience makes any difference in alumni's career and labor market performance.

Figure 17 shows the type of employment of returnees versus that of non-migrants (those without overseas experience) in India. The overall picture for returnees and non-migrants was similar: First, the biggest employers for both returnees and non-migrants were multinational companies; Second, although relatively few alumni in India started their own companies, the percentage of returnees who did so was almost twice as that percentage of non-migrants; Finally, returnees had a higher concentration in education institutions, while non-migrants had a higher concentration in government.

I next look into the industries where returnees and non-migrants worked in (Figure 18). I.I.T.-KGP Alumni were highly concentrated in computer software industry. It appears that there is not much difference in industry concentration between returnees and non-migrants.

Finally, does migration generate any premium in terms of earnings? With overseas education or work experience, do returnees actually do better than non-migrants? I first did a T-test of the difference in earnings between the two groups, followed by a multinomial regression of earnings on various factors, including overseas experience. The key findings are summarized as follows: First, with other variables controlled, returnees have higher earnings than non-migrants (on average about 50% more); Second, MBAs on average have higher earnings than non-MBAs; Third, multinational companies offer higher payment, while educational institutions and government have lower payment; Finally, there is not much difference in earnings across industries (computer hardware has slightly lower earnings, but only statistically significant at 10% level).

4.7. Conclusion

Using a unique data from a survey of the alumni of I.I.T.-KGP, this chapter provides a systematic analysis of the circular migration of I.I.T.-KGP alumni, by examining the whereabouts of migrants, the determinants of return migration, and the labor market performance of returnees when they move back to India.

The results suggest overseas educational attainment, work experience, and social networks largely shape the decision to return to India: Overseas education is negatively associated with return migration; those who have ties with other Indians that are useful in their job search are more likely to move back to India; those who work for small and entrepreneurial companies are more likely to move back to India

than those who work for large organizations. Further investigation into the return migration process shows that returnees rely heavily on the ties with other I.I.T.-KGPians whom they knew from college and the ties with family members. They also develop new professional/work-related ties with co-workers in India and capitalize on these ties once they move back. Finally, a comparison in labor market performance between returnees and non-migrants shows a significant premium in earnings associated with migration experience. Although starting one's own business, in general, is not a desirable choice for the high tech communities India, due to the backwardness of infrastructures and very often inefficient financial institutions, returnees show a higher tendency to start their own businesses than non-migrants.

While prior research has proposed a variety of benefits associated with brain circulation, this study tested these claims through the three-step systemic analysis of the circular migration of I.I.T.-KGP alumni. Although our analysis focuses on the individual level, at the aggregate level, the results can provide important policy implications for evaluating and channeling migration flows of highly skilled engineers.

Figures

Figure 1

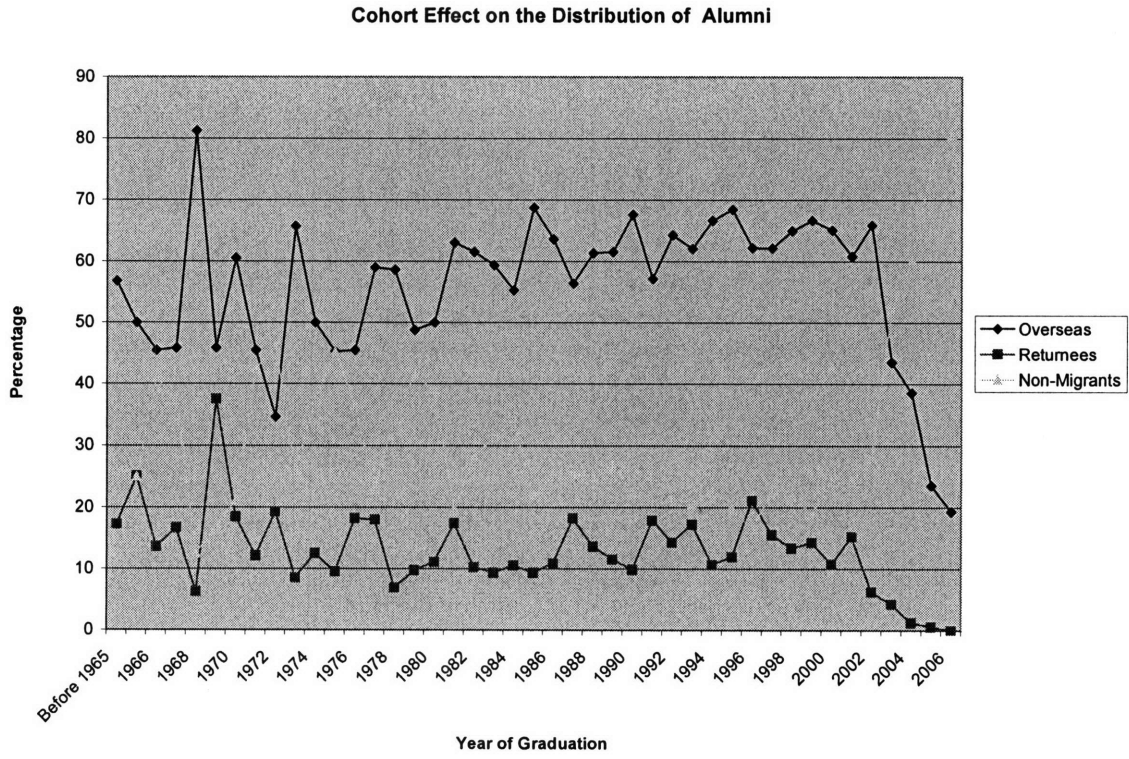


Figure 2

Years between Graduation and First Leaving India: All Alumni with Overseas Experience

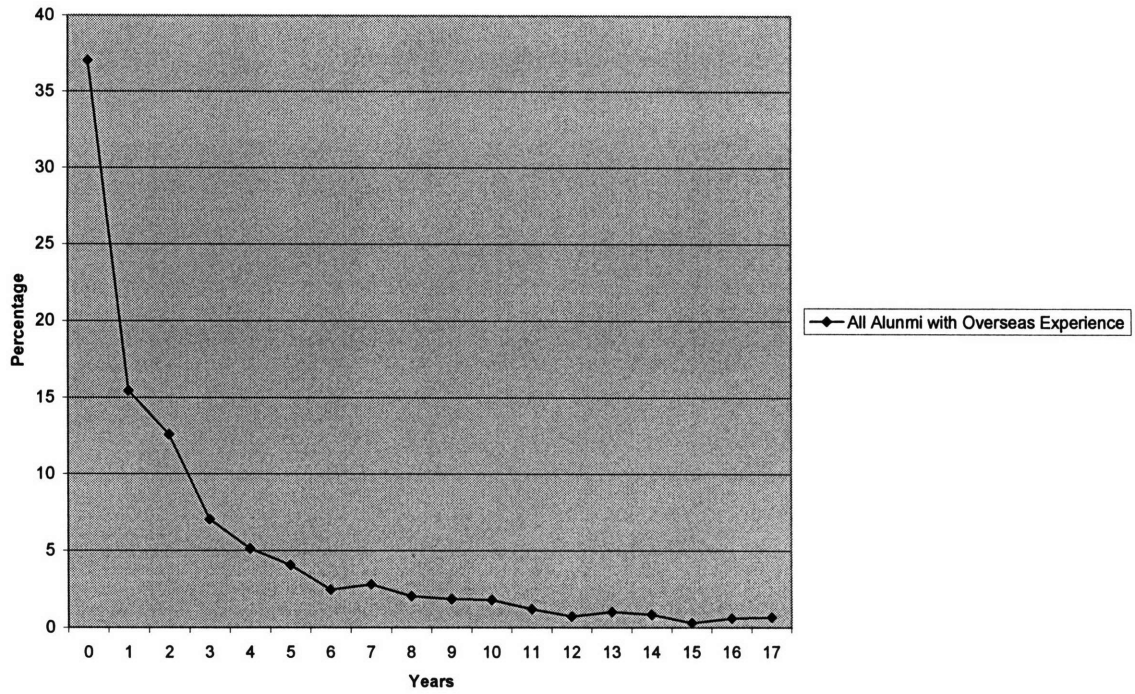


Figure 3

The Initial Purpose for Going Abroad

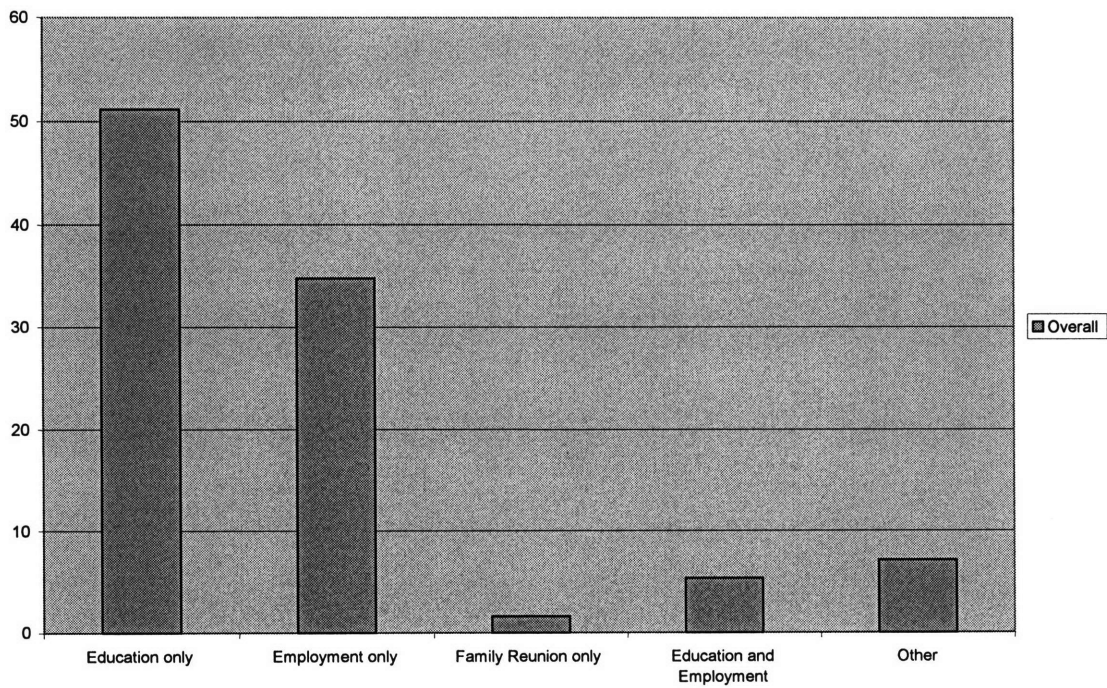


Figure 4

Cohort Effect on Initial Purpose of Going Abroad: All Alumni with Overseas Experience

