



**IMMIGRANT POLICY ON
SCIENTISTS AND ENGINEERS:
PROJECT OVERVIEW**

March 2000

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IMMIGRANT POLICY ON FOREIGN SCIENTISTS AND ENGINEERS

Institute for the Study of International Migration

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- (A) Priorities for Improving Data on Immigrant Scientists and Engineers
- (B) Statistics on Foreign Scientists and Engineers
- (C) Skilled Temporary and Permanent Immigrants in the United States
- (D) Skilled Temporary Specialty Workers in the United States
- (E) Changes in H-1B Demand and Wage Offers: U.S. Department of Labor Petitions Data, 1992-1998
- (F) Contingent Work Among Immigrants in Information Technology: An Analysis with the Current Population Survey
- (G) Characteristics of Employers of Foreign Temporary Workers: A Systematic Profile of Employers of Specialty Worker H-1Bs
- (H) Information Technology Companies and U.S. Immigration Policy: Hiring Foreign Workers
- (I) Presentation of Project Results to the National Research Council's 'Information Technology Workforce'
- (J) Core Occupations of the U.S. Information Technology Workforce (The IT Workforce Data Project, Report 1)
- (K) The Production of U.S. Degrees in Information Technology Disciplines (The IT Workforce Data Project, Report 2)
- (L) Foreign-Origin Persons in the U.S. Information Technology Workforce (The IT Workforce Data Project, Report 3)
- (M) Assessing the Demand for Information Technology Workers (The IT Workforce Data Project, Report 4)

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PROJECT OVERVIEW

The Institute for the Study of International Migration is completing work on a grant from the Alfred P. Sloan Foundation (Grant No. 97-12-20) to evaluate the scientific and engineering sectors and the foreign-born labor force. That grant work has three components:

- Scope: Data Needs and Recommendations,
- Outcomes: The Effects of Foreign Worker Policies,
- Comparative: International Issues and Policy Lessons.

The final product on that grant will include a single summary overview of the research findings, as well as summary policy recommendations oriented to improving the current situation. At the moment, the following reports are finished and/or in progress to meet the grant's obligations.

Expert Meetings. ISIM conducted two successful workshops and one roundtable discussion on scientists and engineers. The first workshop brought together leading government, academic, and other experts familiar with U.S. data systems. The second workshop brought together international experts from Germany, France, Canada, and the U.S. The roundtable joined government and business representatives in a discussion on U.S. policies for temporary admission of skilled foreign workers. The expert meetings were:

- "Statistics on Foreign Scientists and Engineers: What We Know, What We Don't," Georgetown University. October 1998.
- "TransAtlantic Workshop on High Skilled Migration," Georgetown University. May 1999.
- "Regulations for Entry of Temporary Workers in the Professions," Business Roundtable, Leavey Conference Center, January 27, 1999.

DATA NEEDS AND PRIORITIES. The lack of needed data is a major obstacle to research on scientists and engineers. The U.S. agencies responsible for collecting data fail to gather either specific pieces of information, or their databases are seriously compromised. ISIM has evaluated all of the major data sources available for scientists and engineers, as the upshot of the meeting listed above provided the consensus of experts in the field. ISIM goes beyond this description and evaluation of the current state of affairs and recommends data priorities, especially the restructuring of the Immigration and Naturalization Service in order to achieve real statistical capacity.

- "Priorities for Improving Data on Immigrant Scientists and Engineers," A Report to the Alfred P. Sloan Foundation (ISIM) 1999.
- "Statistics on Foreign Scientists and Engineers," Paper prepared for the Alfred P. Sloan Foundation, Grant Number: 97-12-20, and presented to a workshop on Statistics on Foreign Scientists and Engineers: What We Know, What We Do Not, (B. Lindsay Lowell) 1998.
- "Data on Foreign Scientists and Engineers: What We Know, What We Do Not," An edited collection of reports of a workshop discussion (B. Lindsay Lowell) 1999.

LABOR MARKET OUTCOMES. The impacts of scientific and engineering (S&E) professionals on the U.S. labor market is being evaluated in a number of ways. The first set of products by ISIM are papers that combine first-level analyses of existing data and summaries of the literature. The papers listed below establish an apparent demand for H-1B workers in information technology, the link between the temporary and permanent system, the localized impacts of immigrants in the S&E academic and private labor markets, and the size of the foreign-born information technology workforce:

- "Skilled Temporary Specialty Workers in the United States" *People and Place*, (B. Lindsay Lowell) Spring 1999.
- "Skilled Immigration to the United States." Working Paper of the Institute for the Study of International Migration, Georgetown University, (B. Lindsay Lowell) 1999.

- "Skilled Temporary and Permanent Immigration to the United States," in Research on Immigration and Integration in the Metropolis, <http://riim.metropolis.globalx.net/Virtual%20Library/1999/wp99S2.pdf>, January 1999. (see also above "Skilled Immigration to the United States").
- "Foreign-Origin Persons in the U.S. Information Technology Workforce," Report III of the IT Workforce Data Project, a report of the United Engineering Foundation funded by a grant from the Alfred P. Sloan Foundation, see also www.uefoundation.org, March 1999.

ISIM is currently conducting and completing work that assesses changes in the demand for H-1Bs and wage effects, the characteristics of employers of H-1Bs, and employers' perspectives on U.S. immigration policy. The products listed below are in progress.

- "Changes in H-1B Demand and Wage Offers, 1992-1998: Department of Labor Petitions Data."
- "The Characteristics of Employers of H-1Bs: Linking Labor Data to Data Describing Employers."
- "Employer Perceptions of U.S. Immigration Policy: A Survey of Information Technology Firms."
- "Contingent Work Among Immigrant Scientists and Engineers: An Analysis with the Current Population Survey" (B. Lindsay Lowell and Edward Taylor).

INTERNATIONAL COMPARISONS. Policy perspectives can be markedly broadened by comparing the policies and experiences of other post-industrial countries. Clearly, European countries are key in this regard: they have high levels of movement by foreign skilled workers, and they operate under a number of international agreements. Canada is another natural comparative case and a major sender of temporary and permanent workers to the United States. In the second of the ISIM expert meetings listed above, international experts met to discuss comparative lessons. The second ISIM paper compares the migration regimes of major post-industrial countries (United Kingdom, Germany, Austria, Switzerland, France,

the Nordic countries, Belgium, Netherlands, Italy, Spain, Japan).¹ A third set of papers examines the treatment of the migration of scientists, engineers and other professionals in international trade agreements, including the General Agreement on Trade and Services (GATS) and the North American Free Trade Agreement (NAFTA):

- "Comparative Study: Policies for Facilitating High-Skilled Migration to Advanced Industrial Countries," (Bryan Paul Christian).
- "International Migration of Skilled Workers and International Trade" (Gabriel González König)

¹ Currently, ISIM is completing research for the inclusion of policies in the "traditional countries of immigration," e.g., Canada and Australia.

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DRAFT

**PRIORITIES FOR IMPROVING DATA
ON IMMIGRANT SCIENTISTS AND ENGINEERS**

With Support from the Alfred P. Sloan Foundation

October 1999

Institute for the Study of International Migration
School of Foreign Service
Georgetown University

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EXECUTIVE SUMMARY

Policymakers do not have reliable and complete data on immigrants in general. Data on scientists and engineers, in particular, are insufficient. Legislative and administrative action on immigration has been greater than at any time in the past; yet, policies are debated without reference to basic facts—with no meaningful measure of their implementation. Without reliable statistics that are timely and accurate, policy debates are out of synch with social and economic trends. Without adequate data that tell us what we need to know, policies cannot address key managerial challenges.

This report focuses on the managerial/organizational and data *priorities* that policymakers should keep in mind as they set out to improve data on immigrant scientists and engineers. This report recommends priorities for improvements in the organizational structure of the Immigration and Naturalization Service, as well as, priorities for data to be collected. While there is need for better data on all immigrants, there are specific and critical needs for data on immigrant scientists and engineers. Data needs unique to scientists and engineers require a focus on elements of information, primarily having to do with labor-market skills, the measure of the working population, and the tracking of the entry and exit of skilled workers.

Most policymakers are quite aware that immigration statistics are all too often incomplete, of unreliable quality, or are not available on a timely basis. A NAS report evaluated INS data systems and made recommendations on methods for improving (and sharing) data collection. In a second report, the NAS reviews a workshop of government, academic, and statistical-user specialists that tended to center on data needs in research areas that policymakers and social scientists often inquire into. Recommendations were also made for special immigrant surveys. A third NAS report in 1992, unrelated to immigration *per se*, sets out standards that a U.S. statistical agency should meet. In turn, one of three 1998 GAO reports evaluates how well the INS and Census Bureau met those standards, calling for a more independent statistical branch at the Immigration and Naturalization Service (INS). The other two GAO reports discussed the problems posed by administrative, as opposed to statistical, data collection efforts and the attendant lacunae in counting immigrant admissions; and the status of several U.S. agencies in implementing NAS recommendations for improved data elements and collection (many but not all were met).

IMPROVING DATA ON IMMIGRANT SCIENTISTS AND ENGINEERS REQUIRES THE FOLLOWING PRIORITIES:

Improved Organizational Capacity. Neither the INS nor other government agencies collect nor analyze certain data elements needed to make and implement credible immigration policy. The situation at INS is particularly problematic. In many cases data that should be available are either not assembled, or the data are mismanaged and subsequently unavailable for analysis. Official and unofficial data reports have not been forthcoming on a regular schedule and are often years later than anticipated. What is lacking is the organizational structure that elevates the *management of statistics* to the level where governmental agencies accord that function the independence and the authority it needs to meet standards of quality and comprehensiveness.

Because of the centrality of statistics to managing and evaluating immigration, and the evident lack of importance given statistics by administrative personnel in the INS, the statistical function must be elevated and given the authority it needs. The time is propitious for making basic organizational changes that should improve data collection, analysis and release. Two proposals for reorganizing overall immigration functions are under serious consideration at present. The INS itself proposes to divide its service and enforcement functions, with the head of each division reporting directly to the Commissioner. Congressional proposals would also separate the functions, but would elevate them within the Department of Justice. Under one Congressional proposal, the two new bureaus, each headed by an official at the rank of the current INS Commissioner, would report to a newly created post of Associate Attorney General for immigration.

