

Utilizing Immigration Regulations as a Competitive Advantage: An Additional Explanation for India's Success in Exporting Information Technology Services

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Abstract:

The export-led growth of India's Information Technology (IT) industry has been nothing short of phenomenal over the past half-dozen years. A number of explanations for this growth have been put forwarded. This paper proposes that a significant factor may be overlooked or understated in those explanations. Specifically, the Indian IT industry was able to utilize U.S. immigration regulations as a competitive advantage and that accelerated its growth. The paper demonstrates the importance of this factor through quantitative data analysis at the macro and firm levels. The analysis helps to explain why India's IT industry grew while other developing countries with similar human capital resources and wage rates did not. The results also highlight a critical constraint that will shape the future growth pattern of the Indian IT industry. The results may help developing countries' policymakers who are implementing strategies to replicate India's success. The importance of immigration regulations on India's IT development is generally not described in the literature. No other country is as large a source of temporary workers as India, and their policymakers may not be aware of the opportunities available.

Utilizing Immigration Regulations as a Competitive Advantage: An Additional Explanation for India's Success in Exporting Information Technology Services

I. Introduction and Objective

Information Technology (IT) industries can be an important source of economic growth and development for developing countries. The Indian software industry, which has been successful at exporting IT services, is the exemplar for developing countries.

NASSCOM, the Indian software services industry association, estimates that the Indian IT industry has grown nearly eight-fold from 1994 to 2001, with revenues in 2001 of approximately \$13.5 billion and 2.87% share of India's GDP.¹

There are many explanations for India's recent success in IT including: economic liberalization, having a large pool of technically trained workers willing to work for low wages, workers who can speak English, an Indian mind-set that is oriented toward intellectual abstraction which makes it uniquely capable of software development, benign neglect from government, low capital requirements for entry into software services, and the list goes on. (Arora et. al., 2000; Das, 2001) Many of these help to explain what contributed to the rapid IT expansion in the past half-dozen years. However, most of the factors are not unique to India. For example, many Central and Eastern European countries have similar pools of technically capable workers and they liberalized their economies at approximately the same time as India. So, why has India been so much more successful than other countries such as Romania or Russia? Do the factors described in the literature adequately explain differences in success rates?

¹ http://www.nasscom.org/it_industry/indic_statistics.asp

DRAFT

One factor that is often overlooked in explaining the advantage that Indian IT firms have had in the U.S. marketplace is their ability to make the most of the U.S. immigration regulations for competitive advantage. Indian IT firms have adopted business practices predicated on those regulations earlier and in a much greater scale than competitors from other countries. The business model that Indian IT firms use depends on their ability to bring foreign personnel into the U.S. on temporary visas for extended lengths. This practice was learned over time through contacts within the Indian community in the U.S. Indian based companies mimicked the practice of U.S. based companies that had adopted it in the early 1990's. Many of these U.S. based companies were operated by people of Indian origin, such as Syntel, Mastech (now known as IGate), Intelligroup and Complete Business Solutions. Arora et. al. (2000) and Heeks (1998) discuss the importance of onsite labor for the Indian IT industry but they do not measure its impact on the development of the industry.

The objective of the paper is to examine how important utilizing immigration regulations as a business practice was and is to India's IT export business. The hypothesis is tested first by examining macro level immigration data. That analysis indicates that the majority of temporary workers come from India and the types of firms which hired those workers were body-shops. Body-shops are firms that supply software personnel to customers to work on temporary assignments. The hypothesis is then tested by examining firm level financial data to show how critical those temporary workers are to the leading Indian based IT firms. Those workers are significant revenue and earnings generators and a fundamental component of the competitive advantage of Indian IT firms.

DRAFT

The first section of the article will describe the immigration regulations that are relevant to the IT industry and presents macro level data on the use of the regulations by temporary workers who come from various countries. The second section drills down to the firm level and shows how the leading Indian IT firms depend on the regulations for their business. The third section discusses the slowdown in the U.S. IT market and how that might affect the current regulations. The concluding section describes the policy implications and their potential impact on the Indian IT industry as well as future research that could be done in this area.

II. U.S. Immigration Regulations & India's IT Worker Migration

This section describes U.S. immigration regulations that have been utilized by both U.S. based and Indian based IT firms. It then presents longitudinal data on entry into the U.S. by foreign workers by country. This data shows that Indians have been the primary users of these types of visas and that their share has been increasing. The final part of this section introduces specific firms that have been the major users of these types of visas and how the types of firms have shifted over time.

A. Visa Categories

Foreigners are admitted to the U.S. as either immigrants or non-immigrants. Entry for business, pleasure, studying, work or immigration is specified by a visa category assigned by the Immigration and Naturalization Service (INS). Each category allows a foreigner certain privileges and constraints for their stay within the U.S. It also requires them to meet certain criteria to qualify for the visa. The visa categories that are most important to

DRAFT

the IT industry are H-1B, L-1, O, and EB. Each is described below. The use of each visa by the IT industry is described in the following subsection.

EB: Employment-based admissions for permanent immigration (also known as a green card) to the U.S. These visas are divided into five preference categories, most of which are intended to facilitate the entry of managers, professionals and other skilled individuals. There is a per year maximum for each of the 5 categories, which sums to a maximum total of 140,000 for all categories. There are labor certification requirements for the EB category. Employers who want to sponsor an employee must ensure that qualified Americans are not available to fill these positions and that immigrant admissions will not adversely affect the wages and working conditions of U.S. workers who are similarly employed. Employers are required to try to recruit U.S. workers for the position(s) by advertising in a general circulation newspaper or a professional publication. The Department of Labor (DoL) reviews the application for compliance. Green card holders are able to move from employer to employer with ease, and the U.S. based IT industry has used EB visas to sponsor foreign workers.

O: Extraordinary ability visas are reserved for those who demonstrate it by extensive documentation of their national and international accomplishments. The INS generally consults with employee organizations or peer groups in the United States to verify the petitioner's claims. The authorized stay for an O visa holder is limited to the time needed to complete the project, program or event for which they were originally admitted. There is no significant advantage for the IT industry to use the O visa over others.

DRAFT

TN: North American Free Trade Agreement (NAFTA) Professional visas allow Canadian and Mexican professionals to work temporarily in the U.S. if they meet certain educational requirements or credentials. The requirements and flexibility differ for Canadians versus Mexicans. IT employers trying to recruit Canadian technical talent may find the TN visas more flexible to use than other categories.

H-1B: Temporary worker visas issued to employers for people who work in a specialty occupation. A specialty occupation is defined as a position that requires the theoretical and practical application of highly specialized knowledge and skills, and at least a bachelor's degree in the specialty. Common specialty occupations include but are not limited to accountants, computer systems analysts, physical therapists, chemists, electrical engineers, pharmacists, architects, and business managers. The H-1B visa has been the category most closely linked to the IT industry so a more detailed explanation of its process is described below.

Figure 1 shows the H-1B visa process. U.S. employers must submit a labor condition application (LCA) to the DoL asking for permission to hire a prospective H-1B employee.

The LCA requires that the employer attests:

- They will pay foreign workers the higher of the actual or prevailing wage in the intended area(s) of employment,
- Working conditions for U.S. workers will not be adversely affected,
- There are no strikes or lockouts where the foreign workers will be employed, and
- A notice of intent to hire foreign workers has been posted at their intended place(s) of employment.

DRAFT

If a particular employer has more than 50 employees and at least 15 percent of them are H-1B, then they are considered H-1B dependent employers. They are subject to a stricter set of attestations including:

- They have taken good faith steps to recruit U.S. workers, and
- They have not displaced and will not displace similarly qualified U.S. workers 90 days before and 90 days after seeking an authorization to hire H-1B workers.

Once the LCA is approved by the DoL, a prospective employer petitions the INS to admit a specific worker to fill a slot. When the INS approves the petition, the foreigner can file for an H-1B visa at the nearest U.S. consulate if they are living abroad or file a change of status if they are already in the U.S. under another visa category. Specialty occupation visas are granted for a maximum of three years but can be extended for another three years. Visa holders are only allowed to work for a petitioning employer. They cannot change jobs like green card holders can. Permission to work for another employer may be authorized only after an LCA has been certified for the new employer.