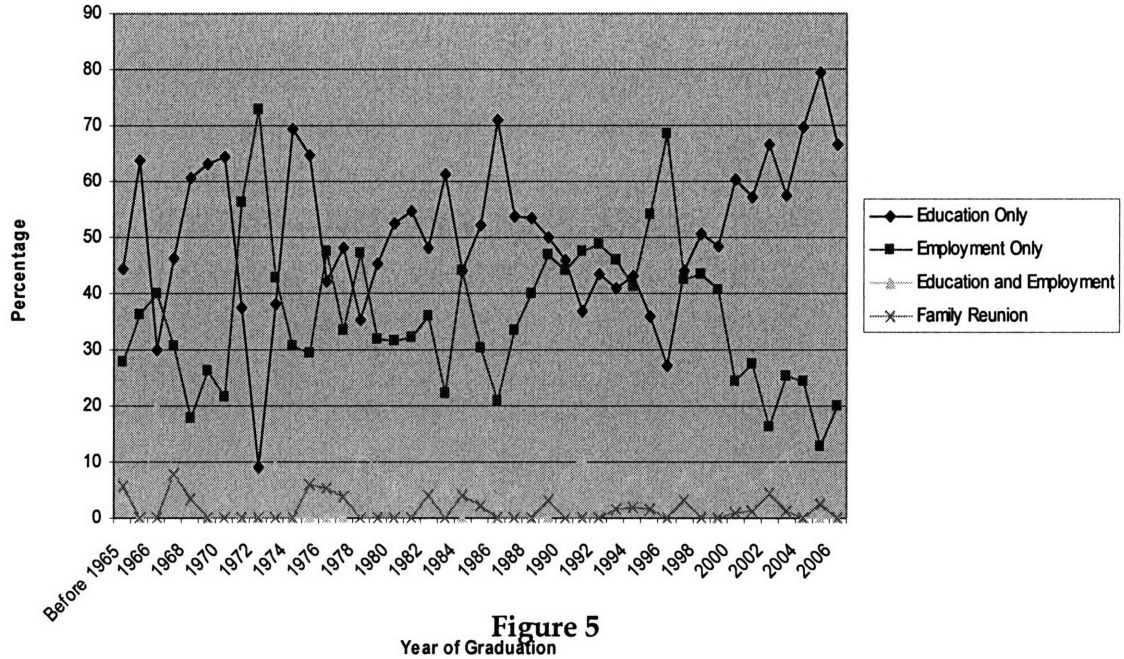


Figure 5
Degree Obtained Abroad: All Alumni

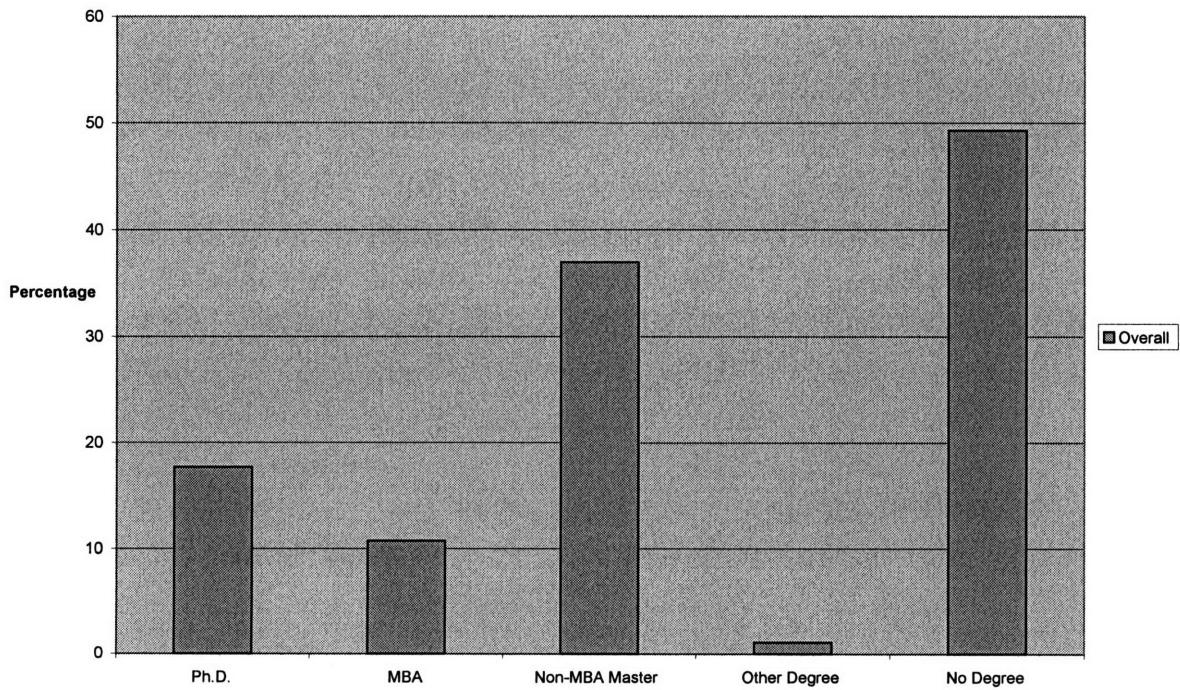


Figure 6

Size of Organization of Last Job Abroad: All Alumni

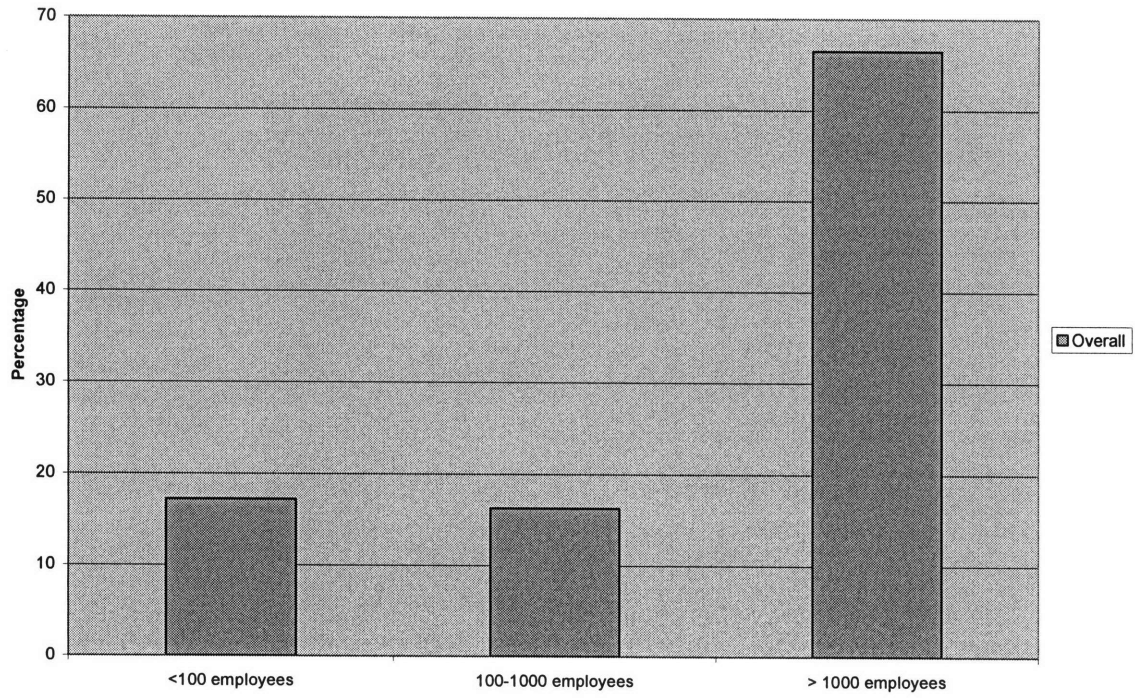


Figure 7

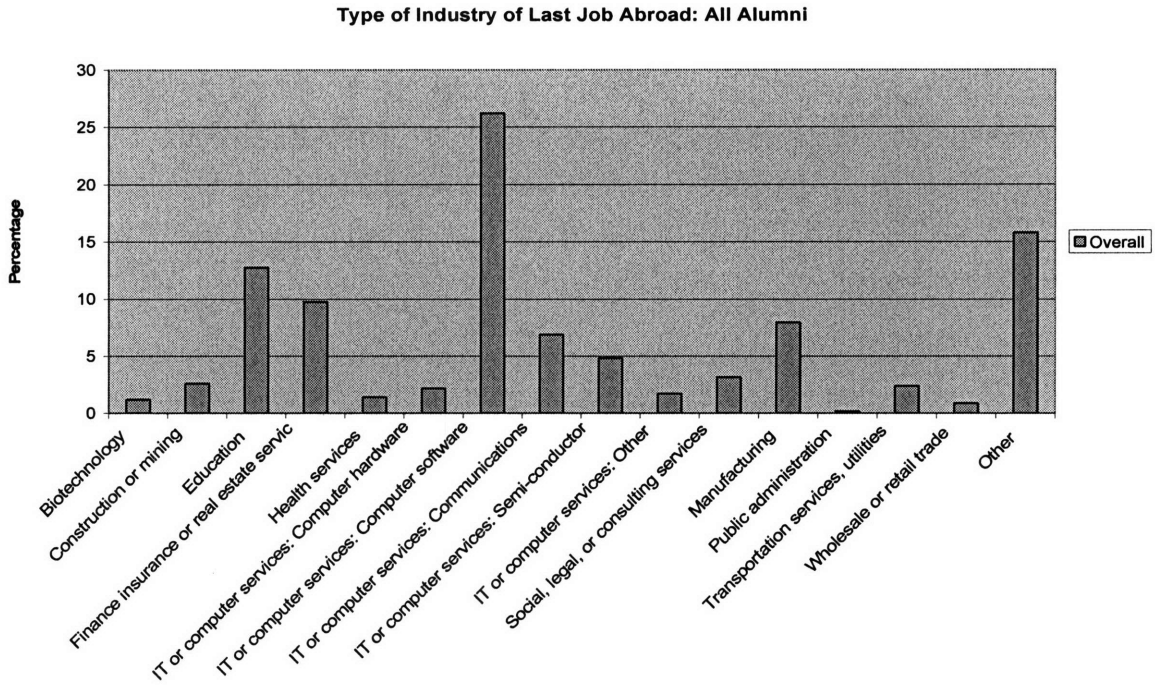


Figure 8

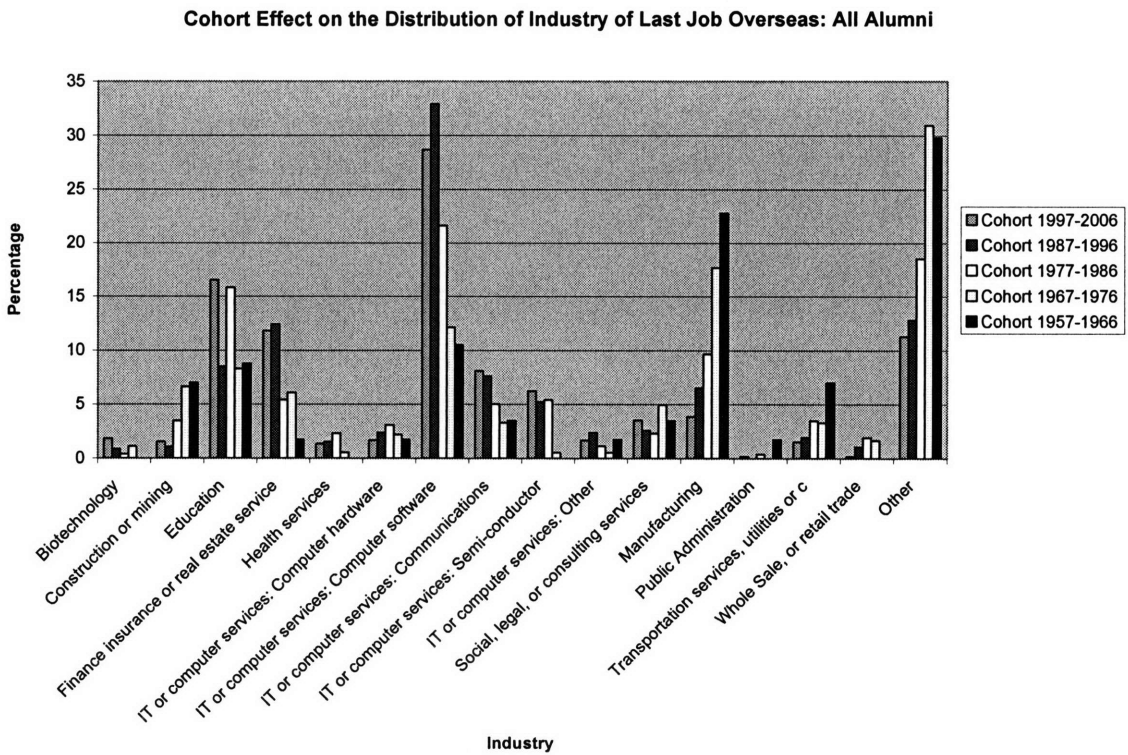


Figure 9

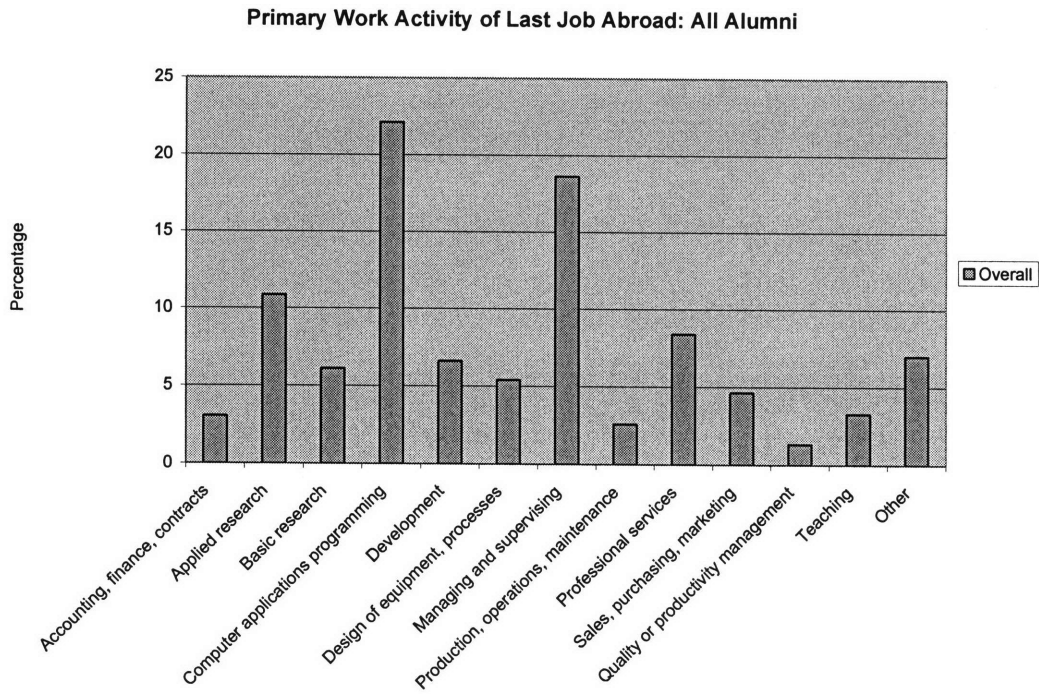


Figure 10

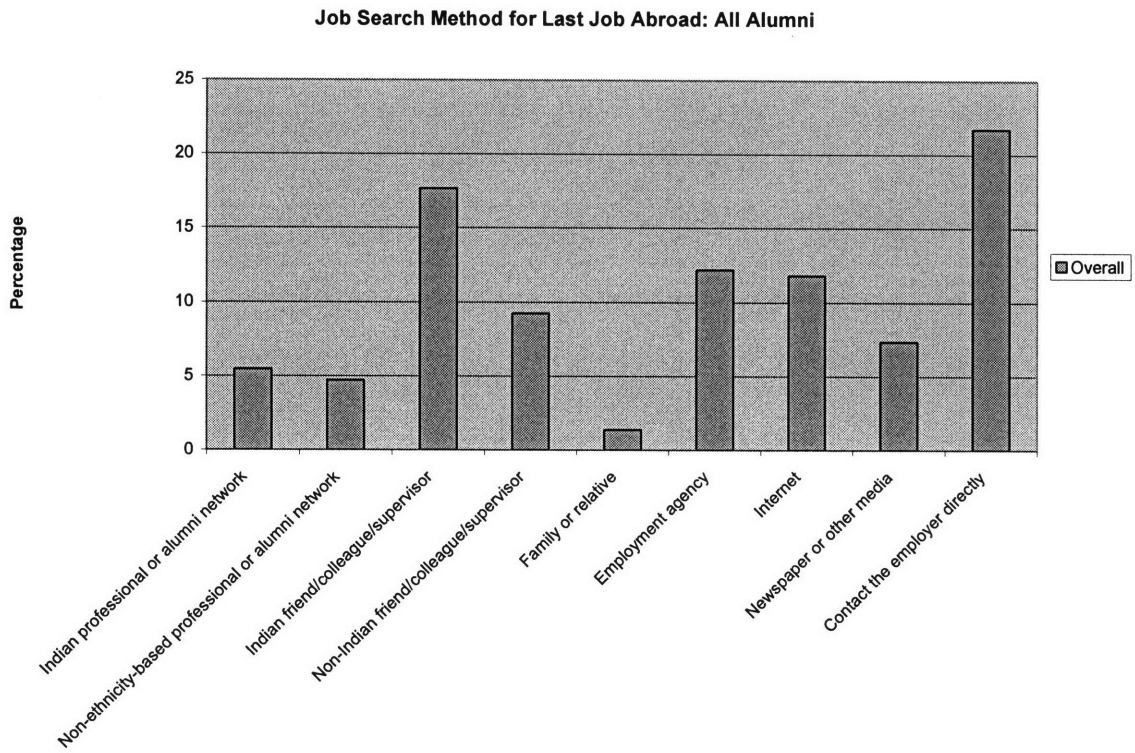


Figure 11

Initial Purpose of Going Abroad: Overseas vs. Returnees

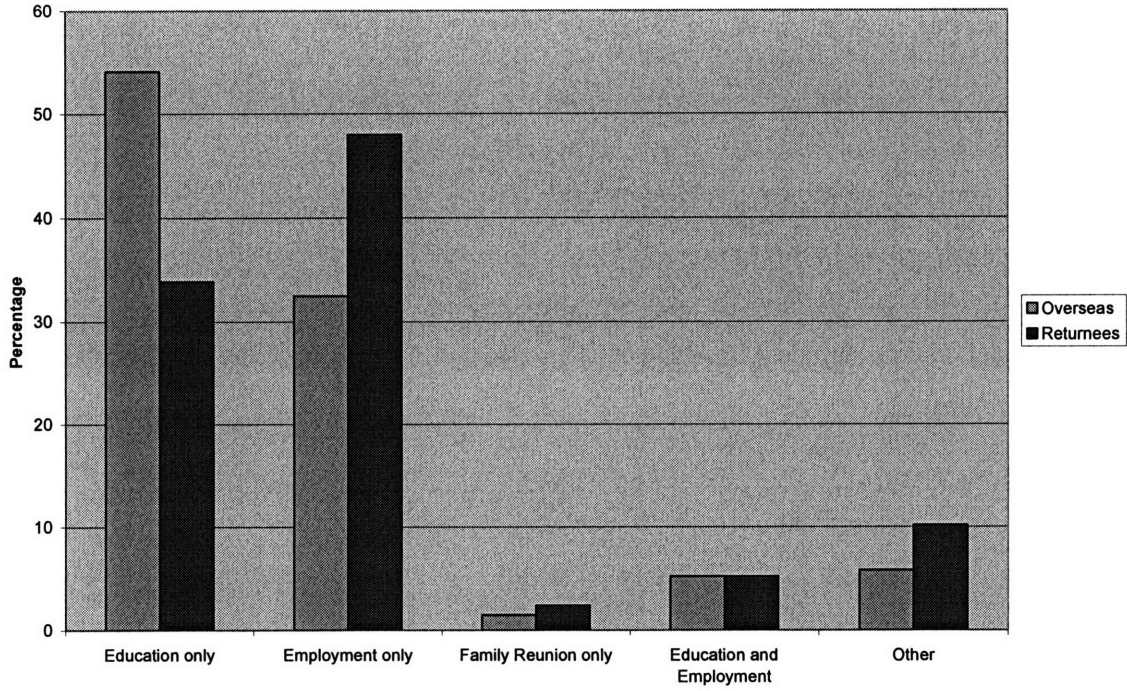


Figure 12

Degree Obtained Abroad: Overseas vs. Returnees

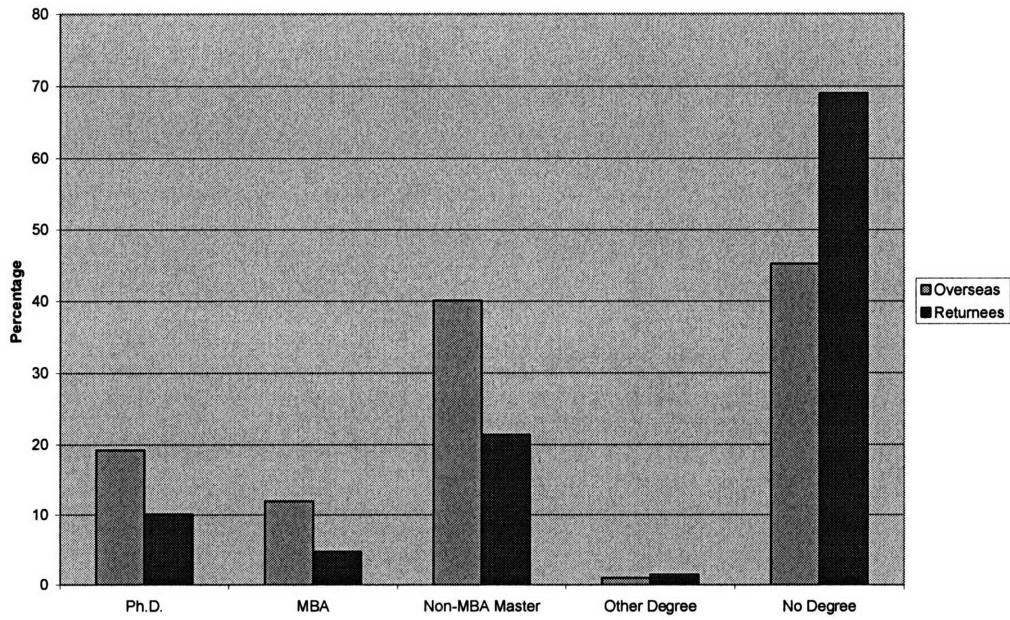


Figure 13