Congress should establish an independent Bureau of Immigration Statistics. To ensure its ability to carry out its responsibilities, the independent Bureau of Immigration Statistics (BIS) would have direct authority over data collection and priorities. The new organization should conform to the National Academy of Sciences' test of independence: The BIA should be established by statute as a separate entity; it should be headed by a career civil servant; it should require no approval for the release of data, and it should have predetermined/scheduled data releases.

The Bureau of Immigration Statistics should be given the authority to coordinate across agencies. Coordination with other agencies should be regular and ongoing, preferably including long-recommended proposals to share and to link data across agencies. Congress can play an important role by creating guidelines that encourage appropriate data sharing across agencies, establishing the framework and legislation necessary. It should give the Bureau of Immigration Statistics the mandate to create the unified collection and reporting of all immigration data.

A Division of Data Development and Quality Assurance should be established within the statistical unit. The Division's mandate would be to take primary responsibility for overseeing all internal data systems development, as well as to oversee external contractors. The Division would develop comprehensive goals, performance measures, and conduct regular progress reviews. It would troubleshoot and develop contingency plans; and it would have the authority to push them through if necessary.

There must be a clearly defined prioritization of data elements and collection, timetables for accomplishing them, and a set schedule of statistical reports. The Statistic Branch has no predetermined schedule for the release of much of its data and it has not been able to release a variety of data on a timely basis. Only by meeting scheduled releases of data that meet criteria of reliability or quality, releases that make their projected due dates, can the INS ensure that its statistical reporting will be received without scepticism.

A Standing Advisory Committee should be formed to review immigration data systems, as well as to comment on methodologies, statistical standards, and data quality. A committee comprised of statistical experts in and outside of government would improve the Bureau of Immigration Statistics ability to identify problems and enhance the reliability of its output. It would raise the reputation of its data among various user groups.

Data Needed on Occupation and Education. It is not possible to identify scientists and engineers unless information is available on the occupation and/or educational characteristics of individual migrants. While this seems only obvious, it bears repeating because data on the occupation and education of immigrants is oftentimes either nonexistent or inadequate. The INS, the Department of State, and the Department of Labor, either collect, or are in a position to

collect, information on individual occupations and working skills. However, there are inconsistencies in the occupational data that are collected and educational data are missing completely.

Basic occupational and educational data should be collected for all working-age legal permanent residents (LPRs) and selected temporary-working nonimmigrant (NIV) classes. The LPR data that has been collected historically is crude and there are instances when its priority has been disregarded. Education simply has not been collected for either permanent or temporary immigrants. As far as occupation is concerned, the priority should be for the collection of data on all LPRs and all working temporary visas. As far as education is concerned, the minimal data priority should be years of education.

All agencies that collect data on immigrants' occupation should adopt a common occupational classification system. Beside different levels of detail, the administrative agencies collect occupational data on immigrants using different classification systems. These differing classification schema can be translated from one to another with a some degree of success, but efficiency and data reliability strongly argue that the agencies adopt a common standard. It would seem reasonable that the agencies involved adopt the Standard Occupational Classification (SOC).

Years of completed schooling should be collected as a regular data item on permanent and temporary-working immigrants. Surprisingly, there is no data collected on the education of immigrants. Yet, the single most important skill or "human capital" in the labor market is the number of years of education that an individual has completed.

Employer Characteristics. In order to understand the full workings of U.S. immigration policy, it is necessary to understand the employment of immigrants. A complete picture must include the demand side—the employers who immigrants work for. Employer actions determine the economic demand for, and the treatment of, native and foreign workers alike. Service-oriented government agencies need to track both parties to the employment-based admission system—the employer and the work authorized foreign worker.

Basic information about employer-sponsors of immigrants should be collected, in particular, industry, size of the organization, and a common employer identifier. Basic information on industry and employee size should be collected—making these standard data items would ensure that they are available for policymakers. Systematically tracking industry and employer size class would help businesses and policymakers monitor shifts in national and global demand. Policymakers would have more confidence about the fit between policy and meeting national priorities, while employers would have more information to plan human resource strategy.

Administrative Data on Immigration Dynamics. Policymakers need to know how many persons are newly arrived in the U.S. each year, but they also need to know how many individuals change/adjust from one immigrant status to another after a period U.S. residence, how long individuals stay, and how many ultimately leave the United States. Over 90 percent of employment-based LPRs reported as admissions in a given annual INS yearbook are "adjustments," e.g., they are admitted to LPR status from within the U.S. on average nearly four years after the time they were first admitted to the U.S.

First, reliable information is needed on the history of prior immigration statuses. Second, the duration of time in prior statuses is critical to measuring annual populations, as well as tracking the function of the entire admission system. However, the INS currently lacks the ability to link information on temporary nonimmigrants, e.g., it cannot track duration of time (in the U.S. in a given status) or link the histories of individuals who change from one nonimmigrant status to another. For that matter, the INS cannot tell when individuals have left or emigrated.

The U.S. needs a reliable administrative and statistical system to track individual transitions in immigrant status. The INS collects the relevant information for tracking changes and adjustments in status, however, that information is not always systematically kept. Tracking changes in status should be a priority item for evolving databases. Only with such data in hand can we evaluate whether or not LPR scientists and engineers enter through what truly looks to be an apprenticeship system including temporary stays for work or study in the U.S.

There is need for reliable data on the duration of time that various classes of temporary nonimmigrants have been in the United States. Duration of stay information is critical for evaluating the relationship between "temporary" jobs and cycles in the economy. More importantly, duration of stay information gives a direct gauge of the adequacy of the time limits set by policy (or not). And with duration of stay information it is possible to estimate the average year-round population.

Random Surveys and Statistical Data. The demands of a statistical record and an administrative record differ. For a statistical record descriptive information is needed on the characteristics of individuals and the quality of such data must be strong. However, the statistical record must include information not always central to the more minimalist needs of the administrator who manages workflow on basic counts. The most powerful aspects of a reliable administrative system is the reliable tracking of movements of individuals in and out of the country; and additional data collection can interfere with the simplicity that helps ensure reliability.

Random samples of individuals taken outside of the normal routine of administrative data collection are another way to get the statistical information that policymakers regularly call for and need to reach informed decisions. Such samples should not be idiosyncratic and irregular, but rather they should be conducted on a regular basis, perhaps yearly or every other year.

Data elements that would impose an unwarranted burden on administrative systems, or elements that pertain to special subjects not of regular interest, should be collected in random surveys. Especially for the working visas, it would be valuable to know a number of additional facts about education. Such information would include the field-of-education for high-skilled immigrants, as well as the specific degree completed (e.g., bachelors, masters, or doctoral degree). It would be valuable to know information on work experience abroad such as years in the labor force and prior occupation. English language ability could prove to be particularly valuable to know: research has found that English language ability is critical to the mobility of immigrants.

Measuring the Resident Population. Administrative data, such as that discussed above, is the best source of information on the entry of migrants into the United States. The stock or resident population is captured best by the U.S. Census and by standard large-scale surveys, in particular the Current Population Survey (CPS). Resident status should be presumed for most individuals admitted as legal permanent residents (LPR), but casual observers are often surprised at the range of other oftentimes "temporary" legal categories that are included in the CPS samples. Many classes of scientists and engineers in the U.S. with temporary visas often reside in the United States over periods of six years and more.

There should be a pilot CPS supplement on immigrants, and it should include survey items that permit researchers to investigate policy-relevant issues. The determination of items to be included in the survey should be arrived at after soliciting input from various agencies, the research community, immigrant advocacy groups, and other stakeholders. At the least, a special supplement could shed light on the effect of immigrant status, U.S. experience and residence, where and how much education is completed, and language ability.

PRIORITIES FOR IMPROVING DATA ON IMMIGRANT SCIENTISTS AND ENGINEERS

INTRODUCTION

Because U.S. immigration policy is largely managed on the basis of the number and the working characteristics of immigrants, the seemingly mundane challenge of collecting sufficient statistical data on immigrants becomes a major challenge in the context of administering the system: (1) the number of immigrants in specified classes of admission is set by law; (2) immigrant skills and their conditions of employment are threshold requirements for particular classes of employment-based admission.¹ Adequate immigration statistics are, in this way, mission critical to administration of the system itself, as well as to an agency's performance and review.

The Federal government is responsible for immigration policy: various agencies implement their part of the system, and the U.S. Congress changes policy directions with new legislation.

Counting the number of entrants and the population in various admission classes is a minimum requirement for policymakers to make sound evaluations of the system. Knowing immigrants' working characteristics and conditions of employment should be equally important.

Policymakers need to evaluate both the administration and the outcomes of the U.S. immigration system. A complete evaluation must have counts of the stock and flow of immigrants, along with their skill characteristics.

The intersection of data on simple counts and working characteristics is most obviously critical when policymakers' interests turn to scientists and engineers, the highly-skilled component of the admission flow. Scientists and engineers make up only about 3.6 percent of the labor force, but they are central to the evolutionary changes in the technology and information sectors of the U.S. economy. Immigrants are known to play a large role in these sectors, providing ample evidence

¹ Obviously, immigrant admissions are predicated, as well, upon family relationships or other humanitarian grounds. These are, however, more or less fixed attributes of classes of admission that we want to the number of.

of positive economic outcomes. Nonetheless, there are valid concerns by all actors—immigrants, native workers, and employers—regarding both the efficiency and the competitive outcomes of U.S. policy on the admission of scientists and engineers.

Information Technology (IT) has been the area receiving the greatest deal of recent attention. The IT sector is estimated to make up about 5 to 8.6 percent of the U.S. GDP. In the past year, Congress has debated and notably increased the number of worker permitted in the temporary or nonimmigrant specialty worker H-1B program. The IT sector is actively involved in ensuring that current admission numbers for skilled or employment-based workers remain at their current levels or are expanded. Rarely, has any sector of the economy, other than agriculture, taken as active an interest in immigration policy.