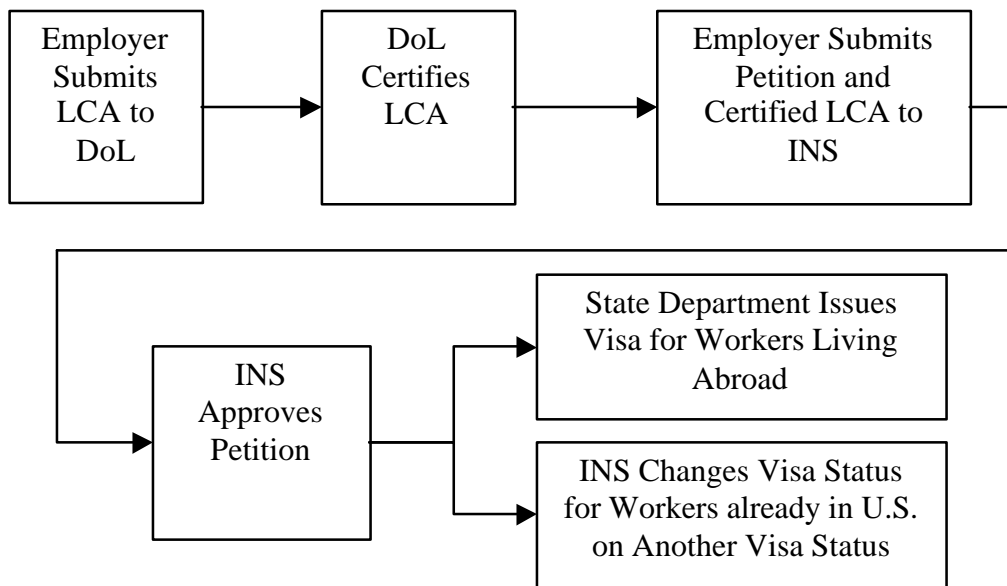


Figure 1: H-1B Visa Process

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The maximum number of new H-1B's was capped at 65,000 from Fiscal Years 1991-1998. For FY 1999 and FY 2000 it was raised to 115,000 and for FY 2001-03 it was raised to 195,000. In FY 2004 it is set to revert back to 65,000 unless the U.S. Congress acts. Employers are required to pay a fee of \$1,130 for each new H-1B visa holder they hire unless they qualify for an exemption from the fee. For example, non-profit organizations and universities are exempt. The six year maximum stay was relaxed in FY 2001 to an indefinite period as long as the employer re-files a petition.

L-1: Intra-company transfer visas used by multi-national companies to move employees to the United States for temporary assignments. The employees are required to be executives, managers, or in positions that require specialized knowledge or skills.

To qualify for an L-1 visa, applicants must have worked for the employer outside the U.S. for at least one year in the same or similar capacity to the one in which they will be working in the U.S. The initial authorization is for three years but it can be extended for an additional four years for executives and managers or two years for workers with specialized knowledge or skills.

Eligible employers can submit blanket L visa petitions to relieve them of the burden of having to file separate petitions for each employee they intend to transfer. There is no cap on the maximum number of L-1s that can be issued in a particular year. There are also no wage parity provisions.

B. Visa Category Use

Figure 2 shows the trends in admissions by visa category. The H-1B, L-1 and EB are most important for the Indian IT industry. The TN only applies to Canada and Mexico, and the O visa numbers are small because it is more difficult to obtain and does not provide any added benefits. The TN visa may become more important as Indian IT industry establishes a greater presence in North America, and may even become critical if the H-1B quotas are lowered to 65,000. The O visa restrictions make it less attractive to the Indian IT industry.

The data in Figure 2 show that in 1996 the number of admissions by H-1B and L-1 visas surpassed the number of employment based visas, EB, and continued to rise substantially. For H-1B's, this phenomenon can be directly attributed to the increases in IT occupations being filled by Indian workers. Data from table 1 shows this quite starkly. The number of computer specialists far exceeded those of any other occupation by 1998. The reason for the rise in the L-1's is not as clear.

Trends in Admissions by Visa Category

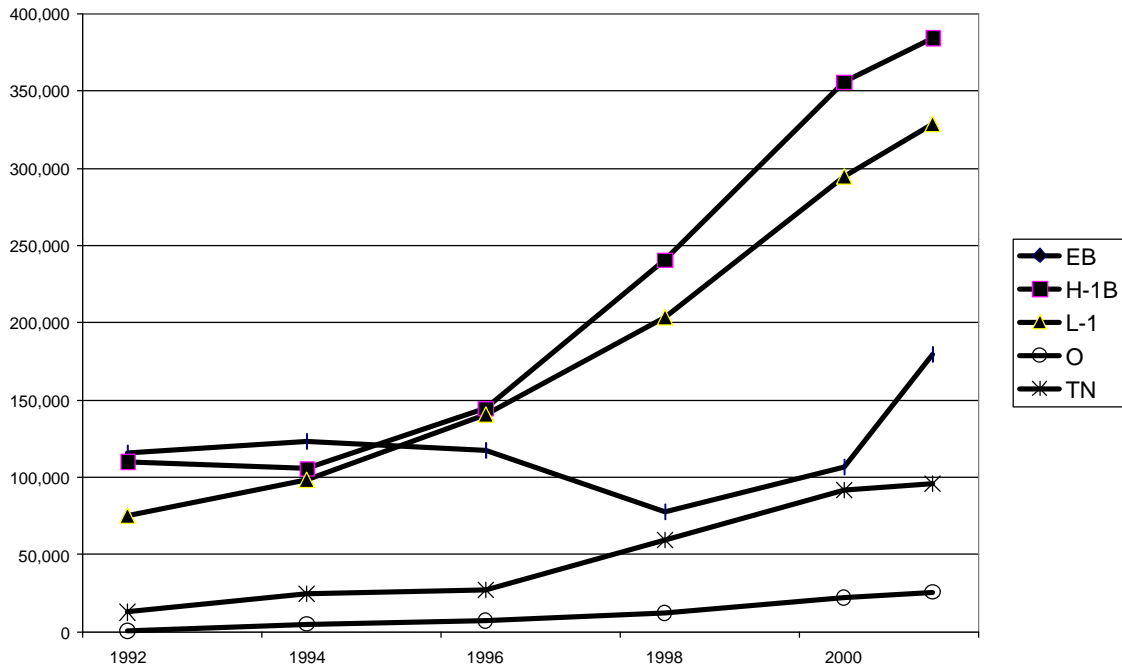


Figure 2: Admissions by Visa Categories

Source: INS

1995		1998	
Top 5 Occupations	Percent of H-1B's	Top 5 Occupations	Percent of H-1B's
Therapists	54%	Computer Specialists	57%
Computer Specialists	25%	Therapists	14%
University Faculty	2%	Accountants	7%
Physicians	2%	Electrical Engineers	3%
Accountants	2%	Architects	2%

Table 1: Top 5 H-1B Occupations Shift Between 1995 & 1998

Source: DoL

In the mid-1990's there was an inflection point in the numbers and types of occupations of H-1B's admitted. This rise has been widely attributed to the acute shortages of technically trained domestic workers, which is likely to be true. However, what is often

DRAFT

overlooked is the type of employers that were applying for H-1B's. Table 2 shows the top ten employers of H-1B workers for 1995 versus 1998.