Size of the Organization of Last Job Abroad: Overseas vs. Returnees

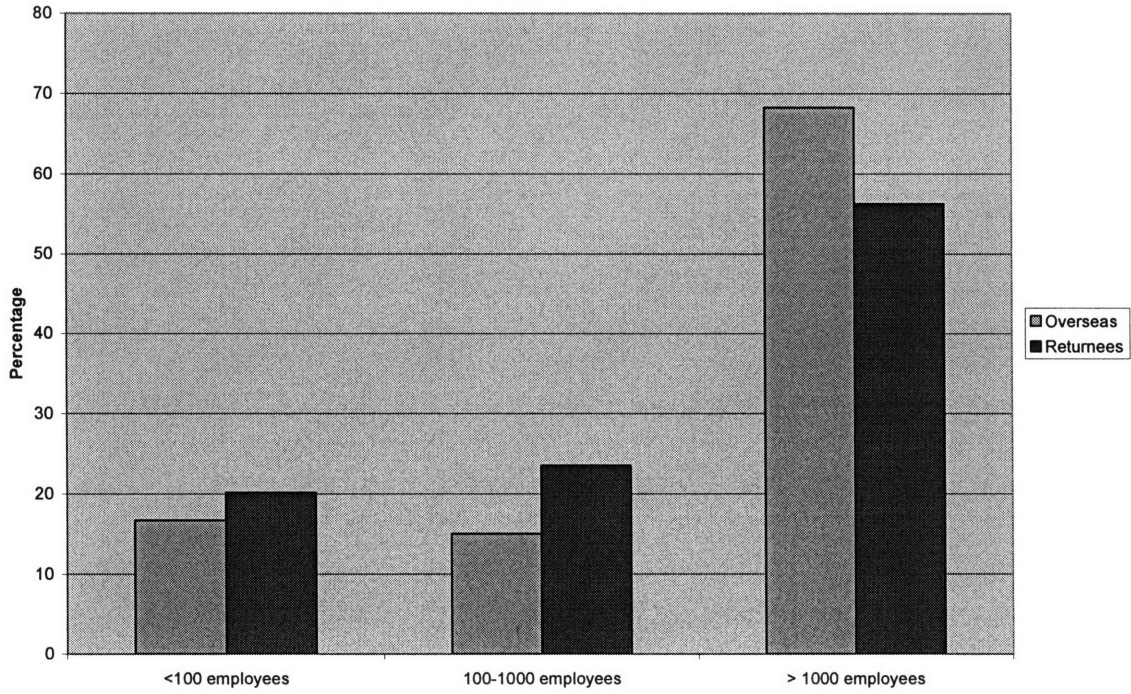


Figure 14

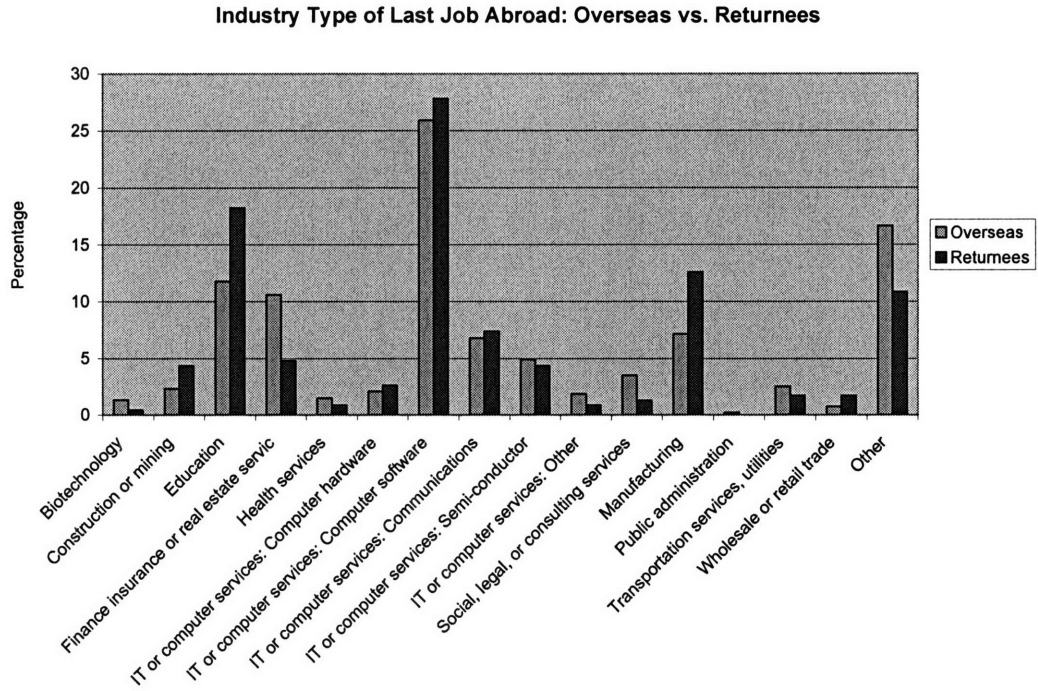


Figure 15

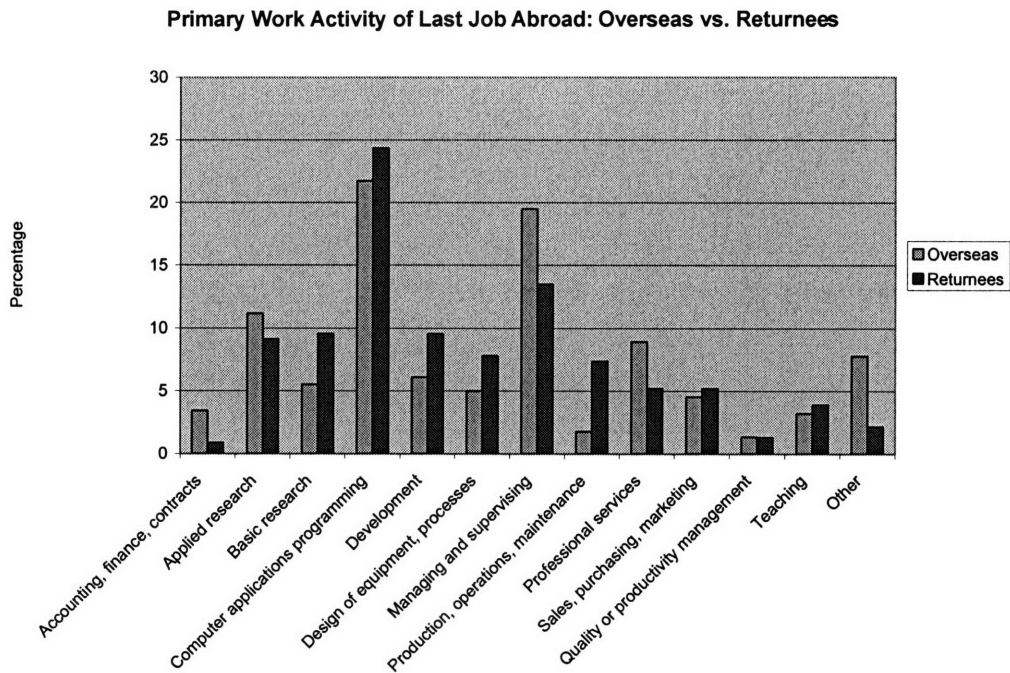


Figure 16

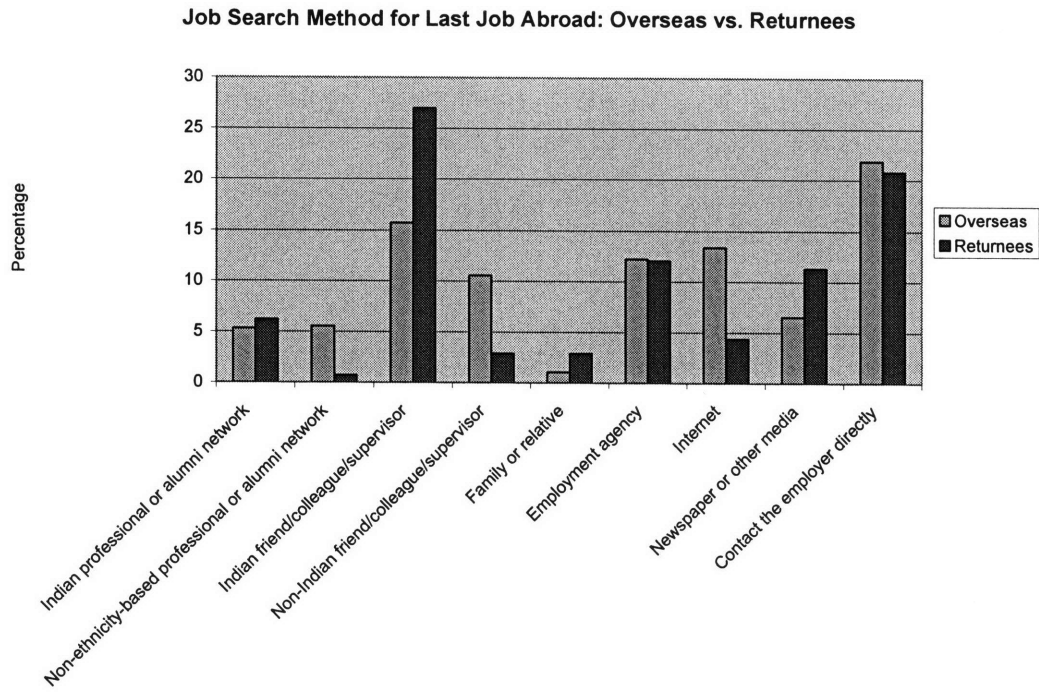


Figure 17

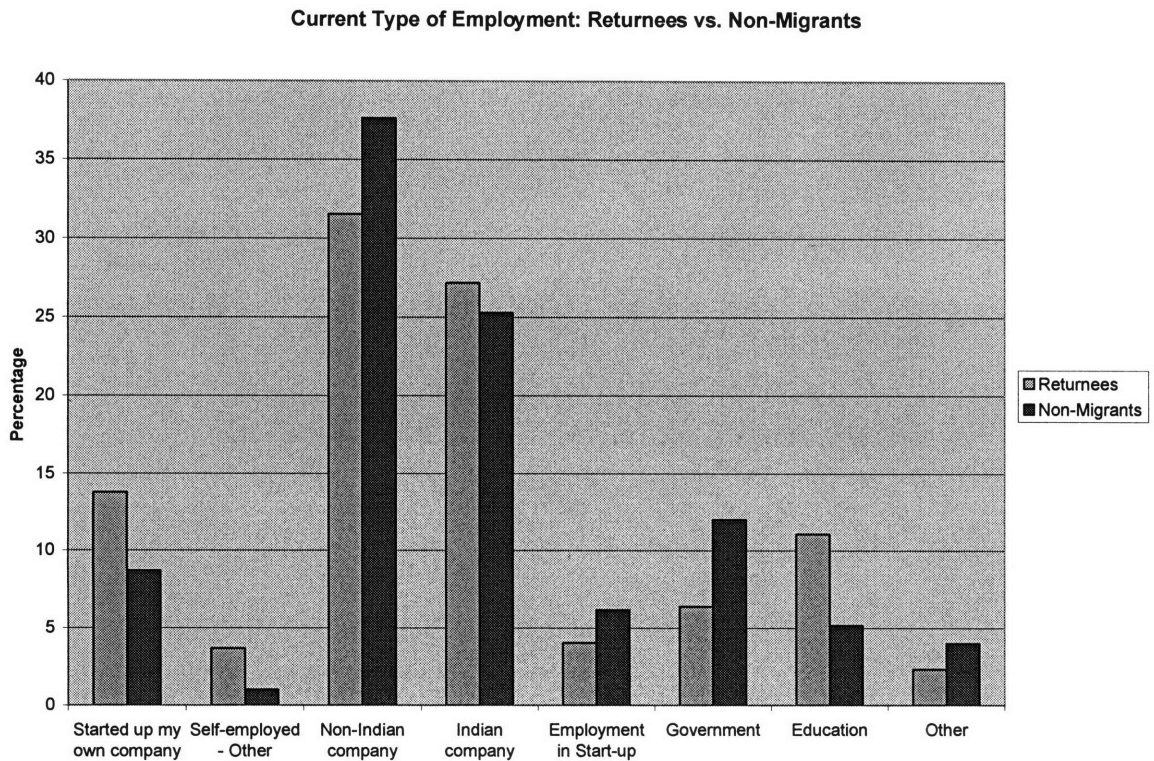


Figure 18

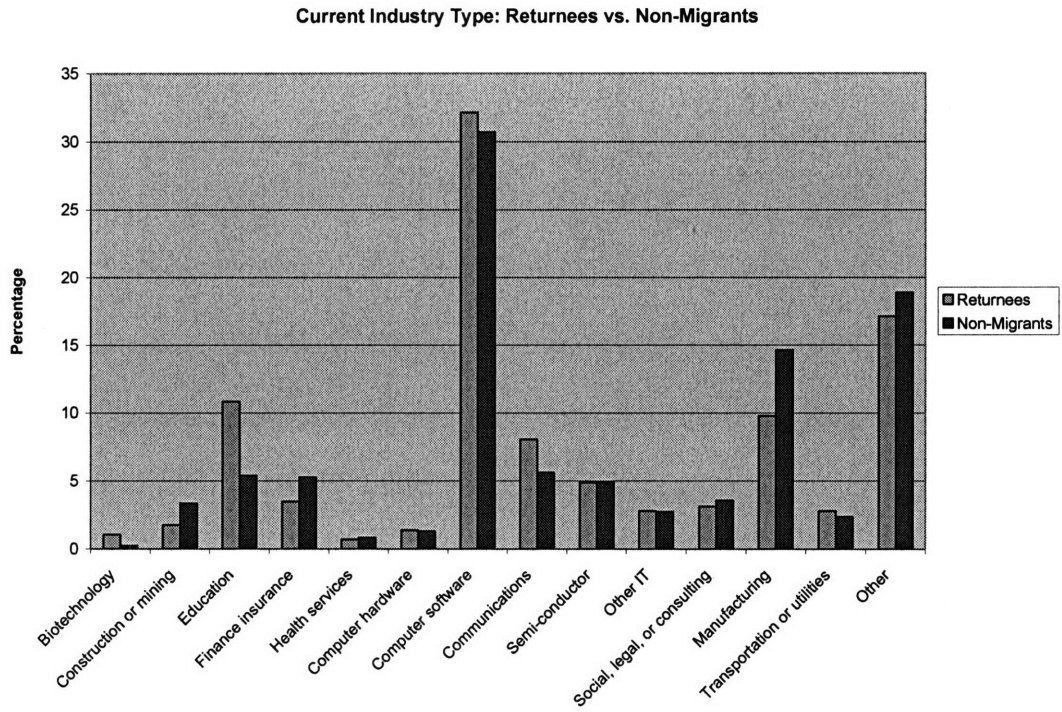


Figure 19

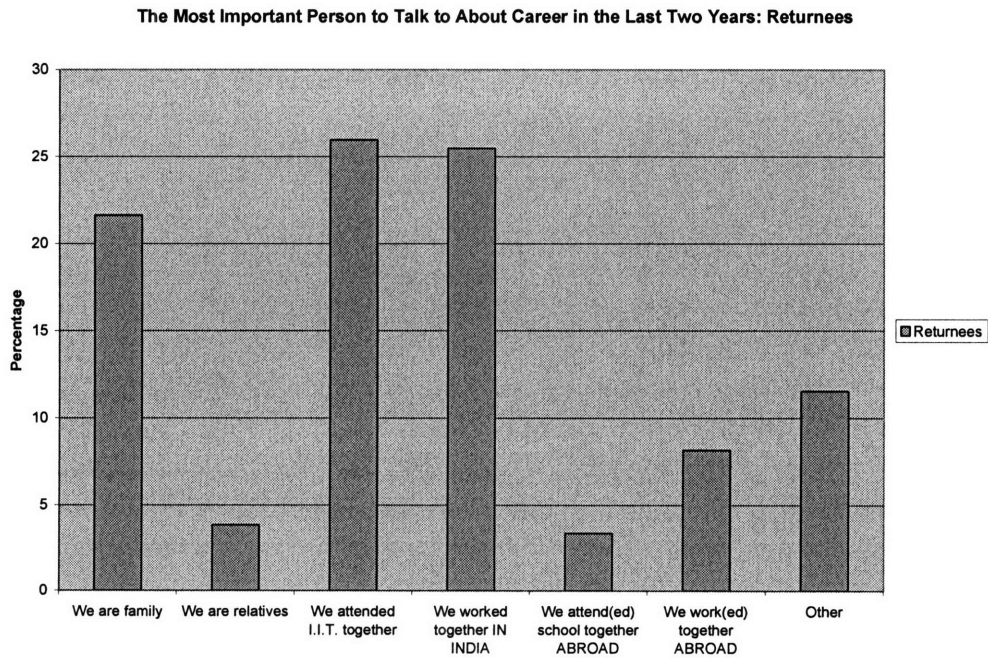
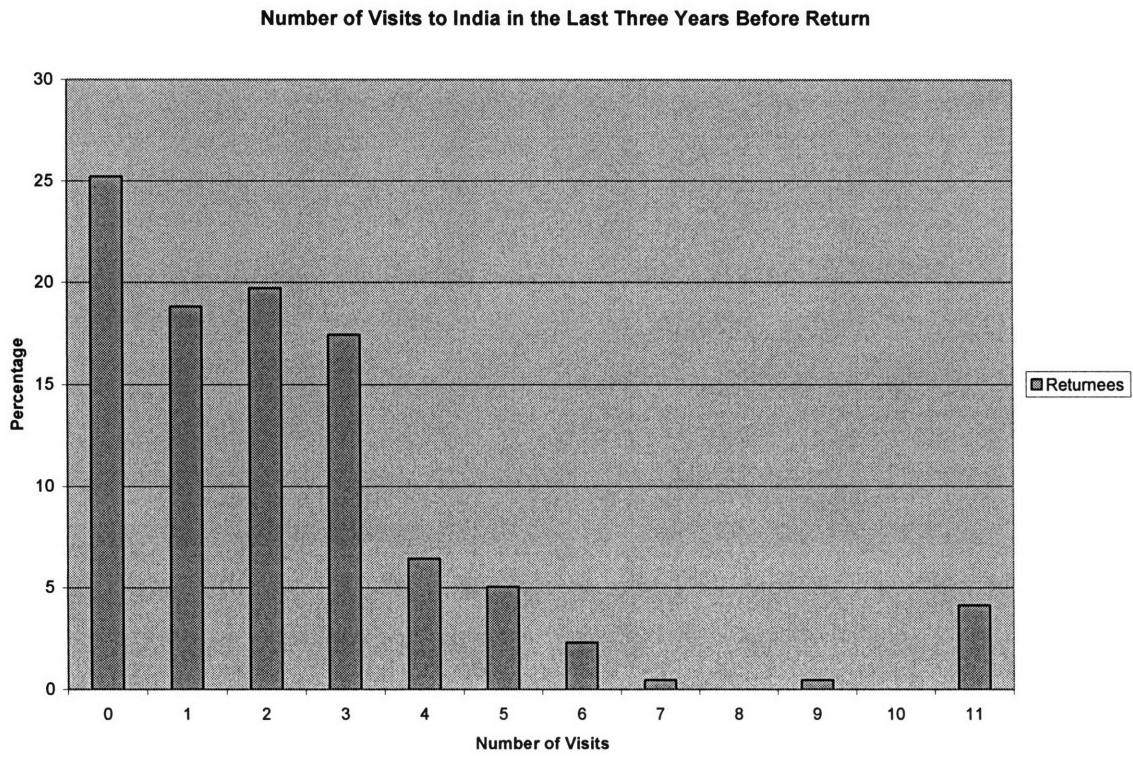


Figure 20



Tables

Table 1 Overseas Experience

	Number of Observation	Percentage
Currently living abroad	1,637	55
Currently living in India, with overseas experience	332	11
Currently living in India, Without overseas experience	1,007	33