Current shortages of nearly 300,000 IT workers are routinely cited in the press, although shortage figures are hotly contested by worker-representatives. Advocates for U.S. workers claim that shortage figures are misleading; that employers are not actively seeking or training the available talent. Middle-aged IT workers, in particular, may be turned away by employers who prefer harder working, less expensive, younger workers. Immigrants may encourage such employer behaviors, e.g., they may relieve incentives for employers to search more efficiently, to stimulate training, or to raise wages.

Unfortunately, current data on immigrant scientists and engineers is deficient in providing information on the simple counts of the stock and flow, as well as the skill composition of admissions. For example, the H-1B debate turns around the number of temporary foreign workers admitted to fill shortages, especially in the IT sector. But policymakers do not know a substantial amount:

- Policymakers do not know the total number of new work authorizations granted in a year, nor the link between the H-1B and other classes of admission. They are not presented with regular counts of the number of H-1B nonimmigrants who achieve U.S. work authorization abroad, or within the United States (particularly after a stint on one of the many other non-working temporary visas).

- They do not know the average time that H-1Bs work in the U.S., so that the average working population throughout the year is not known. This makes it impossible to calculate the true working hours, or the actual contribution that H-1Bs make to the U.S. labor force.
- They do not know the above simple and basic data counts by industry or occupational class, such that it is not possible to evaluate the true number of admissions or the working population in specific sectors. In short, the actual contribution of temporary foreign workers to the IT sector, which is driving the debate on H-1B policy, is unknown.

It is disconcerting that policymakers, and the IT industry, would engage in debates about changing the number of admissions with such an imprecise knowledge of the numbers of temporary or permanent foreign-workers in the system. However, it is not a new state of affairs, While improvements in U.S. data systems are occurring, those improvements have been erratic and slow, and there has been a lack of emphasis on prioritizing the necessary organizational changes, and producing specific data elements.

It is ironic that the IT industry has been the backbone of a resurgence of U.S. labor productivity because it manages the flow of quantitative and quantifiable data in a complete, comprehensive, and timely fashion. Methods of quality management—which have swept the globe and derives in part from IT technologies—depends upon clearly defined goals which are evaluated with reliable, comprehensive data. Yet, while the IT industry paves the way into the new economy, a significant component of its growth, e.g., immigration, is poorly documented, its contribution unmeasured. Resolving the debate over H-1Bs will certainly require more exact information on demand, but lacking information on supply makes any debate sterile. It is difficult to see how this state of affairs benefits any of the actors involved.

OTHER REPORTS ON DATA NEEDS

Most policymakers are quite aware that immigration statistics are all too often incomplete, of unreliable quality, or are not available on a timely basis. There have been several attempts to identify missing data elements for immigrants, particularly notable are the findings of special

panels convened by the U.S. National Academy of Sciences, published in 1985 and 1996. The U.S. General Accounting Office has evaluated several immigration policies touching on data issues, and three reports in 1998 that dealt explicitly with data issues.

The initial NAS report evaluated INS data systems and made recommendations on methods for improving (and sharing) data collection. In its second report, the NAS reviews a workshop of government, academic, and statistical-user specialists that tended to center on data needs in research areas that policymakers and social scientists often inquire into. Recommendations were also made for special immigrant surveys. A third NAS report in 1992, unrelated to immigration *per se*, sets out standards that a U.S. statistical agency should meet. In turn, one of three 1998 GAO reports evaluates how well the INS and Census Bureau met those standards, calling for a more independent statistical branch at the Immigration and Naturalization Service (INS). The other two GAO reports discussed the problems posed by administrative, as opposed to statistical, data collection efforts and the attendant lacunae in counting immigrant admissions; and the status of several U.S. agencies in implementing NAS recommendations for improved data elements and collection (many but not all were met).

Rather than explore these reports in depth, their basic themes are quickly summarized in two accompanying boxes. Table 1 summarizes the reports by ISIM, Table 2 summarizes the three NAS reports, and Table 2 summarizes the recent GAO reports. The interested reader is encouraged to refer to the full text of the reports.²

— TABLES 1, 2, 3 ABOUT HERE —

This ISIM report is part of a larger project that focuses on immigrant scientists and engineers, the Institute for the Study of International Migration (ISIM) has published a report on the data available to study foreign scientists and engineers in the United States. The Institute also held a workshop with immigration-data experts from government, academics, and the private sector during which presentations and discussion raised issues particular to scientists and engineers. Reports were heard on the state-of-affairs at the major U.S. data collection agencies.

² For NAS reports see [http:// www.nationalacademies.org/ publications/](http://www.nationalacademies.org/publications/). For GAO reports see [http:// www.access.gpo.gov/ gao/ index.html](http://www.access.gpo.gov/gao/index.html).

Additionally, reports were heard from experts on the policymaking value of data that is and is not collected. Substantial discussion among the participants was heard on these topics.³

Data needs unique to scientists and engineers require a focus on elements of information, primarily having to do with labor-market skills, that are not treated in depth in the GAO and NAS reports. A focus on skills means that occupation, education, and field-of-study are not just data elements that are missing for almost all immigrants, but critical data on characteristics that are necessary to identifying which immigrants are scientists or engineers. Similarly, missing data on work experience, hours worked, earnings, and other labor force indicators, should be available for all immigrants, but they are basic to tracking labor market outcomes for this critical portion of the immigrant-admissions' pool.

This report does not go into depth on the specifics of data collection, past problems, or other issues, pertaining to specific elements of data or information collect by U.S. agencies in administrative or survey data systems. Rather, those details have been covered in the prior reports by ISIM, GAO, and the NAS. This report focuses on the managerial/organizational and data *priorities* that policymakers should keep in mind as they set out to improve data on immigrant scientists and engineers.

ORGANIZATIONAL STRUCTURE AND RELIABLE AND TIMELY DATA

Any recommendations on improving data on scientists and engineers must start with the organizational structure of the data-collection enterprise. In particular, the recommendations that follow are addressed largely to the Immigration and Naturalization Service. Certain data elements are not collected by the INS or other agencies, and in many cases data that should be available is either not assembled, or the data is mismanaged and subsequently unavailable for analysis. Official and unofficial data reports have not been forthcoming on a regular schedule and are often years later than anticipated.

³ See B.L. Lowell, 1999 in the bibliography to this report.

Some of these data problems have to do with the inertia of administrative agencies whose emphasis is on collecting and analyzing the minimal data elements required to meet administrative goals. Simple counts of events and transactions often satisfy managers who want to allocate salary and operational funds or justify programs. However, policymakers need data that is complete, reliable, and available for their consideration on a timely basis. *Administrative data*, in short, oftentimes falls short of the quality and kind of *statistical data* policymakers need. There are, nevertheless, happy mediums where administrative data can be brought up to quality standards and, more often than not, with minimal additions generate statistics that can readily provide policymakers what they need.

What is lacking is the organizational structure that elevates the *management of statistics* to the level where governmental agencies accord that function the independence and the authority it needs to meet standards of quality and comprehensiveness. Congress is well aware of the organizational mandate needed to elevate administrative data goals to meet the complementary goal of the creation and analysis of statistical data.

The GAO reported in 1998 on the compliance of the INS and the Census Bureau—the two primary agencies that collect data on the foreign born—with "federal guidance on the production of demographic information on the foreign born." To that end, the GAO drew upon the guidelines in the NAS's 1992 report *Principles and Practices for a Federal Statistical Agency*, as well as the OMB's *Statistical Policy Handbook*. The GAO, in narrowing its evaluation, compared the two agencies on their:

(1) *Independence*—The INS's Statistic's Branch does not meet the three GAO criteria very well, especially the criteria of independence. In comparison, the U.S. Census Bureau's Population Division, housed in one of the United State's primary statistical agencies, meets most of the criteria of independence.

(2) *Coordination of the production of information with other data agencies*—The INS has pursued *ad hoc* mechanisms for coordination with other agencies, though not as thorough as the sustained coordinating activities pursued by the U.S. Census Bureau.

(3) *Capacity to produce information*—The INS reports on nine (56 percent) of 16 data elements required by law (8 U.S.C. 1103(d)). Some data elements, such as emigration, cannot be readily collected for technical reasons, others are simply not reported due to problems in underlying data systems. Nevertheless, the GAO concludes that the Statistics Branch has recently made progress in improving its capacity.⁴

Independence: Authority, Scheduled Data Releases, and Oversight

Our recommendations are made in the context of significant Congressional interest in the restructuring of the INS. In its final report, the U.S. Commission on Immigration Reform concluded that the INS suffers from mission overload and that, essentially, it would be best to divide the agency into service and enforcement functions (CIR 1997). The Administration opposed the specific reorganization plan offered by the Commission, but it agreed with the essential argument that the two functions should be separated. Subsequently, INS developed its own reorganization plan, calling for separate service and enforcement divisions reporting to the Commissioner. At this point in time, there are several bills introduced into Congress that call for restructuring.⁵ In one way or the other, these bills would divide the service and enforcement function within the Department of Justice (either separately or reporting to the same Associate Attorney General).

The time is propitious for a basic restructuring of the immigration statistics function within the federal government. Because of the centrality of statistics to managing and evaluating immigration, and the evident lack of importance given statistics by administrative personnel of either services or enforcement, the statistical function must be elevated and given the authority it

⁴ The Statistics Branch improvements in its capacity are covered in the companion 1998 GAO reports (see Table 1 in this paper). Of eight recommendations in the 1985 and 1996 NAS reports (see Table 2 in this paper), the Statistics Branch has partly or substantially implemented five.

⁵ The "Immigration Reform and Improvement Act of 1999" (H.R. 2528) would split the INS into two separate agencies, at Justice, one devoted to enforcement and other to service. The "INS Reform and Border Security Act of 1999" (S.1563) would create a new Immigration Affairs Agency within the Department of Justice and would give it authority over both enforcement and service. In the U.S. House of Representatives, the Immigration Restructing and Accountability Act of 1999 (IRAA) would create a National Immigration Bureau (NIB) within the Justice Department and would establish separate NIB divisions for adjudications, enforcement and detention.

needs. For example, the Bureau of Labor Statistics at the U.S. Department of Labor operates independently in pursuing its statistical mandate. Like the BLS, the INS has significant responsibilities and a wide range of collection activities that must meet public tests of reliability and independence. The statistical function of the agency must be given the authority required to ensure that it meets its administrative, research, and policy imperatives.