Rank	1995 Top H-1B LCA Requestors	1998 Top H-1B LCA Requestors
1	Premier Heal Staff	Mastech Corporation
2	Tata Consultancy Svcs	Tata Consultancy Svcs
3	Professional Therapy Staffing	ComputerPeople
4	University of California	Oracle Corporation
5	Complete Business Solutions	Price Waterhouse Coopers LLP
6	Mastech Corporation	Lucent Technologies
7	Harvard University	Motorola, Inc
8	Sunbelt Physical Therapy	Syntel, Inc
9	Allied Rehabilitation & Pain Mgmt	Intelligroup
10	University of Texas	Comsys Technical Svcs

Table 2: Top H-1B LCA Requestors in 1995 versus 1998
Source: DoL

The names of companies requesting LCA's in Table 2 confirms the shift from physical therapists to IT workers between 1995 and 1998. The top 10 requestors in 1998 include a substantial number of body-shop type software operations such as Mastech and Tata Consultancy. One might think that the H-1B request lists would be dominated by large IT employers such as Microsoft and IBM since one would assume that all of the IT firms faced the same labor shortage. IBM and Microsoft employ an order of magnitude more IT professionals than many of the body shops. There are a few large employers on the list such as Oracle, Lucent and Motorola, but one might expect their peers to dominate the list. Instead the list is populated with software body-shops that fiercely compete on prices. Tata Consultancy Services and Mastech Corporation are high on both lists. Tata is an Indian based IT firm that was one of the first to penetrate the U.S. market. Two of the

DRAFT

firms listed in the 1995 column, Complete Business Solutions (now known as Covansys) and Mastech (now known as IGate), are U.S. based IT services companies founded by entrepreneurs of Indian origin. The 1998 column has three such companies founded by entrepreneurs of Indian origin, Mastech, Syntel, Intelligroup.

The H-1B visa is rightly connected the IT industry because it is overwhelming used to import temporary IT workers. However, it should also be identified with a specific subset of the IT industry – the IT services body-shop.

H-1B Admissions by Country from 1992-2001

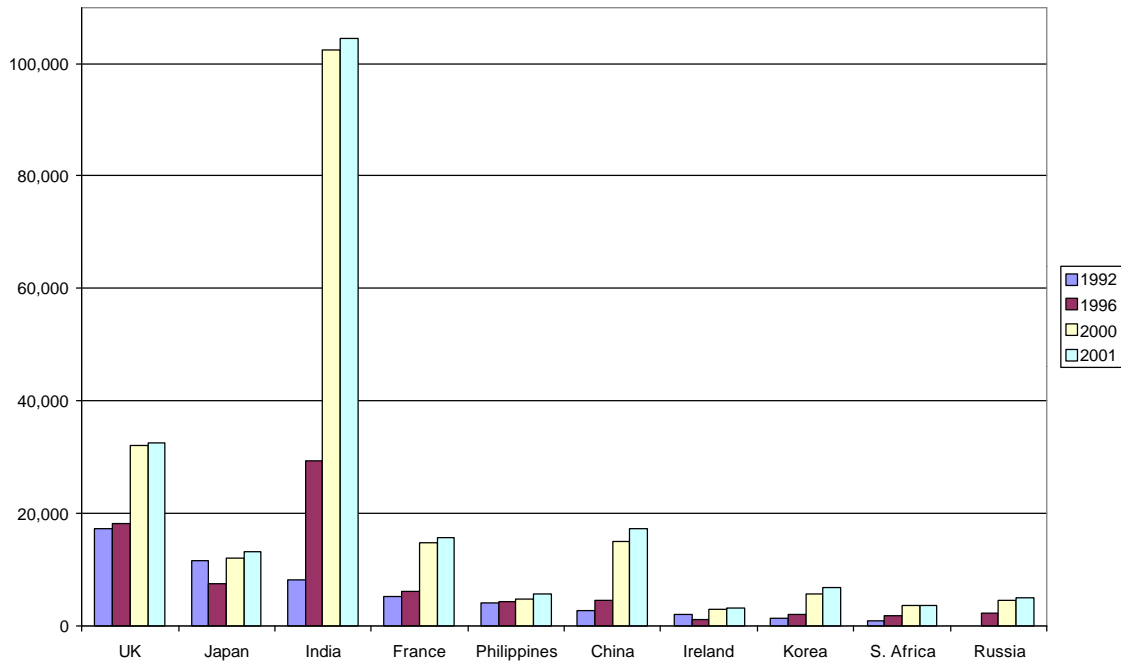


Figure 3: H-1B Admissions by Country from 1992-2001
Source: INS

Figure 3 shows the number of H-1B admissions by country from 1992-2001. The countries are selected either because they are a major source of H-1Bs, such as Japan or U.K., or they are a source of potential competitors to India’s IT industry, for example the

DRAFT

Philippines or Russia. The U.K. was the source of the largest number of admissions in 1992 and India ranked number three with 8,246 or 7.5% of the 110,193 total. However by 1996 India ranked number one with 29,239 or 20.2% of the 144,458 total. Clearly between 1992 and 1996, the market for H-1B's had changed dramatically. While there are no reliable sources for the stock of engineers and computer scientists in countries, it is unlikely that India had a monopoly on the worldwide IT labor stock. For instance, Russia produced more than 82,000 and China more than 195,000 engineering graduates in 1999. (NSF 2002)

India was by far the largest source of H-1B petitions in 2001. The INS approved 331,206 H-1B petitions in 2001 and 49% or 161,561 went to Indian nationals.² The next closest country was China with 8% or 27,331 approved petitions. Almost all, 92%, of the petitions for India were in Computer Related or Engineering occupations. It is clear that *employers* of Indian nationals with IT skills are the heaviest users of the H-1B.

Why would IT service firms use the H-1B so extensively? Cost is a major driver in winning business in the IT market and hiring H-1B's can be a cheaper alternative to hiring a U.S. citizen or green card holder. Why would an Indian H-1B worker accept a lower salary? IT salaries for IT workers from India are significantly lower than in the U.S. so their salary expectations are lower. Plus many Indian H-1B workers want to live in the U.S. which may provide non-monetary benefits that outweigh a lower salary.

² The number of H-1B petitions approved and the number of H-1B temporary workers admissions are not comparable because they measure different populations. Petitions approved pertain to H-1B petitions authorizing temporary employment for specialty workers, whether they are in the United States or overseas, while admissions represent H-1B workers arriving from abroad. H-1B petitions can be approved for aliens changing nonimmigrant status without leaving the United States. Most significantly, H-1B workers can be admitted multiple times using a single petition, and admitted with a petition approved in a prior fiscal year. (INS 2001)

DRAFT

While the cost of living in the U.S. is higher than in India, the H-1B's perception of her net take home pay is influenced by the substantial differences in Purchasing Power Parity (PPP) between the U.S. and India. PPP is an international cost of living measure used by economists who recognize that currency exchange rates do not reflect purchasing power differences between countries. The World Bank (2002) has calculated a PPP of 0.2 between India and the U.S. It means that \$10,000 in India has the same purchasing power as if it was \$50,000 in the U.S. In other words, someone with \$10,000 in India would have the same purchasing power as someone with \$50,000 in the U.S. If the Indian H-1B worker can save a net of even \$5,000 per year of her salary, this can be a substantial sum of money. Put this in contrast with an H-1B worker from the U.K. who would perceive that \$5,000 the same way a U.S. worker would since the PPP's between the U.K. and U.S. are quite close.

Additionally, hiring an H-1B limits employee turnover because the visa is held by the employer. Workers are not able to easily switch jobs from one employer to another. In 1996 the Inspector General's office of the DoL found that, "Some LCA employers use alien labor to reduce payroll costs either by paying less than the prevailing wage to their alien employees or treating these aliens as independent contractors, thereby avoiding related payroll and administrative costs. Other LCA employers are 'job shops' whose business is to provide H-1B alien contract labor to other employers." The IG went on to say that the DoL is doing all it can within its authority but its role is nothing more than a paper shuffle and 'rubber stamping' of the LCA applications (DoL 1996).

DRAFT

The LCA application submitted to DoL contains a section that requires the employer to list the prevailing wage for the occupation in the city of intended employment. This provision is included in the LCA to ensure that the H-1B workers are not paid less than a U.S. equivalent worker. However, the U.S. General Accounting Office (GAO) found that even though employers may be required to pay H-1B workers a prevailing wage, DoL officials said employers can use almost any source to determine it and DoL does not have the authority to verify the authenticity of the information unless it is obviously incorrect on its face. The GAO (2000) also found that the DoL has very limited authority to initiate any enforcement actions against employers who violate the regulations and as a result the process is vulnerable to abuse.