Total	2,976	100

Table 2 Basic Demographic Statistics

	Mean	S.E.
Age	36.89	12.27
Gender(Male=1)	0.954	0.21
Married	0.682	0.466
Number of children	0.863	0.956
I.I.T. undergraduate degree	0.831	0.315
I.I.T. graduate degree	0.281	0.450
Non MBA master	0.456	0.498
MBA	0.183	0.387
Ph.D.	0.154	0.361
With overseas education	0.344	0.475
With entrepreneur experience	0.25	0.43
Number of Observations: 2,976		

Table 3 Probit Regressions of If-Returned on Selected Variables

Predictor	Model A	Model B
Immigration Status	-0.509** (0.189)	-0.533** (0.19)
Number of Visits to India in the past three years (Before Return)	0.011 (0.04)	0.026 (0.04)
Percentage of colleagues of India Origin	0.055 (0.056)	0.032 (0.06)
Entrepreneur Experience	0.498** (0.16)	0.505** (0.18)
(log) Earning of Last Job Overseas	-0.265** (0.09)	-0.192~ (0.10)
(Log) Years of Overseas Experience	-0.407** (0.14)	-0.343* (0.15)
Age (at return)	0.0006 (0.012)	-0.007 (0.013)
If a Manager	-0.217 (0.19)	-0.249 (0.20)
Find Job through Indian Friends	0.361* (0.15)	0.322* (0.16)
Country: USA	-0.745* (0.32)	-0.517 (0.33)
Country: UK	-0.067 (0.42)	0.112 (0.44)
Country: Singapore	-0.353 (0.52)	-0.064 (0.53)
Have a Ph.D. Overseas	0.226 (0.19)	0.328 (0.22)
Have a MBA overseas	0.121 (0.22)	0.198 (0.23)
Last Job Overseas Type: Startup		-0.785 (0.13)
Last Job Overseas Type: Non Indian Company		0.012 (0.95)
Last Job Overseas Type: Education		0.818* (0.36)
Last Job Overseas Type: Government		0.500 (0.53)
Last Job Overseas: Size of Organization		-0.151 (0.09)
Last Job Overseas Industry: Finance		-0.449 (0.28)
Last Job Overseas Industry: IT		0.212

		(0.19)
Last Job Overseas Industry:		0.508~
Manufacture		(0.31)
Initial Purpose of Going Abroad:		-0.138
Education		(0.23)
Initial Purpose of Going Abroad:		0.171
Employment		(0.23)
Constant**	3.207958	2.521085*
	(1.01)	(1.18)
<hr/>		
Number of Observation	702	702
Log Likelihood		
Pseudo R Square	-227.4	-214.8
	0.19	0.22
<hr/>		

Key: ~ p<0.10; * p<0.05; ** p<0.01; *** p<0.001
Standard Deviations are provided in the parentheses.