Congress should establish an independent Bureau of Immigration Statistics. The NAS test of independence calls for a statistical branch to be established by statute as a separate entity, to be headed by a career civil servant, to require no approval for the release of data, and to have predetermined/scheduled data releases. In its 1998 evaluation of the current structure, the GAO concluded that the INS's Statistic's Branch is "not independent as NAS defines the term." Currently, the INS Statistics Branch is housed in the Office of Policy and Planning (OPP) of the INS, which must approve data prior to release. Headed by the Executive Associate Commissioner for Policy and Planning, who reports to the Commissioner of the INS, OPP has responsibility for a wide range of functions and often is the focal point for troubleshooting and defending INS policies and procedures. The INS Statistic's Branch is neither structured for the kind of independence recommended by the NAS, nor has it been able to establish protocols that permit it to release data in an independent fashion. An independent Bureau of Immigration Statistics, organized in conformance with NAS' recommendations for independence, would have greater and more direct authority over data collection and priorities, and would not require approval for the release of data (which can slow and politicize data release).

The Bureau of Immigration Statistics should be given the authority to coordinate across federal agencies. Coordination with other agencies should be regular and ongoing, preferably including long-recommended proposals to share and to link data across agencies. The INS has convened the quarterly Federal Interagency Working Group on Immigration Statistics. That group has had success in helping to initiate regular nativity questions on the CPS, as well as funding for a pilot longitudinal survey of new admissions or green cards. However, the group works on an informal basis with little ability to bring about data linkages. Congress can play an important role by creating guidelines that encourage appropriate data sharing across agencies, establishing the

framework and legislation necessary.⁶ It should give the Bureau of Immigration Statistics the mandate to create the unified collection and reporting of all immigration data.

A Division of Data Development and Quality Assurance should be established within the statistical unit. The Division's mandate would be to take primary responsibility for overseeing all internal data systems development, as well as, to oversee external contractors. The INS has undertaken extensive new data systems development in the past several years, but both internal and external groups working on these systems have met with significant setbacks.⁷ The Division would develop comprehensive goals, performance measures, and conduct regular progress reviews. It would troubleshoot and develop contingency plans; and it would have the authority to push them through if necessary. The Division would combine both planning and oversight functions and serve as an independent auditor of all immigration data systems.

There must be a clearly defined prioritization of data elements and collection, timetables for accomplishing them, and a set schedule of statistical reports. The Statistic Branch has no predetermined schedule for the release of much of its data and it has not been able to release a variety of data on a timely basis, including the INS's most comprehensive data published in the complete *Statistical Yearbook* which is incomplete and running two years late at this point in time. Only by meeting scheduled releases of data that meet criteria of reliability or quality, releases that make their projected due dates, can the INS ensure that its statistical reporting will be received without scepticism. Late or incomplete reporting creates mistrust among data users and raises the suspicion of political manipulation among policymakers.

A Standing Advisory Committee should be formed to review immigration data systems, as well as to comment on methodologies, statistical standards, and data quality. A committee comprised of statistical experts in and outside of government would improve the Bureau of Immigration

⁶ See also GAO 1998, *Statistical Agencies: Proposed Consolidation and Data Sharing Legislation*. GAO/T-GGD-98-91; and NRC (National Research Council) 1999 *Record Linkage Techniques—1997 Proceedings of an International Workshop and Exposition*. Washington, D.C.: National Academy of Sciences.

⁷ See "Follow-up Review Immigration and Naturalization Service Management of Automation Programs," Audit Report 99-19. July 1999 (<http://www.usdoj.gov/oig/au9919/9919tc.htm>). This audit report follows the eight automation programs institute since 1995 and the Office of Information Resources Management (OIRM).

Statistics ability to identify problems and enhance the reliability of its output. It would raise the reputation of its data among various user groups. While the INS has sought outside input from experts on data estimates, as well as data collection for research evaluation, the GAO is correct in noting that a standing advisory committee can be much more effective in improving data quality. The standing committee would have the continuity needed to avoid reinventing the wheel on old data issues, and to follow through on its recommendations.

BASIC OCCUPATION AND EDUCATIONAL CHARACTERISTICS

It is not possible to identify scientists and engineers unless information is available on the occupation and/or educational characteristics of individual migrants. While this seems only obvious, it bears repeating because data on the occupation and education of immigrants is oftentimes either nonexistent or inadequate. This data is absolutely necessary to identify highly-skilled immigrants, as well as to permit policymakers to adequately evaluate the labor market consequence of admission policies.

Occupational data is collected at the point of entry into the United States. The INS, the Department of State, and the Department of Labor, either collect, or are in a position to collect, information on individual occupations and working skills. The INS collects data on permanent admissions (LPRs) and the Department of State collects information on visa issuances. The Labor Department collects data from employers applying for approval to hire foreign workers (see employer data below), and that data could, in principle, be linked over to the INS to classify immigrants admitted to fill specific jobs. However, there are inconsistencies in the occupational data that are collected and educational data are missing completely.

Basic occupational and educational data should be collected for all working-age legal permanent residents (LPRs) and selected temporary-working nonimmigrant (NIV) classes.⁸ The

⁸ All persons 16 and over in the LPR stream are able to work in the U.S. labor market. On the other hand, work is authorized for only a select set of temporary "working" visas: H-1B speciality workers; H-2B temporary nonagricultural workers; E visas treaty traders and investors, L intracompany transferees; TN professional workers as part of the North American Free Trade Agreement; O extraordinary abilities in sciences, arts, education, business, or athletics, and those assisting in their athletic or artistic performances, may include scientists and engineers; P internationally recognized entertainers and athletes, artists or

LPR data that has been collected historically is crude and there are instances when its priority has been disregarded. Education simply has not been collected for either permanent or temporary immigrants. As far as occupation is concerned, the priority should be for the collection of data on all LPRs and all working temporary visas. The corollary for this priority must be the use of the same occupational classification scheme by the involved agencies. As far as education is concerned, the minimal data priority should be years of education. However, additional information would be of value and could either be included in administrative collection systems or as part of special surveys (see discussion below).

Occupational data are necessary to meet the reporting requirements of the Immigration Act of 1990, as well as legislation in 1998, yet there is no available detail on the occupations of temporary nonimmigrants. To date, the occupations of temporary migrants can at best be loosely inferred from the Department of Labor's data on the occupations of those jobs which employers are applying to have approved for the authorization of a foreign worker. That data, however, is not linked with INS data on the approval of a specific foreign worker to the approved employer. And because the INS has not collected data independently on occupation, it has not been possible to count the number of individuals scientists and engineers admitted in temporary status.⁹ Interagency collaboration could permit Labor's data on occupations to be used to identify the job/occupation for which a temporary or permanent visa is issued.

All agencies that collect data on immigrants' occupation should adopt a common occupational classification system. Beside different levels of detail, the administrative agencies collect occupational data on immigrants using different classification systems. The INS collects occupation for LPRs using crude classifications unique to the agency, the Census Bureau follows the Standard Occupational Classification (SOC) in Census and Current Population Survey data, the U.S. Department of Labor (including BLS) uses the Dictionary of Occupational Titles

entertainers; Q participants in international exchange programs; R religious workers; and J exchange visas may include researchers, scholars, *au pairs*, and camp counselors.

⁹ The I-94 entry/exit form that is used to track temporary workers has a question on occupation which is not always answered, much less keyed into the electronic database. Steps have been taken by the INS to collect data on the occupations of temporary workers in the "CLAIMS" database of petitioners. There should be an independent evaluation and Congressional evaluation of the timeliness and quality of the prospective databases.

(DOT), while the BLS Occupation and Employment Survey currently uses yet another detailed classification scheme.

These differing classification schema can be translated from one to another with a some degree of success, but efficiency and data reliability strongly argue that the agencies adopt a common standard. It would seem reasonable that the agencies involved adopt the Standard Occupational Classification (SOC) as the U.S. Census uses the SOC, and because the Bureau of Labor Statistics and National Science Foundation are planning on using the SOC more or less exclusively.¹⁰

Years of completed schooling should be collected as a regular data item on permanent and temporary-working immigrants. Surprisingly, there is no data collected on the education of immigrants.¹¹ At the least, policymakers should know the years of schooling completed by immigrants. The single most important skill or "human capital" in the labor market is the number of years of education that an individual has completed. A special purpose survey of LPRs finds that there are marked differences, for example, between the years of education completed by the typical family- as compared with an employment-based immigrant (Jasso et al. 1997). Simply knowing years of education completed would help bring closure to ongoing debates about the work-qualifications of immigrants for today's post-industrial economy. Especially for the working visas, it would be valuable to know a number of additional facts about education. These additional pieces of information are a priority, but they are not as critical as collecting simple years of education. The data might be collected as part of an ongoing data collection effort, or it could be collected through a small, random samples of admissions (see discussion below). Such information would include the field-of-education for high-skilled immigrants, as well as the specific degree completed.

¹⁰ Depending on the immigrant class, more or less detail could be collected. More detail would permit us to identify, for example, computer programmers who are currently not identifiable in the INS classification system used for LPRs. Lesser detail, however, is required for the less-skilled occupational classes such as family-based derivatives.

¹¹ The exception to this statement are the data collected by the Department of State on visa issuances to individuals in the diversity class of admission.

BASIC DATA ON EMPLOYER SPONSORS

In order to understand the full workings of U.S. immigration policy, it is necessary to understand the employment of immigrants. A complete picture must include the demand side—the employers who immigrants work for. Employers are the institutional actors for whom U.S. policy on employment-based admissions is designed. Employers are the sponsors of immigrants and they create the socioeconomic context within which the immigrant flow, and the workforce built from the flow, takes place. Employer actions determine the economic demand for, and the treatment of, native and foreign workers alike.