L-1 Admissions by Country from 1992-2001

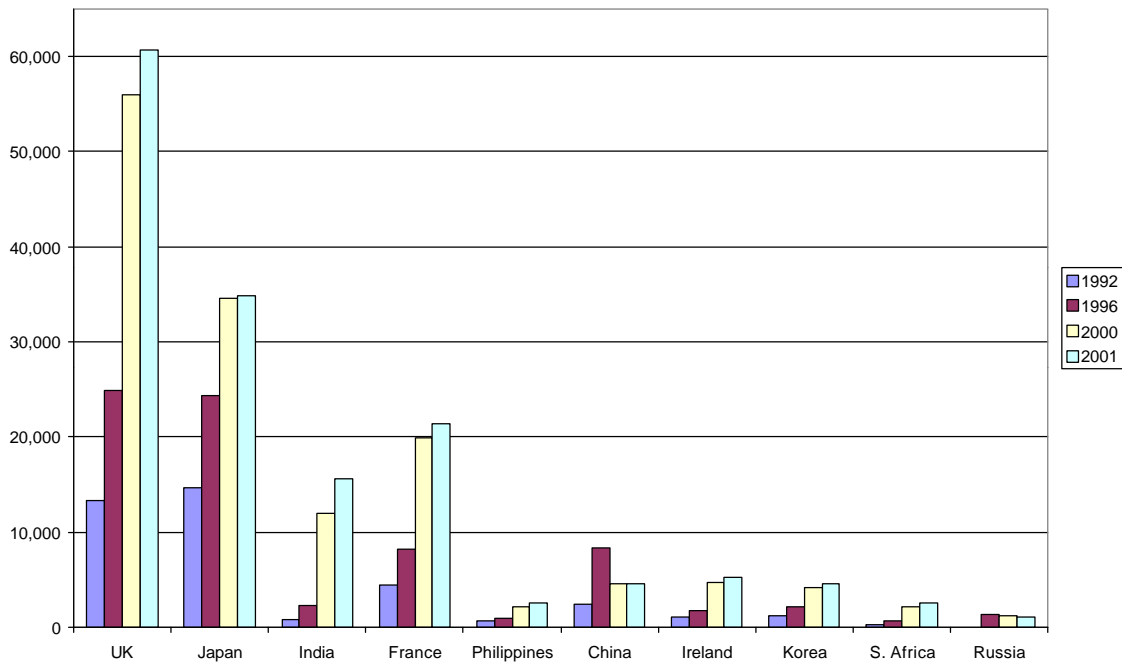


Figure 4: L-1 Admissions by Country from 1992-2001
Source: INS

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Figure 4 shows the number of L-1 intra-corporate transfer visa admissions were made from 1992 to 2001. The chart indicates that the L-1 has been much smaller source of admissions of workers from India but its importance grew significantly from 1996 to 2000. This is in contrast to the data presented in Figure 1 that showed that overall increases in L-1 admissions have steadily increased from 1992-2001. The UK, Japan and France are large trading partners with the U.S. and they own a significant amount of assets and businesses in America. U.S. based businesses also own large assets and business operations in those countries. Therefore, it's not surprising that the number of L-1 admissions from those countries is fairly high, but it is rather surprising why India is so much higher than China or Korea.

India has been an important source of temporary workers in the U.S., who have come primarily on H-1B and L-1 visas. The numbers made significant jumps between 1992-96 for the H-1B and 1996-2000 for the L-1. No other country had comparable increases in rates or scale. This tells us that there are a large number of Indians in the U.S. working on temporary visas in the U.S. The reason for the increases in L-1 visas is not clear at the macro level. The data does show that a number of body-shop type companies began to utilize the H-1B visa extensively between 1995 and 1998. However, it does not tell us explicitly how important these visas were and are to the Indian IT industry. After all, most of the employers of H-1B workers are U.S. based firms.

III. How Important are the H-1B and L-1 Visa for Indian IT Companies?

The objective of the paper is to examine how important utilizing immigration regulations as a business practice was and is to India's IT export business. INS officials cannot tell us

DRAFT

how many H-1B and L-1 holders are currently employed in the U.S. nor identify the company where they work. Therefore, it is impossible with publicly available data to calculate the impact each program has had on the entire Indian IT industry. Leading Indian IT firms will be used as a proxy for the industry. Those firms provide detailed information on their use of H-1B and L-1 in their financial statements. Other financial data from those statements are used to show how critical the temporary workers are to the business as both revenue and earnings generators.

An analysis of detailed financial information is required to quantify the true impact that U.S. immigration laws have on India's IT industry. However, most companies deem that information proprietary and do not disclose it in their financial statements. The following publicly available numbers are used to make a first order estimate of the impact. The variables of interest include:

- the number of visas used by and requested by Indian IT firms,
- importance of U.S. clients,
- offshore versus onsite personnel used to service U.S. clients, and,
- demand for visas.

A. Indian IT Firm Use of H-1B and L-1 Visas

Indian IT firms extensively use temporary workers to serve their U.S. clients. The largest publicly traded Indian IT firms have a disclaimer in their financial statements attesting to the importance of the H-1B and L-1 visas to their operations. For example, Wipro states in its 2002 20-F³, "If U.S. immigration laws change and make it more difficult for us to obtain H-1B and L-1 visas for our employees, our ability to compete for and provide services to clients in the United States could be impaired. ... This restriction and any

³ A 20-F is the annual report of a foreign company that is publicly traded on a U.S. stock exchange. It is submitted to the U.S. Securities and Exchange Commission. It is equivalent to a U.S. firm's 10-K form.

DRAFT

other changes in turn could hamper our growth and cause our revenues to decline.”

Satyam, another leading Indian IT firm states in its 2002 20-F, “U.S. immigration restrictions could limit our ability to *expand* our U.S. operations.” [emphasis added] It is clear from these statements that management believes that U.S. immigration laws will affect the business prospects of their companies.

The most obvious indicator of the importance of labor mobility is the number of personnel of Indian IT firms that are using temporary visas. Infosys, another leading Indian IT firm, states in its 2002 20-F that, “As of March 31, 2002, the *majority* of our personnel in the United States held H-1B visas (1,582 persons) or L-1 visas (445 persons).” [emphasis added] Satyam and Wipro have similar statements in their respective annual reports. As part of their business strategy, Indian IT firms have chosen to hire foreigners working on temporary visas rather than U.S. permanent residents or citizens. The most likely reason for the preference of foreign workers is cost. In spite of wage parity provisions in the H-1B regulations, which require that workers be paid the same rate and as equivalent U.S. worker, the lack of enforcement and monitoring has enabled employers to choose to use the H-1B visa as a low cost alternative to hiring U.S. workers. Another reason that a firm may prefer an H-1B over a U.S. national is that the H-1B holder has significantly less ability to switch firms within the U.S., which would reduce employee turnover, a significant characteristic of the U.S. IT labor market from 1998-2001.

Figure 5 shows the visa use trends for one of the leading Indian IT firms, Infosys. The trends indicate acceleration in the numbers of visas used, in particular in the use of the L-

DRAFT

1 visa for personnel. By the end of 2002, Infosys had 2,884 employees on temporary visas in the U.S., a 200% increase from March 2000, which was the peak of the technology induced NASDAQ bubble. Infosys had approximately 14,000 employees worldwide at the end of 2002, so workers on temporary visas represented 20% of the workforce.

At first glance, it may seem that 20% of the workforce is fairly small but they generate a significant portion of Infosys' revenues (72%) and earnings (71%). Their impact will be estimated by using some key figures from Infosys' financial statements in the following sub-section.