Table 4: T-Test for Current Earning of Returnees and Alumni without Overseas Experience (US\$)

Variable	Num. Obs.	Mean	Std. Err.	Std. Dev.
Current Earning for Returnees	180	42483.77	7183.752	96380.14
Current Earning for Alumni without Overseas Experience	554	24705.17	2190.235	51552.02
Diff		17778.6	5612.3	
<hr/>				
diff = mean(Returnees) - mean(Without Overseas Experience) t = 3.1678				
Ho: diff = 0 degrees of freedom = 732				
Ha: diff < 0	Ha: diff != 0	Ha: diff > 0		
Pr(T < t) = 0.9992	Pr(T > t) = 0.0016	Pr(T > t) = 0.0008		
<hr/>				

Table 5 Regression Results for Current Earning of Returnees and Those without Overseas Experience on Selected Variables (Dependent Variable: log(current earning))

Predictor	Coefficient
Returnee	0.427* (0.18)
Age	0.023*** (0.0067)
Ph.D.	-0.147 (0.30)
MBA	0.48* (0.18)
Master (Non MBA)	0.0018 (0.32)
Employer Type: Multinational Company	0.401~ (0.23)
Employer Type: Indian Company	0.014 (0.23)
Employer Type: Government	-0.825** (0.30)
Employer Type: Education	-0.976* (0.40)
Employer Size	-0.047 (0.10)
Industry: Computer Hardware	-1.19~ (0.69)
Industry: Computer Software	-0.207 (0.18)
Industry: Telecom.	0.277 (0.30)
Industry: Manufacturing	-0.032 (0.23)
Industry: Finance and Insurance	0.153 (0.34)
Constant	8.62*** (0.36)
Number of Observations	691
R Square	0.083

Key: ~ p<0.10; * p<0.05; ** p<0.01; *** p<0.001
Standard Deviations are provided in the parentheses.

Appendix

Table 6 Probit Regression of If-Returned on Selected Variables: Cohort Effects

	Year of Graduation			
	1997-2006	1987-1996	1977-1986	1967-1976
Immigration		-0.616* (0.283)		
Percentage of Colleagues of India Origin	-0.015 (0.101)	0.222* (0.102)	-0.132 (0.272)	-0.641 (0.603)
Entrepreneur Experience	1.048** (.366)	-0.007 (0.304)	1.03~ (0.57)	3.678 (2.38)
(log) Salary of Last job Overseas	-0.214 (0.171)	-0.381** (0.133)	-0.361 (0.462)	-2.505 (1.81)
(Log) Years of Overseas Experience	-0.457* (0.229)	-0.991*** (0.300)	-3.90*** (1.08)	-5.103* (2.27)
Age (at return)	0.083* (0.043)	-0.061~ (0.034)		
Find job through Indian Friends	0.439 (0.316)	0.099 (0.276)	1.447* (0.667)	1.530 (2.152)
Initial Purpose of Going Abroad: Education	-0.343 (.443)	-0.445 (0.462)	-1.58~ (0.875)	2.441 (17.35)
Initial Purpose of Going Abroad: Employment	0.054 (0.446)	0.290 (0.455)	-2.64** (1.02)	0.572 (17.33)
Country: USA	-1.005~ (0.56)	-1.097 (1.09)		
Country: UK	-0.236 (0.677)	-0.29 (1.20)		
Country: Singapore		-0.764 (1.24)		
Have a Ph.D. Overseas	-0.497 (0.57)	0.576 (0.389)	1.92* (1.00)	-0.587 (1.83)
Have a MBA Overseas		-0.452 (0.342)	1.072 (.941)	
Constant	0.471 (2.22)	7.980*** (2.15)	13.44* (6.07)	39.24 (28.33)
Number of Observations	211 0.20	241 0.34	124 0.68	57 0.81
Pseudo R Square				

Key: ~ p<0.10; * p<0.05; ** p<0.01; *** p<0.001
Standard Deviations are provided in the parentheses.

Chapter 5: Conclusion

5.1. Summary of Key Findings

Through case studies of the international migration of Chinese and Indian engineers, this dissertation provides a systematic analysis of the mechanisms of the circular migration. It addresses a number of issues that have not been answered in the existing literature. From both a theoretical and an empirical standpoint, this dissertation will contribute to our understanding of the labor market processes associated with international migration, especially in the segments of professional and engineering labor markets.

The first part of this dissertation looks into the post migration settlement process of Chinese engineers. The study identifies significant changes in the compositions of migrants' social networks at different phases of their careers. In contrast to low-wage migration that often involves family and kinship networks, the initial migration of highly skilled Chinese engineers has little to do with networks. However, co-ethnic networks are developed post migration among those who had little contact in China, and play an important role in migrants' job search in the host country.

The second part of this dissertation examines the causes and processes of the return migration of Chinese engineers and entrepreneurs and the institutionalization process of voluntary ethnic associations. I find that return migration flows are largely shaped by the match between the skills and career orientations of individuals and the

opportunity structures in the host and home countries. In addition, return migration is usually not a lonely journey. When migrants return, they draw heavily upon the ties that have been established in the migration and settlement process. Many of these networks have been institutionalized and play an important role in when migrants move back to China.

In the third study of the migration of Indian engineers, by looking at non-migrants, migrants and returnees, this research design enables me to avoid the bias of sampling around the dependent variable, which is often seen in migration research where only those who already migrated or returned are examined. The analysis corroborates some of the key findings from the China case and also reveals some interesting contrasts between the return migration of Indians and that of Chinese, which reflects the difference in opportunity structures and social environments in India and China.

First, the study identifies a strong relationship between return migration and job search method for the most recent overseas job, which indicates that those who possess co-ethnic networks that are instrumental to them and got them their most recent jobs in the host countries, are more likely to return to India. A further examination at the social networks of returnees shows that they maintain strong and close connections with their college classmates and family members, who offer valuable support to their transition back to India. Second, the paper points to the propensity of returnees to invest in small businesses and to take up self-employment. Returnees are more entrepreneurial than both migrants who stay abroad and non-migrants. When comparing the labor market performance of returnees and non-

migrants, the study reveals a significant premium in earnings associated with migration experience.

5.2. The flavor of Comparison

Although this dissertation is not designed to be a comparative study of the circulation migration of Chinese versus Indians, the results show some common threads as well as distinctions between the two cases.

5.2.1. Social Networks, Institutions, and the Migration System

The first primary common thread across the two cases is the evolution of social networks and institutions in the migration system. The cycle of migration is more appropriately interpreted as group processes instead of individual processes. In both cases, migrants develop and maintain social ties with co-ethnics and construct community institutions. During the migration process, they build up structures, comprised of a mix of formal institutions and informal networks, to support their movement between their home and host countries and their settlement in the receiving societies. The form and type of the networks and institutions vary to some extent between the two cases. In the case of the migration of Chinese engineers, we find new ties being established among those who have little contacts while in China and these ties are particularly strengthened among those who intend to move back to China; In the case of the migration of Indian engineers, we observe that old ties pre-existing before migration are transformed to ones that are instrumental to their professional careers when migrants move back to India. While professional networks dominate in

the China case, they very often overlap with alumni networks and extended family/kinship networks in India. Anecdotal evidence suggests that these distinctions are likely to be an outcome of the differences in the family background and social classes of highly skilled migrants from the two countries. In both occasions migration practices interact with the institutions -- it is migrants who drive the development or transformation of these formal or informal institutions, and these institutions, in turn, facilitate migration.

5.2.2. Careers and Migration

This study also shows that the circular migration of Chinese engineers and that of Indian engineers share a few patterns of the interactions between migration and migrants' careers that have rarely been seen in previous highly skilled migration. In this dissertation, we see that migration is also a journey where the careers of those who are involved unfold. In the initial out migration, Chinese and Indian engineers not only migrate through the employment gate, but also through the academic gate. Whether education being an ingredient of the initial migration makes a big difference in their career paths afterwards. In the India case, those who migrate for education enjoy the luxury of choosing among a wide spectrum of career paths, while those who migrate for employment have more defined career paths and are more likely to move back to India. This distinction is less manifested in the China case, where those who migrate for education are at least equally, if not more, prone to return migration.

I also identified a strong association between return migration and entrepreneurship among both Chinese and Indians. A mixture of opportunities and

constraints that exists in both countries leads technologically trained migrants to return for entrepreneurship, although there is a sharp distinction in the paths along which returnees move into entrepreneurship.

Moreover, positive selection versus negative selection is a long time debate in the discussion of return migration and the empirical evidence has been mixed. This study finds evidence of both. While return migration is associated with higher host country earnings for the Chinese engineers, there is a trace of negative selection with regards to earnings for Indians. This distinction need to be interpreted with caution because the population studied in the two cases are not exactly the same – while in the India case we surveyed a special group of technologically-trained Indians, the alumni of I.I.T.-KGP, in the China case we surveyed a smaller group of migrants with diverse background. Nonetheless, the results may reflect some important distinctions in the situations in the host and home countries. As I mentioned earlier in the thesis, some of the findings of this study need to be interpreted as associated with the special moment or development stage in China and India. When we look into the cohort effects of return migration, we find that the negative selection effect is only significant for the cohort that graduated in late 1980s and early 1990s. A close look at this cohort (Figure 1) shows that the majority of the return migration happened after 2000, which coincided with the downturn of the I.T. industry in the U.S. So the pattern we see is very likely an outcome of the push forces that exist in that particular moment of the history. This is also partially the reason that the empirical studies on selection of migration identified positive selection for some migration flows (Blejer & Goldberg,

1980; Beenstock, 1996; Cohen & Harverfeld, 2001) and negative selection for others (Jasso and Rosenzweig, 1990).