Service-oriented government agencies need to track both parties to the employment-based admission system—the employer and the work authorized foreign worker. The Department of Labor and the Immigration and Naturalization Service collect basic information on employers. Labor receives employer applications to fill specific jobs, and clears those applications as meeting appropriate worker protections (e.g., unsuccessful advertising for U.S. workers, the wage offered, etc.). The INS fills clears Labor-approved petitions for specific foreign workers, collecting basic information on employers in the process.

Basic information about employer-sponsors of immigrants should be collected, in particular, industry, size of the organization, and a common employer identifier.¹² Basic information on industry and employee size should be collected—making these standard data items would ensure that they are available for policymakers. Systematically tracking industry and employer size class would help businesses and policymakers monitor shifts in national and global demand. Policymakers would have more confidence about the fit between policy and meeting national priorities, while employers would have more information to plan human resource strategy.

¹² These basic pieces of standardized data would permit us to track very basic administrative functions, as well as to track more effectively changes in labor market conditions. It is easy to imagine other desirable information, especially having to do with the nature of the foreign-workers job (hours worked, benefits, etc.), along with the organizational structure (number of similar jobs, number of professional employees, number of temporary foreign workers). However, these additional pieces of information begin to cut into time for administrative functions and they might be more efficiently collected through special-purpose surveys.

A common employer identification number should be required just so that the totality of actions taken by firms can be tracked, something both parties should find useful. Currently, neither Department of Labor or INS data permit the identification of the same employer already in the database, e.g., multiple entries by the same employer cannot be reliably linked within the database. This means that it is not always possible to count the number of temporary or permanent immigrants hired by a single employer in a given year or over time. Neither is it possible to track employers from the application process through the final sponsorship of an immigrant.

Policymakers simply do not know the degree to which the admission system serves a general cross-section of U.S. employers with special demands, or a special subset of employers who are familiar with the system. Policymakers and employers are unable to monitor the service of the INS and Labor, a cross-agency employer identifier would tell us which employers actually succeed in sponsoring an immigrant and how long it took in total time. Being able to track employers by information already keyed into the administrative data—but in a nonsystematic fashion—would permit us to estimate use rates over time and to gauge dependency on foreign workers. A common identifier could be a federal identification number for employers, and the standardized use of the legally registered name of the employer's company.¹³

ADMINISTRATIVE DATA AND THE DYNAMICS OF IMMIGRATION

Administrative data is the primary means of capturing the dynamics of the process of managing international migration. Policymakers need to know how many persons are newly arrived in the U.S. each year, but they also need to know how many individuals change/adjust from one immigrant status to another after a period U.S. residence, how long individuals stay, and how many ultimately leave the United States. Certainly, many immigrants apply for admission from abroad and have never been in the U.S. before, although most foreign scientists and engineers tend to live in the U.S. for extended periods of time before receiving "permanent" status. For example, an F student may pursue a degree for many years only to later become an specialty worker H-1B and, subsequently, an employment-based LPR.

¹³ Currently, administrative data on both Labor and INS does neither systematically include employers' EIN, nor are company names entered systematically.

Table 3 shows two basic types of immigrants who are often not distinguishable in most immigration statistics.¹⁴ "New" entrants are individuals who have never before resided in the United States, or at least individuals who have not recently resided in the U.S. within the last five years (a common demographic time period). "Transitional" entrants are those who, although counted as new to a given visa class, have actually resided in the U.S. previously. Typically, the transitional migrant has legally resided on a temporary visa to study or work (the F student example above), but unauthorized sojourners are known to adjust to legal permanent status as well. In other words, many scientists and engineers have been in the United States, sometimes in multiple visa statuses, for several years prior to their admission as permanent residents.

— TABLE 4 ABOUT HERE —

Transitional immigrants are counted as having been admitted to a given immigration status within a given year, but while they are newly achieving say a permanent residence LPR status, they have prior U.S. residency and/or experience. For example, over 90 percent of employment-based LPRs reported as admissions in a given annual INS yearbook are "adjustments," e.g., they are admitted to LPR status from within the U.S. On average, employment-based immigrants have been in the U.S. nearly four years at the time they are "admitted" to the U.S. in LPR status—they are transitional in the sense that they have already resided in the U.S., although a casual observer may read the INS annual data and mistakenly believe that the numbers represent immigrants who are new residents as of that year.

Ideally, the truly "new" and "transitional" entrants would be kept separate within the data. Policymakers should want to know the number of admissions to a status that are "new" and the number that are simply transitions from one immigrant status to another. In fact, the U.S. system is not one of mythical newcomers, but rather the reality is that of a process of settling in. Most individuals try out residing/working in the United States over some period of time in various temporary statuses before, ultimately, achieving permanent status. In turn, some aspiring immigrants fail to achieve permanent status, while a goodly share of those receiving permanent

¹⁴ The figure parallels a classificatory table on flows developed by the General Accounting Office (GAO 1998). The GAO classificatory scheme is somewhat more involved and diverges in minor aspects (e.g., no definition of "new" entrant, sojourners are not included as transitional illegal residents, etc.).

status later emigrate. In terms of the labor market, the implications of apparently "new" workers in a given year differs tremendously from the reality that many immigrants tallied in annual reports already have substantial U.S. work experience.

There are two major pieces of information that are needed to track the new and transitional statuses of immigrants. First, reliable information is needed on the history of prior immigration statuses. Second, the duration of time in prior statuses is critical to measuring annual populations, as well as tracking the function of the entire admission system. The INS has the primary data to track individual's duration of stay and prior statuses. Tracking just-prior temporary /nonimmigrant (NIV) status is done reliably for adjusters to legal permanent residency (LPR). However, the INS currently lacks the ability to link information on temporary nonimmigrants, e.g., it cannot track duration of time (in the U.S. in a given status) or link the histories of individuals who change from one nonimmigrant status to another. For that matter, the INS cannot tell when individuals have left or emigrated.

Linking Immigration Statuses

The U.S. needs a reliable administrative and statistical system to track individual transitions in immigrant status. The INS collects the relevant information for tracking changes and adjustments in status, however, that information is not always systematically kept.¹⁵ In principle, the new CLAIMS database should track admissions (match pairs of entries and exits), as well as, the totality of entries and exits made by individuals over the course of one or several years. A uniform individual tracking number would be needed to successfully track individuals across transitions in immigration statuses. Tracking changes in status should be a priority item for evolving databases. Only with such data in hand can we evaluate whether or not LPR scientists and engineers enter through what truly looks to be an apprenticeship system including temporary stays for work or study in the U.S.

¹⁵ The I-94 form issued by carriers to foreign travelers upon entering the U.S., and collected again upon exit, is not a satisfactory system. Our recommendation is for an electronic system that has the capacity to track individuals over time and across immigration statuses.

The only gauge we currently have of this process is upon adjustment to LPR status, the final segment of the linked process of residency. It is not possible with current data to know about these linked statuses— such as an NIV change in status from student to a speciality worker, followed by the adjustment into LPR status. One crude lower-bound estimate based on available data suggests, for example, that about one-fifth of the foreign students moved both from F directly, *and* indirectly through H-1B, to achieve any permanent status in FY 1996 (Lowell, 1996:8). With no regular and accurate information on change of status, it is not possible to examine whether or not increasing proportions of speciality workers (H-1B) were previously foreign students (F), which might signal changes in the academic market and graduate training.

There is no existing data that capture these transitions. If there were, it would make it possible to track occupation upon entry as a temporary immigrant and the occupation after permanent admission. How much do the occupations and earnings of temporary migrants change during their stay in the United States? These types of issues are important to highly-skilled immigrants, as demonstrated by the INS data on adjustment to LPR status. As of FY 1994, about one-third of the H-1B adjusters report science or engineering occupations, while 90 percent of intracompany transferees (L) report executive or administrative occupations upon adjustment. In contrast, neither foreign students (F) or exchange visitors (J) fall clearly into occupational grouping upon adjustment (Lowell 1996:8). Clearly, there are unique pathways by which certain occupations of highly skilled immigrants navigate from temporary to permanent status.

Duration of Stay in Status in the United States

*There is need for reliable data on the duration of time that various classes of temporary nonimmigrants have been in the United States.*¹⁶ Again, the new CLAIMS database, which aims to more thoroughly automate admissions information, may be able to resolve current problems and provide reliable estimates of duration of stay in the future. The resolution of technical difficulties, and the regular reporting of duration of stay, should be targeted as a statistical priority.

Duration of stay information is critical for evaluating the relationship between "temporary" jobs and cycles in the economy. More importantly, duration of stay information gives a direct gauge of the adequacy of the time limits set by policy (or not). And with duration of stay information it is possible to estimate the average year-round population. This is the "average" population, reflecting just the portion of a year that all individuals spend in the United States. For example, the person-year population is the full-time equivalent contribution of working visas to the labor force — if there were 100 temporary workers with an average stay of one-half year, they would contribute 50 person-years' worth of labor in that year. In 1994, the only year for which an estimate is available, a "year-round population" of 1.4 million temporary migrants was estimated,¹⁷ including some 48.8 thousand temporary workers and trainees, 89.7 thousand exchange visitors, and 20.8 thousand intra company transferees. Obviously, the person-year population is much more relevant gauge of the contribution that "temporary" workers make to the labor force.

¹⁶ The INS provided estimates of duration of stay for nonimmigrants through the FY 1992/1994 period. Unfortunately, those estimates were based on the I-94 form collected by U.S. air carriers and were incomplete, as well as, inclusive only of persons traveling during the year. The estimates seriously undercount durations of stay of persons who do not travel during the year, or who accumulate multiple trips during a year (Lowell 1999). The CLAIMS database at the moment does not seem able to overcome these deficiencies.

¹⁷ This figure is not inclusive of migrants from visa-waiver countries. Note that these duration of stay estimates from the INS are imprecise on other grounds. They measure the time only between entry and exit only for those who travel within a given year, and they track only trips and not individuals. In other words, migrants who do not travel (longer-term stayers) are not included in the estimate (reducing the estimated person-year population), and if an individual makes several trips their true stay is underestimated (again reducing the estimated person-year population).