Infosys Employees on H-1B and L-1 Visas from 2000-2002

Source: Infosys 20-F's and 6-K's filed with the SEC

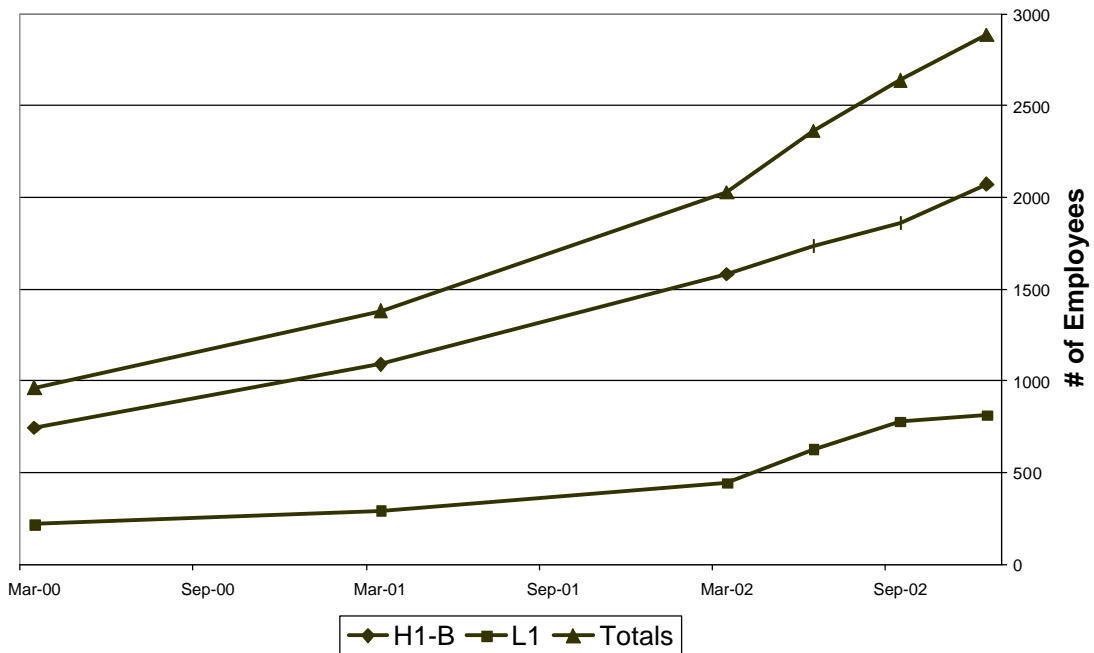


Figure 5: Infosys' use of H-1B and L-1 for 2000-2002

DRAFT

The INS does not regularly publish the number of H-1B petitions granted for individual companies. However, it did publish a document showing the leading H-1B petitioners for a short window from October 1999-February 2000 (INS 2000). The top twenty-four firms are shown in Table 3. Many of the same firms that appeared in Table 2, top LCA requestors in 1995 and 1998, show up again. In fact almost all of the H-1B petitioners in Table 3 are IT firms and many of the leading Indian IT firms are on the list.

Rank	Company	Rank	Company
1	Motorola Inc	13	Lucent Technologies
2	Oracle Corp	14	Infosys
3	Cisco Systems Inc	15	Nortel Networks
4	Mastech	16	Tekedge Corp
5	Intel Corp	17	Data Conversion
6	Microsoft Corp	18	Tata Infotech
7	Rapidigm	19	Cotelligent USA, Inc
8	Syntel, Inc	20	Sun Microsystems, Inc
9	Wipro	21	Compuware Corp
10	Tata Consultancy Svcs	22	KPMG LLP
11	Price WaterhouseCoopers	23	Intelligroup
12	People Com Consultants	24	Hi Tech Consultants, Inc

Table 3: Top H-1B Petitioners, Oct 1999- Feb 2000
Source: INS

B. How Important are U.S. Clients for Indian IT Firms?

The impact of temporary workers is modulated by how important U.S. clients are to Indian IT firms. If U.S. clients represent a significant portion of the Indian IT firm's business then one can calculate how important the H-1B and L-1 visa holders are for the firm. The revenue and earnings data show that U.S. clients are important.

North America is the most important geographic segment for Infosys because it accounts for the majority of the company's revenue. The data used in this section was obtained

DRAFT

from 20-F's and 6-K's filed by Infosys with the U.S. SEC. Table 4 shows clients in North America accounted for between 62% and 83% of its total annual revenue from fiscal years 2000-02.

Fiscal Year	Total Annual Revenue	North American Revenue	% of Total Revenue Attributable to North American Clients
2000	\$203,443,754	\$158,723,649	83%
2001	\$413,850,510	\$304,242,537	62%
2002	\$545,051,214	\$388,168,447	72%

Table 4: Infosys' Revenue from North American Clients

Fiscal Year	Total Operating Earnings	Operating Earnings from North America	% of Operating Earnings Attributable to North America
2000	\$ 77,884,858	\$ 63,176,215	81%
2001	\$ 167,124,247	\$ 125,830,720	75%
2002	\$ 217,164,653	\$ 154,712,508	71%

Table 5: Infosys' Earnings from North American Clients

North American clients also account for the majority of operating earnings for Infosys (Table 5), ranging from 71% to 81% for fiscal years 2000-02. It is clear from these two tables that North American clients are the most important to Infosys in terms of revenue and earnings generation. The North American IT market is by far the largest in the world, and that will not change anytime soon. Indian IT exporters like Infosys are highly dependent on the North American market for their business, and it turns out that their temporary workers account for a substantial portion of that business.

The contribution of temporary visa holders to Infosys' revenues can be estimated by calculating the average onsite revenue per person-year and multiplying it by the number

DRAFT

of visa holders. It yields an estimate of the revenue directly attributable to the visa holders.

The average onsite revenue per person-year, is calculated by the dividing the onsite revenue by the onsite person years, both available in Infosys' financial statements.

Revenue generated from onsite work was \$276.72 million and \$268.33 from offshore for fiscal year 2002.

The number of onsite person-months for that period was 24,173 or 2,014.42 person-years.

Therefore, onsite average revenue per person-year = $\$137,370 = \$276.72 \text{ million} \div 2,014.42$

That means that each onsite person generates approximately \$137,370 of revenue for Infosys. This figure is in line for IT services firms operating in the U.S. Note, this figure already takes utilization rates (i.e., some worker hours are not billable) into account.

Based on the onsite average revenue per person-year factor above, Table 6 shows the *estimated* revenue directly attributable to temporary visa personnel and the percentage of North America revenues they account for. Personnel on temporary visas directly contributed between 62% and 83% from fiscal years 2000-02. This contribution coupled with the significant revenues and earnings that are generated by North American clients (Tables 4 & 5), demonstrate how important temporary visas are to Infosys. Taking the results from Tables 4, 5, and 6, one could estimate that they directly accounted for 52% of revenue and 51% of earnings for the entire firm for 2002. There are of course indirect benefits from having personnel working onsite.

DRAFT

Fiscal Year	Total number of H-1B + L-1	Estimated Annual Revenue from Personnel on Temporary Visas = (column to left X \$137,370)	Total Annual Revenue for Infosys for <i>North American</i> Segments	% of Total Annual North American Revenue Directly Attributable to Temporary Visa Personnel
2000	963	\$ 132,287,310	\$158,723,649	83%
2001	1382	\$ 189,845,340	\$304,242,537	62%
2002	2027	\$ 278,448,990	\$388,168,447	72%

Table 6: Infosys' Revenue Generated Temporary Visas

Temporary visas may be important for Infosys, but does that hold for other Indian firms? Similar statistics for two other leading Indian IT firms, Satyam and Wipro, are shown in Tables 7 and 8. Similar revenue per person-year metric, as calculated for Infosys, was not available for Satyam or Wipro, so Infosys' metric is used to calculate the estimates.

Fiscal year 2002 revenue data for Wipro and Satyam are shown in Tables 7 and 8. Table 7 shows the estimated revenue due to personnel on temporary visas is large and a significant portion of overall revenue. Wipro's data deviates from the others because it is more diversified, with a large portion of its total revenue coming from the Indian market and in non-IT lines. For example, Wipro's *Consumer Care and Lighting* segment manufactures, distributes and sells soaps, toiletries, lighting products and hydrogenated cooking oils. However, Wipro's Global IT segment, whose clients are outside of India, is its fastest growing business line and accounted for 67% of its revenue and 92% of its operating earnings.

Table 8 shows that temporary visa personnel directly contribute 61% and 65% of the United States client revenue for Satyam and Wipro respectively. These figures indicate that all three firms are highly dependent on temporary visa personnel.