5.3. Policy Implications

Although this study does not focus on policies, it may have useful policy implications, particularly for the governments of sending countries that are eager to capitalize on their overseas talent.

One of the key findings of this study is that social groups and more formal institutions emerge from the process of migration and also guide the evolution of the migration process once they are established. They are important components in the migration system described in this dissertation. For governments in the sending countries to play a role in such a system, approaches targeting communities should be more effective than approaches targeting individuals or aggregates of individuals. Although it appears that the informal ties among migrants can hardly be influenced by the state, the institutions that are created by the migrants do not emerge spontaneously. They are developed in the interactions between migrant communities and various actors in the migration system, especially the state. There are two ways that the state can play a role in these institutions – creating new institutions and transforming existing institutions.

Another observation of this study is that the interplay between migrants' group characteristics and the opportunity structures in home countries largely shape the flows of return migration. Whether to return or not, when to return, and for what to

return are significantly influenced by a mixture of opportunities and constraints out there. This finding has important policy implications. Although highly skilled migrants are highly autonomous and it is not possible for sending countries to set quotas for what types of returnees they would accept, as most of the receiving countries do to the skilled immigrants in order to keep a tight control of the additional supply of skilled labor to their labor force, policy makers in developing countries are capable of stimulating or discouraging particular types of return migration by creating the right incentive structure.

To reverse the brain drain and to turn the brain bank into a brain gain, attracting overseas talent back is only the first step. More importantly, the returnees need to be placed to the right position, one where they can utilize their skills and knowledge acquired abroad. Policy makers are in the position to create infrastructures that can offer returnees a soft-landing, which is very critical to the sustainability of return migration. In China, returnee entrepreneurship parks mushroomed under the encouragement of the government. In India, government's promotion of large-scale and capital-intensive investments and the dominance of multinationals and giant domestic companies have generated an environment that is inhospitable to entrepreneurship. Returnees have adopted various strategies to cope with the barriers by detouring through large multinational companies – return through the internal labor market of multinationals before start their own businesses – and by developing collective coping mechanisms facilitated by professional associations. Yet there is big room for the state to transform the environment fundamentally, such as formulating sets of sector specific and technology specific targeted policies and establishing

entrepreneurship parks for returnees with the adequate infrastructures at least at local, if not at a national scale.

5.4. The Broad Picture - Global Labor Market

This dissertation has answered a set of questions about the circular migration of skilled labor. At the same time, it has also raised a number of issues that warrants further exploration.

In recent years, “global labor market” has been a popular term both in media and in academic research. Some researchers have claimed that, with development in technology and the reduced cost in communication and transportation, national borders no longer restrain labor markets – numerous skilled workers are moving across national boundaries, so as jobs. Studies at the aggregated level (for example, the World Bank, 2005; McKinsey Global Institute, 2005) have been devoted to demonstrating how the supply of talents at one location meets the demands and opportunities in some other places in the world, and how does that generate international flows of labors and jobs.

However, in the current situation, boundaries do exist and people do not wake up the next morning working in a different country. The fact is that, in certain sectors, geographically still separated labor markets have witnessed the emergence of a whole set of new institutions, or existing institutions with new roles, breaking the boundaries of regional labor markets and channeling the flows of labor or jobs from one place to

another. This dissertation explored, in a rather preliminary fashion, the mechanisms of transnational labor flows and the associated emergence of new institutions.

In addition to formal institutions, social networks have long been identified as crucial to migration flows and the economic outcomes of migrants. Although most of the literature of networks and migration has focused on the migration of lower-wage of lower skilled workers, it provides important insights about the relationship between networks and mobility. Compared with low skilled migrants, the networks utilized by skilled migrants often tend to be of different nature, and may have different migratory outcomes.

This dissertation shows that local, or domestic, labor markets have started to be linked by various types of networks and institutions surrounding migrants, including migration networks based on family and kinship ties, networks based on organization ties, such as schools and professional associations, or institutions like multinational companies. Different types of informal networks and formal institutions interact with specific types of career pursuits. Identifying the key ingredients and actors could be a first move to develop a model of the new global labor market.

Figures

Figure 1
Distribution of Year of Return: Cohort 1987-1996

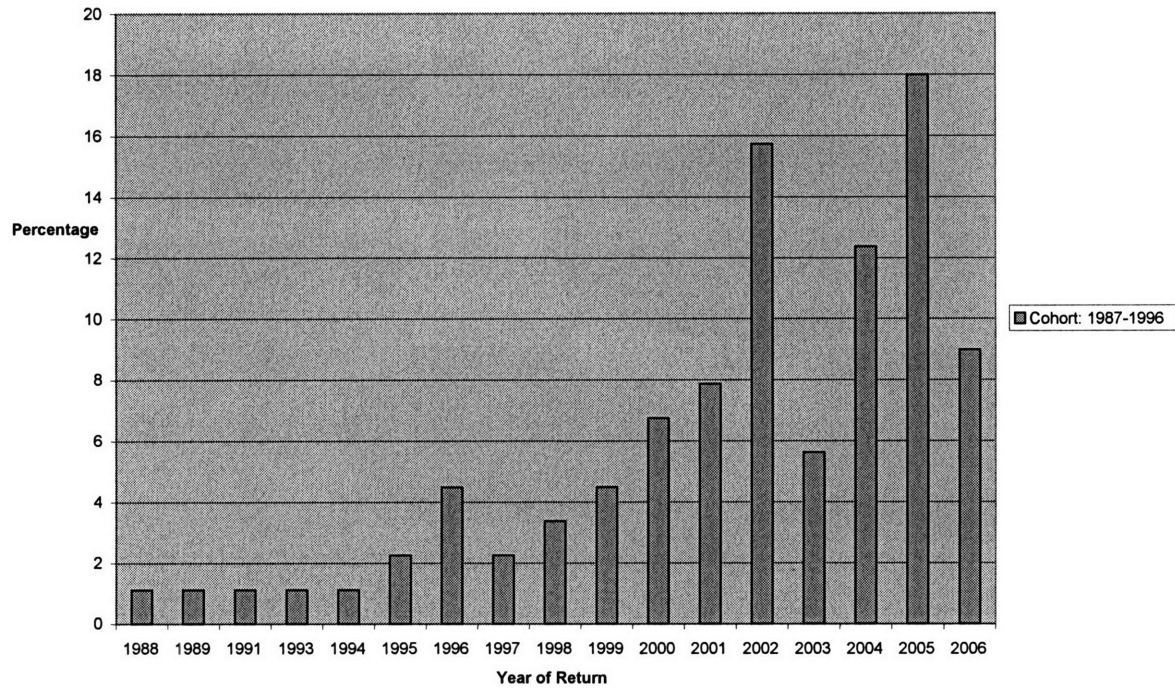
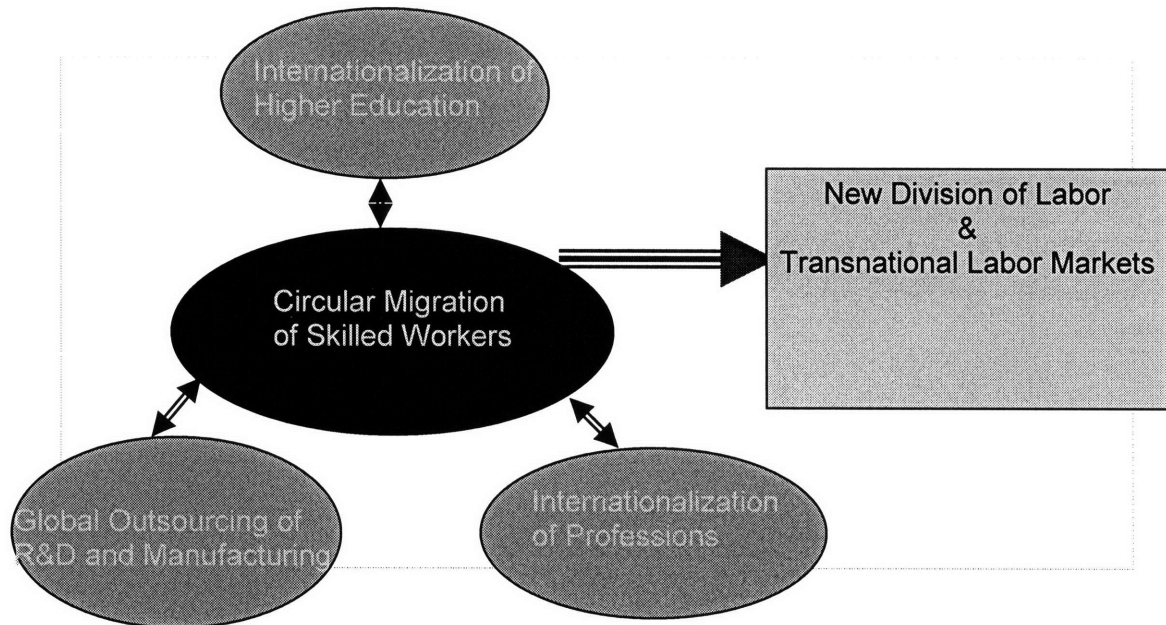


Figure 2
Long-Run Perspective



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