And finally, a reliable administrative and statistical would permit us to know when an individual left the United States for extended periods of time. In particular, we could tell when temporary migrants left "for good." Thus, we would know final departure for those who do not remain in the United States. We would know the true length of stay of those who choose not to enter into permanent U.S. residency.

RANDOM SURVEYS TO COLLECT STATISTICAL DATA

The demands of a statistical record and an administrative record differ. For a statistical record descriptive information is needed on the characteristics of individuals and the quality of such data must be strong. However, the statistical record must include information not always central to the more minimalist needs of the administrator who manages workflow on basic counts. Much of the data systems just outline above could collect the more inclusive information of a statistical record, e.g., information such as occupation, education, intended residence, accompanying family members and so on.

Yet, the most powerful aspects of a reliable administrative system is the reliable tracking of movements of individuals in and out of the country; and additional data collection can interfere with the simplicity that helps ensure reliability. Of course, some statistical information need only be gathered for individuals who are, for example, work-authorized temporary migrants—it is not necessary to collect this detailed information for tourists or similar travelers. A reasonable balance of data elements can achieve both ends, especially if data elements are collected for targeted groups of migrants and not the entire flow.

Random samples of individuals taken outside of the normal routine of administrative data collection are another way to get the statistical information that policymakers regularly call for and need to reach informed decisions. The New Immigrant Survey that took a small sample of green carders in 1996 is one such example (Jasso 1997). From it we have learned much about the skill characteristics and working conditions of new permanent immigrants. A report by the General Accounting Office (GAO 1992) provides an example of the insights to be gained from a small sample of temporary H and L nonimmigrant workers. Such samples should not be

idiosyncratic and irregular, but rather they should be conducted on a regular basis, perhaps yearly or every other year.

Data elements that would impose an unwarranted burden on administrative systems, or elements that pertain to special subjects not of regular interest, should be collected in random surveys. Of course, educational information, beyond years-of-schooling, is complex to collect and might be best gotten through special purpose surveys, rather than administrative data. Especially for the working visas, it would be valuable to know a number of additional facts about education. These additional pieces of information are a priority, but they are not as critical as collecting simple years of education. Such information would include the field-of-education for high-skilled immigrants, as well as the specific degree completed (e.g., bachelors, masters, or doctoral degree).

Other skill-relevant information could, likewise, be supplemented with special purpose surveys. In particular, it would be valuable to know information on work experience abroad such as years in the labor force and prior occupation. Given that a significant proportion of new immigrants report no occupation upon arrival, and that an unknown proportion change occupations once here, it would be valuable to track the direction of occupational mobility.

However, an individual's primary occupation classification itself does not capture all science and engineering workers. It is possible that an individual would be listed as having a managerial occupation and, thus, not be classified as a scientist or engineer. Information on field of education, along with industry of employment, would help to identify persons who are working in the sciences or engineering. Such information would help identify occupational mismatches, or the degree to which foreign scientists and engineers are able to translate their training into gainful employment which is in the U.S. national interest. Knowing where an immigrant's degree was granted, here or abroad, would also help to supplement the National Science Foundations inter-censal data on degree-holders from U.S. institutions.

Finally, English language ability could prove to be particularly valuable to know. Research has found that English language ability is critical to the mobility of immigrants. While we might expect many highly-skilled immigrants to be English proficient, this is not necessarily the case.

Again, the 1996 special-purpose survey of LPRs demonstrates a significant range of proficiency among admission classes.

MEASURING THE RESIDENT POPULATION: SUPPLEMENTING THE CPS

Administrative data, such as that discussed above, is the best source of information on the entry of migrants into the United States. The stock or resident population is captured best by the U.S. Census and by standard large-scale surveys, in particular the Current Population Survey (CPS). Indeed, these two sources of data have been the pre-eminent sources of information used by researchers who study immigrants.

The internationally accepted definition of residents requires a year of residency in a country, which happens to correspond loosely to the criteria for inclusion in national samples. Typically, "usual residence" (six months or more) in the past year qualifies an individual for inclusion in the Census or the CPS sample. Resident status should be presumed for most individuals admitted as legal permanent residents (LPR), but casual observers are often surprised at the range of other legal categories that included in the CPS samples.

Many classes of foreign-born persons in the U.S. with "temporary visas," a.k.a., nonimmigrants, often reside in the United States over periods of six years and more. Consider foreign students studying at U.S. institutions or H-1B workers who reside for long periods. These persons will be counted in the CPS, as will other classes of individuals covered by legal categories such as temporary protected status (TPS). At the same time, even most illegal residents are thought to be counted in the U.S. Census or the CPS.

Special Immigrant Supplement CPS

There should be a pilot CPS supplement on immigrants, and it should include survey items that permit researchers to investigate policy-relevant issues. The determination of items to be included in the survey should be arrived at after soliciting input from various agencies, the research community, immigrant advocacy groups, and other stakeholders. At the least, a special

supplement could shed light on the effect of immigrant status, U.S. experience and residence, where and how much education is completed, and language ability.

While the Census, CPS, and similar national surveys are the best source of data on the stock or resident foreign-born population, they fail to identify immigrant status. Standard surveys identify only two statuses for the foreign-born, e.g., whether they are technically non-native non-citizens (i.e., aliens), and whether or not they are naturalized citizens:

Native U.S. Citizen

Foreign-Born Resident

 Naturalized Citizen

 Alien Resident

 Legal Permanent Resident (LPR)

 Refugee or aslyee

 Legal temporary nonimmigrant visaholder (NIV)

 Illegal resident

There is no legal requirement that government surveys identify the foreign borns' immigrant status and there would be technical problems in trying to do so. Many immigrants do not know their specific status, especially after living in the U.S. for many years. There is good evidence that many aliens misreport being naturalized citizens. Asking for immigration status might discourage illegal aliens from participating in surveys.

Nevertheless, our ability to adequately evaluate immigration policy is severely hampered by not being able to track labor market and other outcomes. These special surveys are the only currently available data for most studies of the adaptation of immigrants. Yet, research clearly demonstrates that data that are limited to describing all foreign-born residents yield misleading conclusions. It might appear from the bimodal distribution of education (averaged across all foreign born residents) that, for example, the legal admission system does not admit well-educated immigrants.

However, the "legal admission" system admits primarily better educated immigrants, especially in the employment-based classes of admission. Survey data that does not distinguish immigrant status includes refugees and illegal residents and both groups include large shares of adults with less than a high school education. Refugees are admitted for humanitarian reasons (not skills), and the effects of illegal residents should be kept separate from the legal admission system. Policy prescriptions based upon averaged data can be misleading.¹⁸

Demographers have been able to impute immigration status to persons in the CPS, i.e., they presume that immigrants with particular characteristics are, in fact, of a particular status. For example, country of origin and year of entry are two characteristics that permit researchers to confidently proxy aliens as refugees if they arrived during the 1970s from Vietnam.

A special CPS supplement could include questions designed to determine immigrant status. Researchers have given thought to questions that help differentiate at least broad categories such as legal permanent resident, refugee, temporary status, or other (likely illegal). Additional information on education, sponsorship, and other items could help further identify a respondent's immigration status.

Knowing more about educational characteristics would, in and of itself, help disentangle other questions. It would be useful to ask surveyed immigrants where they had received an advanced education, and which degree and field. This would permit us to more accurately estimate the number of college-educated immigrants, by using these data to supplement NSF data. The NSF data are the nation's best on the total U.S. college education population, but they fail to include non-U.S. educated immigrants. Scientists and engineers are particularly susceptible to significant numerical undercounts in the NSF data. An inter-censal CPS would help to improve our knowledge of this group of highly skilled immigrants.

¹⁸ This discussion here refers just to broad immigration status, yet even within broad groupings status matters. For example, data on employment-based admissions often averages together the age, occupation, etc., of both the principle immigrant (who must meet visa requirements) and accompanying or derivative spouses.

A brief set of questions probing past U.S. experience would yield answers to several policy-relevant points. Time in the United States is one of the best predictors of immigrant success. Over time immigrants tend to earn more, to improve their English ability, and, for many, they become naturalized citizens. Yet, the single questions on time in the United States in various surveys are unreliable measures of true time, a sophisticated set of questions could point to improved measurements. Appropriate questions would also shed light on the likelihood of a respondent being in one of various immigration statuses.

The Census includes questions about self-reported English spoken ability. However, this self-reported measure is of uncertain quality and it is a narrow assessment of English abilities. The usual monthly CPS includes no questions on English ability, but a special supplement might include questions on hours of formal training, and pilot improved methods of measuring ability.

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Table 1. Reports by the Institute for the Study of International Migration (ISIM)

- *Data on Foreign Scientists and Engineers: Report on a Workshop.* Institute for the Study of International Migration, Georgetown University. 1999.

The report includes short descriptions and critiques by relevant government experts of the major data elements collected by the Immigration and Naturalization Service, the U.S. Department of State, the U.S. Department of Labor, and the National Science Foundation. Four short papers describe the results data from the major national Census and Current Population Surveys, as well as, special purpose surveys of greencarders and temporary work-authorized immigrants. Five papers describe particular policy lacunae created by the lack of special-purpose data, for example, on employers who sponsor employment-based temporary and permanent workers or their working conditions.

- "Statistics on Foreign Scientists and Engineers." Institute for the Study of International Migration, Georgetown University. 1999.

Data sources for studying foreign-born scientists and engineers roughly divide into data on flow (administrative data) and data on stock (general and special-purpose surveys). Administrative data should, in principle, permit us to fully track changes and adjustments in status, but do not. General purpose and special-purpose surveys give us a much better idea of how the population is employed. However, the most widely used data for analyzing the labor market, the U.S. Census and CPS, suffer from oftentimes small samples and the crudity of distinguishing only between naturalized citizens and resident aliens. The NSF special-purpose surveys are extremely valuable for tracking the U.S. educational system, and they have some detail on visa status, but the most generalizable NSF data exclude S&Es educated in other than U.S. institutions. It should be a priority to collect reliable occupation data for temporary and permanent admissions. Reliable entry and exit data on individuals may soon be available, for its security and enforcement value, but hopefully also for its analytic value for debates over changes in the measure of the supply and demand of S&E workers. Finally, fully linking the status trails of the immigrant system — changes and adjustments of status — should be doable and is essential for evaluating how legislative intent is unfolding on the ground.