Fiscal Year 2002	Total number of H-1B + L-1	Estimated Annual Revenue from Personnel on Temporary Visas = (column to left X \$137,370)	Total Annual Revenue for all Geographic Segments	Annual Revenue from US Clients
Satyam	1,322	\$181,603,140	\$414,491,000	\$298,458,000
Wipro	1,231	\$169,102,470	\$696,000,000	\$260,000,000

Table 7: Satyam & Wipro Revenue Generated by Personnel on Temporary Visas

Fiscal Year 2002	% of Total Annual Operating Revenue Directly Attributable to Temporary Visa Personnel	% of Total Annual Revenue from US Clients	% of Total Annual Revenue from US Clients Directly Attributable to Temporary Visa Personnel
Satyam	44%	72%	61%
Wipro	24%	37%	65%

Table 8: Satyam & Wipro Percent of Revenue from Temporary Visas

Three of the leading Indian IT firms are dependent on the North American market and their temporary workers in the U.S. account for a significant amount of the revenue and earnings for the company. While the sample is only three, most of the Indian IT exporters are in similar business lines. Now that the direct contributions of the temporary workers have been estimated, the indirect contributions are described next. The fastest growing segment of India's IT export business is work that is completed offshore.

C. Offshore Work Depends on Onsite Access

The importance of temporary workers is amplified through their critical relationship to winning and directing projects completed offshore. Table 6 showed that a large portion of the total revenue for Infosys is generated by onsite personnel working in the U.S. on

DRAFT

temporary visas. The importance of those onsite personnel goes beyond their direct contributions to revenue generation. In fact, most of the offshore work is *dependent* on onsite personnel. An example helps to illustrate how this works. Mastek, a Mumbai based IT services firm, provides the following example in one of its marketing white papers.

Staff Costs Assumption: U.S. onsite \$100,000 per year; offshore cost: \$50,000 per year

A Fortune 1000 company needs 60 man-year's worth of effort. If they used only U.S. labor, then the cost would be $60 \times \$100,000 = \6 million. If the company used a 60 person that consisted of 20 onsite and 40 offshore, then the costs would be $20 \times \$100,000 + 40 \times \$50,000 = \$4$ million. Thus if the client used the offshore model, it could realize a 33% cost savings or \$2 million.

This example illustrates something that I will define as the *offshore to onsite leveraging ratio*. In this example, the *employee leveraging ratio* is 40:20 or 2:1; and, the *revenue leveraging ratio* is \$2 million: \$2 million or 1:1. The leveraging ratio varies greatly from project to project in part because of the nature of the work, as well as the IT firms' capabilities. Some projects require extensive face-to-face interaction with the client onsite; whereas, others can be completed almost entirely offshore.

The relationship between onsite and offshore personnel cannot be easily estimated but because of the nature of the software services business, which requires significant customer interaction, onsite personnel are critical to a successful project. If the employee leveraging ratio could be increased significantly then the need for onsite personnel will be reduced along with the demand for temporary visas.

D. Current Demand for Temporary Visas

Another measure of the importance of temporary work visas is to calculate demand by Indian IT firms. A proxy for this value is to count the number of LCAs that firms have filed with the DoL. Approval of an LCA is required before a company can petition the

DRAFT

INS to bring an individual to the U.S. on an H-1B visa. Additionally, DoL regulations require companies to have specific job slots open before they apply for an LCA; i.e., a firm is not supposed to apply for LCA approval just to have it ready in case a slot is needed. Nevertheless, business reasons motivate firms to have them ready so that they can petition the INS without the delay of LCA processing time when a project is scheduled.

Company	Number of Employees Requested on LCAs	Total LCA Wages to be Paid (\$ millions)	Average Wages Paid per Position per Year (\$)
Wipro	3,120	\$158	\$50,648
HCL Tech	3,828	\$147	\$38,428
Satyam	8,692	\$483	\$55,621
Tata	11,982	\$437	\$36,502
Infosys	12,211	\$657	\$53,880
TOTALS	39,833	\$1,884	\$47,294

Table 9: 2001 LCA Requests by Leading Indian IT Firms
Source: U.S. DoL

Table 9 shows the LCA requests by leading Indian IT firms for fiscal year 2001. Comparable data for fiscal year 2002 is not yet available from the DoL. The LCA's requested is an imperfect measure of H-1B demand because not all LCA's will become actual petitions to the INS for H-1B visas. However, it is quite clear that all of the companies are planning on expanding their pool of H-1B workers.

Company	Number of Employees Requested on LCAs	LCA Wages to be Paid (\$ millions)	Average Wages per Position per Year (\$)	Total Revenues for 2001 (in millions)	LCA Wages Requested ÷ Total Revenues
Electronic Data Systems (US)	452	\$32	\$71,251	\$21,543	0.15%
American Mgmt Systems (US)	246	\$17	\$68,550	\$1,183	1.43%
Wipro	3,120	\$158	\$50,648	\$414	38.17%
Tata	11,982	\$437	\$36,502	\$631	69.31%
Satyam	8,692	\$483	\$55,621	\$310	155.95%

Table 10: U.S. Versus Indian IT Firm LCA Use

For reference it is useful to compare the Indian companies' LCA requests with U.S. firms that are in similar markets, Electronic Data Systems and American Management Systems. Table 10 shows that the number of employees requested is far smaller for the U.S. firms, and the average wage requested is higher. It also shows that the LCA wages requested relative to the company's size (as measured by revenues) is orders of magnitude smaller for the U.S. firms; i.e., if American Management Systems petitioned the INS for all of its LCAs, it would pay wages to all of those H-1B's equal to 1.43% of its 2001 revenues. Indian IT firms are more heavily dependent on H-1B's than their U.S. counterparts. The use of the H-1B is a core business strategy for the Indian IT firms but it is only one tool for the U.S. firms.

This section demonstrated that the utilizing H-1B and L-1 visa programs are critical business strategies for individual Indian IT firms. The H-1B visa cap was significantly expanded in the late 1990's to redress a shortage of IT professionals in the U.S. However, the U.S. IT market has been slowing and the H-1B cap is slated to revert to 65,000. What are the implications of the IT slowdown in the U.S. to the Indian companies?

DRAFT

IV. The Implications of the Slowdown in the U.S. IT Market on the Indian IT Export Business

Indian IT firms rely on immigration regulations, which was demonstrated through macro and firm level data earlier. These practices were facilitated by favorable market conditions, but changes in the market will force them to adapt their business practices.

The market conditions are detailed first. Policy implications with respect to immigration regulation, specific to Indian firms, is explored next. Lastly, the potential ways that Indian IT firms may adapt business practices to meet the new environment are discussed.

The IT business and labor market conditions in the U.S. during the late 1990's provided a golden opportunity to develop India's IT industry. India's software services are still primarily exported to U.S. customers; therefore, the industry's current and future prospects are heavily dependent on U.S. IT demand.⁴ In addition to sales, the U.S. market was and is critical for India's IT development because it is the largest and most sophisticated. Also, the U.S. market provided a link to the Indian diaspora who are prominent in the U.S. high technology industry. The exposure to technological and business environment in the U.S. has been a boon to Indian firms enabling them to pursue new business lines outside of software services.

It is useful to recount the IT conditions of the late 1990's in the U.S. and how it has markedly changed in the past two years. These changes will surely have an effect on the future prospects of the Indian services exports to the U.S. If U.S. IT demand continues to stagnate, the IT services market will become more competitive and supplier growth can only come by increasing market share. Also, some policy decisions that will be made in

⁴ 62.7% of the exports go to North America, http://www.nasscom.org/it_industry/export_destinations.asp

DRAFT

the near future will impact the ability of Indian IT export growth. The U.S. Congress has the H-1B visa on its legislative agenda because the cap is slated to revert from 195,000 to 65,000 in 2004. If it does revert to 65,000 this may limit Indian IT firms' growth and force them to adjust their business practices. The more general issue of international labor mobility will also be addressed by the World Trading Organization's (WTO) Doha round of negotiations. The General Agreement on Trade in Services will specifically address the ability to move labor more freely amongst member nations.

Newer business practices may emerge to mitigate Indian IT firms' dependence on having temporary workers in the U.S. As the Indian IT firms become more knowledgeable about managing offshore outsourcing arrangements they may be able improve their leveraging ratios. They may also choose to partner with U.S. based firms to co-manage projects where the U.S. based firm supplies onsite personnel and the Indian IT firms provide the offshore personnel.

A. U.S. IT Market Conditions are Drastically Different

U.S. IT demand spurred the need for temporary workers. U.S. IT demand exploded over the past decade as a result of technological, business and labor market changes. Major technology paradigm shifts in computer hardware, software and network technologies created disruptions in the normal evolution of IT systems and sparked demand for IT services. For example, the maturation of the personal computer caused a shift in system architectures from mainframes to client-server technology, a major departure from mainframe dominance of the previous three decades.

DRAFT

In addition to shifts in computer hardware, there were three important shifts in software. The first was a shift from function based programming languages to object-oriented languages. COBOL was replaced by C++ as the language of choice for business applications. The second was a shift by businesses from custom-built software to standard software packages such as Enterprise Resource Planning (ERP). The third major software impact came from the so-called Year 2000 bug. These software and hardware shifts are often overlooked as important factors in spurring IT demand because disruptive changes in computer networking technologies, such as the Internet, are more visible.

The 1990's will likely be remembered technologically as the decade of the Internet. About mid-decade, businesses recognized the potential for commercializing the Internet, and rapid business model experimentation ensued. The business community also made large investments based on the future of the Internet. For example, U.S. venture capital investments in IT rose from \$3.5 billion in 1995 to \$56.5 billion in 2000, an astounding growth rate of 1,511%.⁵ Firms also had much easier access to capital in public equity markets as their initial public offerings were quickly snapped up. Businesses and investors were practically shoveling money into any firm that had a technological component to it, which fueled an already hot market for IT services.

As U.S. demand for IT services was expanding, the domestic labor supply was moving in the opposite direction. The number of electrical engineers and computer scientists graduating from U.S. universities was substantially smaller than the peaks of the mid-1980's.⁶ The combination of technological paradigm changes, easy access to capital, and

⁵ <http://www.ventureone.com/>

⁶ <http://www.nsf.gov/sbe/srs/nsf01325/start.htm>

DRAFT

workforce dynamics created a perfect environment for foreign IT service exporters to enter the U.S. market.

In response to industry pressure, the U.S. Congress facilitated IT service imports by tripling the quota of the number of foreign workers entering the U.S. on temporary H-1B visas. Domestic and foreign IT companies learned how to utilize this type of visa to meet their workforce needs, and Indian IT workers became the largest group receiving H-1B visas. In 2001 Indian IT workers received 148 of the 331 thousand (45%) H-1B visas issued or renewed (INS 1992-2001). The H-1B visa program provides at least three benefits to the Indian software services industry. First, it allows Indian companies to move labor more easily to U.S. client sites. Second, it facilitates the business networks necessary for increasing the number of software development projects completed in India.⁷ Third, it expands the opportunities for Indian firms to provide non-IT services, for example, business process outsourcing.

The technological, business and labor market conditions of the 1990's are not likely to be repeated in the current decade. Technology platforms are stabilizing around the personal computer and the product replacement cycle is slowing. While technologies like broadband and wireless will continue to fuel IT demand, these are more evolutionary than revolutionary. Another technological factor mitigating the growth in IT demand is software automation. Currently the software development process is labor intensive, but emerging automation tools and standards will increase software development productivity.

⁷ NASSCOM estimates that the offshore:onsite ratio has gone from 0.6:1 in 1999 to 1:1 in 2001, http://www.nasscom.org/it_industry/sw_export.asp

DRAFT

The business climate for technology is reflected by the capital markets, which are experiencing a severe decline from the bubble of the late 1990's. For example, U.S. venture capital investments in IT dropped from \$56.5 billion in 2000 to \$22.1 billion in 2001, and the early data from 2002 indicate continued declines.

The labor market has also turned significantly negative in the past year. Figure 1 shows the marked increase in unemployment rates for electrical engineers and computer scientists over the past two years. In fact, the U.S. high-technology labor market is its severest slump in history. Unemployment rates in 2002 were at historically high levels for electrical engineers, 4.2%, and computer scientists, 5.0%. The previous high for computer science unemployment was 3.2% in 1993.⁸ This is particularly surprising since computer scientists and electrical engineers are generally considered the highest skilled and most in demand IT workers. It indicates that the market for other IT workers is probably even worse. While the slump persists, the number of U.S. electrical engineering and computer science graduates continues to rise and domestic population demographics will perpetuate that trend. The U.S. has entered a new paradigm for electrical engineering employment where a once stable profession enters an era with much greater volatility (Hira 2003). The change in market conditions should lead U.S. policymakers to draw different conclusions when considering temporary worker visa programs.

⁸ Source: United States Bureau of Labor Statistics

**U.S. Unemployment Rates for Electrical Engineers & Computer Scientists,
2000-02**

Source: Bureau of Labor Statistics

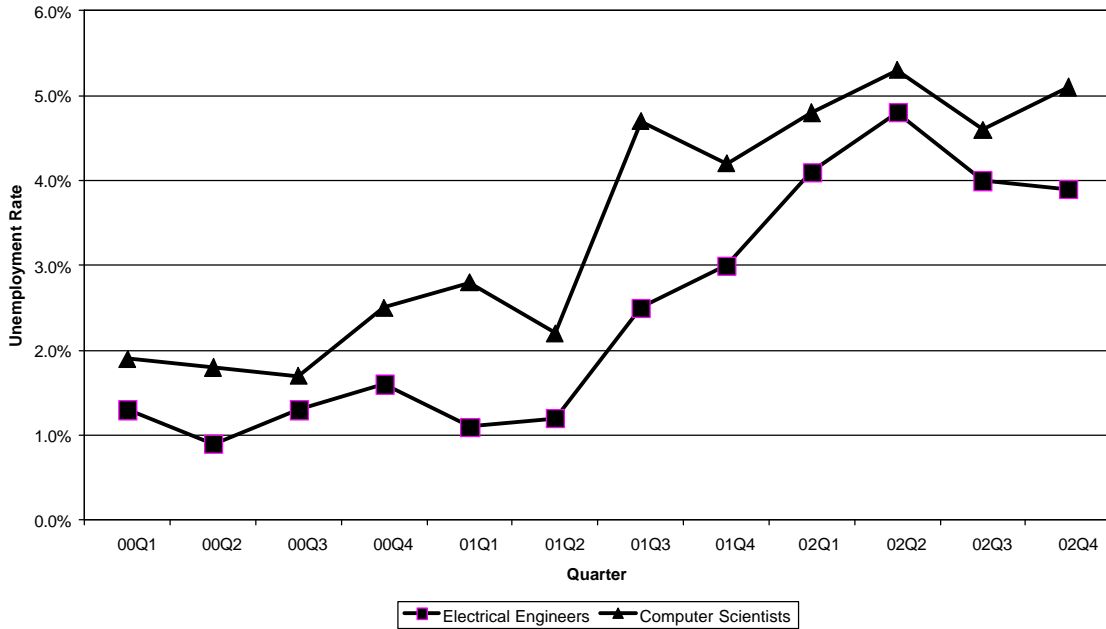


Figure 6: IT Unemployment Rises in the U.S.

B. Policy Implications of the U.S. IT Slowdown

How will the decreased growth rates of U.S. IT demand affect Indian IT services exporters? The good news is that India’s share of the \$219 billion North American IT market is only 1.78%.⁹ Even if U.S. demand remains flat, the Indian IT industry can grow by increasing market share. However, there are some policy and business challenges that the Indian IT industry faces because of their business practices.