Table 2. Reports by the National Academy of Sciences (NAS)

- *Immigration Statistics: A Story of Neglect*. Commission on Behavioral Social Sciences and Education. Washington, D.C.: The National Academy of Sciences. 1985.

Report by group of government and academic specialists. It reviews the history of U.S. immigration legislation and data needed on legal immigrants, as well as techniques used to estimate the size of the population of illegal residents. The report evaluates statistics for immigrants, refugees, and illegal aliens, and the reliability of available data systems and estimates. It makes recommendations on data that policymakers need on immigrants, and specific recommendations on how to collect and improve upon existing data systems. Almost all of the conclusions and recommendations of this report are current today.

- *Statistics on U.S. Immigration: An Assessment of Data Needs for the Future*. Commission on Behavioral Social Sciences and Education. Washington, D.C.: The National Academy of Sciences. 1996.

Report of a group of government, academic, and statistical-user specialists that revisits many of the concerns raised a decade earlier in the 1985 report *A Story of Neglect*. However, the report evaluates data needs in the context of research areas that policymakers and social scientists often inquire into, e.g., measuring trends, economic and labor force impacts, assimilation, and social and family networks. Recommendations are made for special surveys (foreign-born items on the CPS, longitudinal green-card surveys), as well as for improved data collection and data linkage capability at U.S. agencies that collect immigration data.

- *Principles and Practices for a Federal Statistical Agency*. Commission on Behavioral Social Sciences and Education. Committee on National Statistics. Washington, D.C.: The National Academy of Sciences. 1992.

A definitive set of standards, in part derived from parts of prior NAS reports, for "the fundamental characteristics that define a federal statistical agency and its operation." Four major dimensions are discussed—the definition, principles, practices, and the establishment of a federal statistical agency. The statistical function needs independence from larger administrative operations in order to emphasize the principles and qualities of an effective statistical agency. This report is the basis upon which the GAO evaluates the effectiveness of the INS statistical function in its 1998 report *Immigration Statistics: Guidance on Producing Information on the U.S. Resident Foreign-Born*.

Table 3. Reports by the General Accounting Office (GAO)

- *Immigration Statistics: Information Gaps, Quality Issues Limit Utility of Federal Data to Policymakers.* GAO/GGD-98-164. Washington, D.C.: U.S. General Accounting Office. 1998.

This GAO report focused on data quality, the measurement of the "admissions" or the flow of immigrants, and issues surrounding administrative versus statistical data. The GAO made a systematic study of data gaps in INS and Census data. They noted a need at the INS for more accurate flow-data on entries and exits, and an inability to identify immigrant status. The GAO recommended that the INS evaluate those problems and work to improve the data where possible.

- *Immigration Statistics: Status of the Implementation of National Academy of Sciences' Recommendations.* GAO/GGD-98-119. Washington, D.C.: U.S. General Accounting Office. 1998.

The GAO evaluated the implementation of 1985 and 1996 National Academy of Science (NAS) recommendations, primarily at the INS, most having to do with methodologies to collect better data and eliminate duplication and improve management. The GAO found that the INS and other agencies did make some progress in implementing various recommendations. Indeed, the GAO concluded that 15 of 19 recommendations have been partly to fully implemented by the various agencies. However; it was concluded that the INS has not implemented certain recommendations, and that the INS should review specific data needs and uses, improve the question and format design on its administrative forms, standardize definitions and concepts, and introduce statistical standards and procedures.

- *Immigration Statistics: Guidance on Producing Information on the U.S. Resident Foreign-Born.* GAO/GGD-98-155. Washington, D.C.: U.S. General Accounting Office. 1998.

The GAO reported on the management/organizational structure of the statistical enterprise on immigrants at the INS, the Census Bureau, and elsewhere. In particular, agencies that collect immigration data are evaluated according to guidelines for statistical functions developed by the National Academy of Sciences in a 1992 report. The GAO noted that the INS statistics branch has made progress in increasing its capacity, but that its capacity is limited because it reports on just 9 out of 16 data "elements" listed in the Immigration Act of 1990 (such as the occupation of temporary migrants, etc.). The report found that information required by the Immigration Act of 1990 that should be included in the INS annual report was not reported, including non-immigrants' occupation and non-immigrants' duration of stay. Timeliness was also noted as an important aspect of a statistical division's independence (adherence to predetermined schedules for the release of data), which the Census Bureau follows and the INS is working on.

Table 4. Counting the Annual Flow of Immigrants

LEGAL STATUS	NEW ENTRANTS	TRANSITIONAL
(1) Legal Permanent Resident (LPR) ¹	No prior US residence ²	Prior US resident adjusting to LPR status (from 2, 3, 4)
(2) Refugee and Asylee	No prior US residence ²	Some prior US residence prior to filing or waiting for determination of status (from 3,4) ³
(3) Temporary/nonimmigrant (NIV)	No prior US residence ⁴	Some prior US experience/residence for persons changing status between visas (from 3) ⁵
(4) Illegal resident	No prior US residence ²	(a) Prior US experience as NIV (e.g., visa overstayer from 3); (b) Prior US experience as sojourner (from 4).

NOTES:

¹ LPRs applying for naturalized citizenship currently wait 18 months on average for their paperwork to be processed and approved. Technically these individuals are in LPR status, however, high proportions are eligible to be citizens and are simply waiting for their final paperwork (e.g., the rejection rate has been low until recently).

² This categorization of "significant" prior residence permits persons to be counted as "new" who may have resided in the US previously (i.e., for at least most of one year), but, for our purposes, not within the immediately previous five year period.

³ Since 1997, seekers must apply for asylum status within one year of residing in the United States. In the past, persons in the US for a year or more were eligible to apply for asylum.

⁴ See footnote two and note that an individual who is admitted as an F student may have been in the US briefly during the previous year as a B tourist, or a business persons last trip to the United States may have been well over five years previously (e.g., the term of the visa had expired).

⁵ A special class of persons covered by Temporary Protected Status (TPS) would likely fall in this category. The TPS individual may have applied from another legal status, but mostly persons who are illegal entrants make up the bulk of the TPS population. The Attorney General grants TPS status to classes of such individuals who have prior US residence. Some may eventually return to their home country, many others ultimately achieve LPR status.

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STATISTICS ON FOREIGN SCIENTISTS AND ENGINEERS*

October 1998

by

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STATISTICS ON FOREIGN SCIENTISTS AND ENGINEERS

Technology in the United States continues to drive an economy demanding highly-skilled workers, and scientists and engineers (S&Es) are the core of the new economy. The foreign worker has been playing a role in greater numbers in all S&E fields since the 1970s. Currently, information technology is a leading growth sector with rapid increases its native- and foreign-born labor force.

This paper addresses the measurement of S&E workers, native-born, foreign-born residents, and temporary nonimmigrants. It does not enter into the debate over shortages of worker supply in the United States. It does discuss, in a non-comprehensive but systematic way, the basic data sources that are used to estimate the flow and the stock of S&E foreign workers in today's labor force.

ADMINISTRATIVE DATA SOURCES (FLOW)

Foreign workers in the sciences and engineering enter the United States as temporary workers, students or exchange visitors, and permanent residents. Admission to the United States is authorized by different rules for each visa class and, correspondingly, there are varied sources of administrative data collected.

Temporary Classes of Admission

Admission classes for temporary migrants fall into two broad categories, those that are specifically for work-related purposes (work authorized) and those for which the visa is primarily issued for other reasons upon which work authorization is contingent (students and exchange visitors).

Work Authorized. Work is authorized for only a select set of temporary “working” visas. These are largely oriented toward special-purpose occupations, international trade purposes, and for employment by multinationals.

H-1B speciality workers are professionals and highly skilled individuals in specialty occupations. They are sponsored by employers who must first submit and have approved by the DOL a Labor

Condition Application (LCA) in which they attest that they will pay the actual or prevailing wage, not adversely affect the working conditions of U.S. workers, that they will post the job and that there has been no strike or lock out. There is legislated time period on the DOL's review of employers' applications. The Immigration Act of 1990 recognizes that many employers hire nonimmigrants with dual intent, i.e., as temporary workers at the moment and as potential additions to their permanent workforce. The legislation permits entry of nonimmigrant H-1B workers who possess an intent to immigrate at some future time, with a duration of no more than six years. The H-1B visa generally requires a baccalaureate or higher degree.

H-2B visa for temporary nonagricultural workers permits entry for nonprofessionals who work in science and engineering fields.¹ This category requires that the employer first submit and have approved by DOL a labor certification which requires that the employer fulfill a number of wage and working conditions that demonstrate that the job will not adversely affect similar workers. It requires provision and scrutiny of employer evidence that insufficient U.S. workers were able, willing, qualified, or available for hire and, typically, takes some time to process. The program has a double temporary requirement, i.e., that both the job be temporary or seasonal and the workers may only remain for temporary periods. About one-half of the H-2B entrants are for low-wage, low-skill occupations such as seafood, hotel, and resort industries. The higher-skilled H-2Bs appear to be in health-related services or engineering.

E visas for treaty traders and investors do not require labor market testing and attestations or certifications are not required. The E visa entitles a temporary alien to enter the United States under the provisions of treaties with foreign nations to carry on trade, including trade in services or technology, and develop or direct the operations of an enterprise.

L visas for intracompany transferees are employed by a multinational company and do not require labor market testing and attestations/certifications are not required. The classification dates from 1970 and requires that the alien has been employed continuously for one year by a firm or corporation or other entity to render temporary services to their employer in the capacity of a manager, executive, or position of specialized knowledge. The Immigration Act of 1990 amended previous requirements and permits dual intent, i.e., the worker may possess an intent to immigrate permanently at some future time for a position which may be permanent. Stays are from between five and seven years.