Onsite project work is still a significant share of IT services, so labor mobility is critical to capturing business opportunities. The WTO GATS negotiations on the movement of natural persons, mode 4, will affect the ease in which developing countries’ programmers are able to work at a customer’s site. In addition to labor mobility, developing countries

⁹ http://www.nasscom.org/it_industry/export_destinations.asp

DRAFT

will face stiffer price competition from the increases in IT supply from China and Central and Eastern European nations. Increased supply with little demand expansion will create significant pricing pressure, and service providers will need to differentiate their product offerings by something other than price. The post-September 11th climate in the U.S. has also created a dampening effect on free flow of people and raised the consciousness of the risks associated with outsourcing critical IT functions, especially overseas.

Developing countries are using the current Doha round of negotiations on movement of natural persons, mode 4 of GATS, to argue for the elimination of quota and wage parity provisions on visas like the H-1B in the U.S.¹⁰ (Chanda 1999). However, if the U.S.'s domestic high-technology labor market continues to be depressed, then a contentious debate on visa restrictions will ensue. Organizations that represent domestic IT workers are becoming more vocal in their opposition to the H-1B program and are asking for the cap to revert to 65,000.¹¹ As more IT services suppliers from other developing countries enter the U.S. market, there will be more competition for the limited number of H-1B slots. Even with the technology slowdown in 2001 relative to 2000, the number of H-1B petitions increased from approximately 258,000 to 331,000. The number of H-1B petitions that counted against the cap in 2001 was 201,079. Although initial indications are that the numbers for 2002 and 2003 will be smaller, they would still far exceed 65,000, the cap that will be in effect for 2004 if the U.S. Congress takes no action.

Adding to the pressure for Indian firms, supply of IT services will increase as more developing nations enter the market. India may be one of the first movers into the IT

¹⁰ http://www.insidetrade.com/secure/dsply_ex_txt.asp?f=wto2001.ask&dh=88072674&q=

¹¹ There are a number of organizations who have made public statements on the H-1B program such as: IEEE-USA, Programmers Guild, and WashTech.

DRAFT

services export market, but it is hardly alone in hoping that it will be the engine for export-led growth. IT services providers will increasingly have to differentiate their product offerings, competing with something other than price. Indian companies that have adopted software quality certification programs such as the Capability Maturity Model have only moderate success (Arora and Asundi 2000).

C. Indian IT Firms Will Have to Adapt Business Practices

Temporary visas have been an important source of competitive advantage for Indian IT firms but the H-1B may become more difficult to obtain. One logical way for Indian IT firms to adapt is to reduce their dependence on the H-1B. There are two primary ways that they can directly reduce their demand of H-1Bs. One method would be by finding a substitute visa, such as the L-1. Another method would be by improving the offshore to onsite leveraging ratio. Other methods to reduce H-1B dependence include strategic partnerships or joint ventures with U.S. based firms where the U.S. firm manages the onsite work and the Indian firm performs the offshore work. In fact with current equity valuations favoring Indian IT firms over U.S. ones, Indian firms may decide to purchase some of their U.S. counterparts.

The L-1 visa has advantages over the H-1B especially because it's not subject to a cap. There are more restrictions on which personnel are eligible for the L-1, but at least Infosys seems to be favoring the L-1 over the H-1B in recent quarters (Figure 5 above) as they expand their U.S. operations. The L-1 visa may offer relief from the H-1B cap but increasing the offshore to onsite leveraging ratio offers expanded opportunities in new business lines, higher profits, and greater benefits to the Indian economy.

DRAFT

It is difficult to estimate an average leveraging ratio, but the ratio is likely to increase for all Indian IT firms because increasing the proportion of offshore work is in the interests of both the customer and the Indian IT service provider. The customer benefits from lower costs because of lower wages and the Indian IT firms have higher gross margins for work completed offshore.¹² The average leveraging ratio will also increase as more customers gain confidence in shifting a greater portion of a project offshore and as Indian IT firms improve their project management skills and information infrastructure. Information and communications technologies, such as videoconferencing and web-conferencing, will enable more work to be completed remotely. Table 11 shows that Infosys slightly increased both its *employee leveraging ratio* and its *revenue leveraging ratio* from 2001 to 2002. As another example, Satyam states, “Typically 20% of a project team will be on site depending on the nature and complexity of the project. Projects completed in our offshore centers in India contributed 60.9% and 47.8% to our IT services revenues in fiscal 2001 and fiscal 2002, respectively.” That would translate into a typical employee leveraging ratio of 5 and an average revenue leveraging ratio of 0.92 for 2002.

While there will be increases in average leveraging ratios for most Indian IT firms over time, there will be an upper limit to these because some work will have to be done onsite. One can only speculate on the dynamics of the amount of work that can be completed offshore. However, it is likely that the type of work that is easiest to offshore has already transitioned offshore.

¹² Infosys 2002 20-F

Fiscal Year	Revenue Leveraging Ratio	Employee Leveraging Ratio
2001	0.94	1.94
2002	0.97	2.26

Table 11: Infosys' Offshore: Onsite Leveraging Ratios

Strategic partnerships and joint ventures between Indian and U.S. IT already exist. For example, Wipro has a joint venture with General Electric. The question will be which firm captures the bulk of the profits.

Table 12 shows that Indian IT firms have a major comparative advantage over U.S. firms, which is most apparent in vastly greater profit margins than their U.S. counterparts. In fact, investors seem to agree by bidding up the market capitalizations of the largest Indian IT firms to levels that rival or surpass the largest U.S. IT firms in spite of significantly lower revenues. The price to revenue ratio for Wipro and Infosys are 20 to 30 times that of the U.S. firms.

They could partner with U.S. based firms, such as Electronic Data Systems, which would manage and source the onsite personnel with the Indian IT partner providing the offshore labor. In this scenario, the U.S. based firm would expect to share in the profits. In fact EDS recently made a bid to purchase Satyam but was rebuffed when Satyam made a statement saying that it is not for sale.(SOURCE) In fact the reverse may become true.

Table 12 shows that the larger Indian IT firms could actually purchase some of their U.S. counterparts.

DRAFT

Company	Country of Headquarters	Market Capitalization (billions)	Revenue (billions)	P/E Ratio	Profit Margin	Price/Revenue Ratio
American Management Systems	US	\$0.5	\$1	21	2%	0.5
Computer Sciences Corp	US	\$5.9	\$11.4	15	4%	0.5
Wipro	India	\$7.8	\$0.8	44	23%	9.8
Infosys	India	\$9.2	\$0.6	53	28%	15.3
Electronic Data Systems	US	\$9.3	\$22	8	5%	0.4

Table 12: Comparison of Equity Market Valuations of U.S. and Indian IT Firms

Offshore wage differentials are significant and will likely persist because they mask the PPP differences between the U.S. and India. As mentioned earlier the World Bank has calculated a PPP of 0.2 between India and the U.S. Increases in Indian wages result in much greater purchasing power than an equivalent increase in the U.S. An Indian IT firm would have to raise a U.S. onsite workers' wages by five times as much as its offshore workers to keep them equally happy. There are many ways in which the Indian IT firms can adapt to a new set of U.S. immigrations regulations. For instance because of the PPP differences, they have significant competitive advantages over even their U.S. counterparts.

V. Conclusions

Many factors have played important roles in India's IT industry development. This paper has highlighted an additional factor that is often overlooked in the literature: India's IT industry grew because of its use of U.S. immigration regulations as a competitive business practice. The importance and impact of this business practice was shown not only to be of significance historically but also contemporarily and was argued to be an important variable shaping the future direction of the industry. Estimates of the

DRAFT

importance of this factor were presented at the macro, such as the increase in H-1B visas for IT use, and firm levels, such as the increase in revenues and earnings for Indian IT firms.

Market conditions have changed drastically and the immigration regulations that were once a competitive advantage for Indian IT firms will transform. Other developing countries are entering the IT market as suppliers at the same time that U.S. demand is leveling off. This will create a more competitive market for all suppliers and will force strategic adaptation. The policy environment for U.S. immigration rules, where tightening is likely, will present significant future challenges for all foreign IT suppliers. Firms will have to adapt their practices to mitigate the impact of these challenges. They have plenty of opportunities to adapt to the new regulatory environment by increasing their offshore to onsite leveraging ratio, utilizing alternative visas, improving their product differentiation, or partnering with U.S. based businesses.

DRAFT

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