¹ H-2A agricultural workers, although the numbers are small, also require a labor certification by the U.S. Department of Labor, as do D visas for foreign crewman.

TN professional workers are citizens of Canada or Mexico and the category was created by the North American Free Trade Agreement (and TN refers to “Trade NAFTA”). Their status is somewhat analogous to H-1 workers; however, the TN category remains separate, distinct, and the number of TNs is in addition to other working visas issued to Canada or Mexico. Presently, TN professionals from Canada are exempt from visa requirements, whereas Mexicans must first obtain a visa with requirements that are similar to the H-1B before they can be admitted to the United States in TN status. The applicant must have a baccalaureate degree or appropriate professional credentials and stay for up to one year with no limit on the number of extensions.

O visas are for aliens with extraordinary abilities in sciences, arts, education, business, or athletics, and those assisting in their athletic or artistic performances, may include scientists and engineers.² The individual must demonstrate sustained national or international acclaim and must be entering the U.S. to work in his or her particular field. Petitions are filed with the INS.

Students and Exchange Visitors. Both the foreign student (F) and the cultural exchange visitor (J) visas are intended primarily to promote both formal education and learning by experience, and both permit limited work authorization.

The foreign student (F) is admitted with the understanding that they have no intention of abandoning their home country and these visas are issued only to students who are attending INS-accepted institutions. Work authorization is generally restricted to campus with one year of off-campus work (practical training) allowed. Work may also be authorized if a student faces financial hardship and students from certain countries may on occasion be granted blanket work authorization due to economic crises in their home countries. The number of such workers is essentially unknown.

The exchange visitor (J) visa may partly be governed by international agreements, some may only study, while others engage in significant work activity during their stay. The USIA regulations state that the underlying purpose must be to stimulate international collaborative teaching and research efforts or to promote interchange between research and education institutions. Although

² P visas for internationally recognized entertainers and athletes, artists or entertainers on an exchange program or under a culturally-unique program are applicable to those who cannot qualify as extraordinary. Stay is limited to the project or training program. Q visas for participants in international exchange programs were created by the Immigration Act of 1990 and allow entry for prearranged employment with comparable wages and working conditions to domestic workers. Cultural exchange is the underlying motive for admission. The 1990 Act also established R visas for religious workers to meet the need for nonprofit religious organizations that have different requirements for jobs from the business world (e.g., B, H, or Js). Additional workers, such as researchers, scholars, *au pairs*, and camp counselors, enter under the J visas (see text).

many (those funded by U.S. institutions and paid the prevailing wage) could qualify under the current H-1 category and some of extraordinary ability could qualify under O, most who are funded from abroad or who are paid less than prevailing wage qualify only under J. There are number of separate subcategories of J visas including trainees, students, teachers, and physicians.

The vocational student (M) visa is used for vocational students, who are prohibited from any employment except for postcompletion of studies and practical training.

Permanent Classes of Admission

Permanent resident admissions are given to several classes of immigrants the two broadest of which, family-based (FB) and employment-based (EB), are generated, respectively, through the sponsorship of an immediate family member or an employer.

Family Based. The family-based admissions dominate the flow of immigrants into the country. Any family-based immigrant may work in the United States. These categories do not require labor market tests or exceptional ability to contribute to the U.S. economy. Significant portions of S&E workers enter under family-based admissions.

Employment-Based. There are four preference categories of those admitted to work. The first three apply to those admitted for employment-related reasons in the for-profit U.S. labor market, while the fourth applies to ministers and religious workers, and the fifth to self-employed entrepreneurs.

Priority workers or first preference (EB-1) permanent immigrants are those with extraordinary ability; or outstanding professors/researchers; or multinational executives and managers. These workers are exempt from labor market tests and must demonstrate sustained national or international acclaim. The required level of expertise should make the individual one of a very small percentage of those who have risen to the top of their field.

Professionals with advanced degrees or second preference (EB-2) immigrants are those with exceptional ability who do not meet the criteria laid out for priority workers and are labor market tested. The Attorney General may waive the job offer requirement when it is deemed to be in the national interest. The requirements for the Permanent Labor Certification (PLC) are the same as described above for the H-2B, the employer must first submit and have approved by DOL a labor certification which requires that the employer fulfill a number of wage and working conditions that demonstrate that the job will not adversely affect similar workers.

Skilled workers/professionals with baccalaureate degrees, or third preference (EB-3) immigrants are those with at least two years of training or experience and are labor market tested. The employer must first submit and have approved by DOL a permanent labor certification which requires that the employer fulfill a number of wage and working conditions that demonstrate that the job will not adversely affect similar workers. This preference category includes those who generally have a baccalaureate degree (EB-3a) and those with less than two years training or experience (EB-3b).

Administrative Statistical Sources

Department of Labor. The DOL data come by the way of Labor Condition Applications (LCA) filed by employers who petition to have a job filled by a nonimmigrant which requires approval of an employer “attestation,” and applications for Permanent Labor Certifications (PLC) which require an employer “certification.” Information is collected on the employer, on each petition made by an employer (who may petition for multiple persons to fill a job description), on the occupation of the job being petitioned for, the wage or yearly income, and the company name.

The LCAs are faster to process than the PLC certification. The first attestation system was enacted as part of the Immigration Nursing Relief Act of 1989.³ The Immigration Act of 1990 created attestations for crewmembers (D), a very small student-worker program (F), and a third for specialty occupation workers (H-1B). For LCAs, the employer must attest that certain wage and employment conditions prevail before they are permitted to fill a job(s) with a nonimmigrant worker.

For other than priority employment-based permanent immigrants, the DOL must review and certify that the job is to fill legitimate needs and that wage is that is offered is at least the prevailing wage in the industry. Once approved by the DOL, the employer may turn to the INS to have an appropriate visa issued to the qualified foreign person.

Department of State. Individuals apply for their visa through U.S. embassies and visas are issued by the U.S. Department of State to individuals abroad. Visas for workers (LCAs or PLCs) are issued by the DOS following approval by the appropriate agency. Visas for students are issued to students who attend one of the INS accepted educational institutions. Visas for cultural exchange visitors follow guidelines and approval of the USIA.

³ The nonimmigrant nursing program (H-1A) was discontinued in 1995.

Immigrant visa petitions are sent directly to the to the National Visa center for initial screening, record-keeping, and instructions to the applicant before being sent overseas for action. Information is limited to the individuals country of origin and visa status.

The DOS figures are of issuances. They over count to the degree that individuals who are issued a visa consequently fail to seek entrance to the United States, and they undercount in that they do not include visa “waivers” which permit individuals from qualified countries to enter the United States on a temporary basis without a nonimmigrant visa. Also, the figures do not include nonimmigrant visas obtained in the United States through a nonimmigrant visa “change of status” which occurs when an individual is granted a new and different nonimmigrant visa within U.S. borders.

The Immigration and Naturalization Service. The INS is the primary data-collection agency for statistics on the flow of immigrants into the United States. Data are collected on all aspects of the immigration system including refugees, border enforcement, naturalizations, etc., but for our purposes the relevant data are on temporary and permanent admissions.

Temporary Admissions. *I-94 inspection forms* are the source for most typically cited admission’s figures. They are integrated into the Nonimmigrant Information System (NIIS) with data on age, country of citizenship, class of admission, visa-issuing post, port of entry, and destination in the United States. Data are from the I-94 inspection forms delivered by an arriving nonimmigrant to an immigrant inspector. An arrival portion or stub is torn off the form and sent to a central processing facility and, upon leaving, a departure stub is sent to the processing facility and it can be matched with the entry form.

The temporary or NIV admission data collected by the INS do not count individuals, but rather they count the multiple entries made by individuals over the course of the year.⁴ Each time the INS admits a tourist, businessperson, worker, etc., they are counted in the admissions’ data, which is consistent with its administrative role to inspect each entrant. They are however, as misleading a picture of individuals as the notorious border apprehension data. The number of temporary admissions including tourists grew 19 percent from 20.8 million in 1992 to 24.8 in 1996.

Admissions’ data do not include parolees, withdrawals, stowaways, and refugees, but they do include admissions on a nonimmigrant basis under the temporary visa-waiver program. The

⁴ In this sense they are comparable to the renown “apprehension” data on illegal entrants.

program originally extended only to countries that offered a reciprocal waiver of visas to U.S. citizens. It is limited to admissions in the visitor for pleasure and for business classes of admission, with admission not to exceed 90 days. In 1996, there were 25 countries in the Visa Waiver Pilot Program with 11,192,932 admissions (INS 1997:108).

Visa Petitions is a little-used database collected by the INS from the petitions to the INS for the admission of immigrants to fill DOL-approved positions (see LCA and PLC above). Recent legislation requires that the INS annually report on the occupations and the wage rate of those approved (and denied) petitioners in the database.

Permanent Admissions. The INS collects data on new immigrants from the immigrant visa issued by the Department of State, and on those who adjust status in the United States from INS grants of adjustments. Information is collected on port of admission, type (class) of admission, country of birth, last residence, nationality, age, sex, marital status, occupation, original year of entry and class of entry for adjustments from temporary to permanent residence, and state and zipcode of intended residence (INS, 1997: 23).

The information on occupations is an INS code lacking detailed occupational classifications; nonetheless, the INS codes are equated with general occupational categories of the Census (see Jasso and Rosenzweig, 1990:381). In FY 1996 just more than 1 percent of employment-based principles report no occupation upon admission, while fully 57 percent of all other immigrants report no occupation. The large share of non-employment-principles reporting “no occupation” is largely due to the fact that many are children (31%) or retired. Many in this category may not have worked in their country of origin, but many, especially women, will most certainly begin to work sometime after arrival in the United States.

Major Data Needs and Administrative Data

Occupational Data. Information on occupation is key to producing truly useful data on scientists and engineers. There is no available detail on the occupations of temporary nonimmigrants.⁵ At the same time, the occupational information for permanent residents is problematic because its categories are not detailed.

⁵ Currently, the occupations of temporary migrants can at best be loosely inferred from the DOL's LCA/PLC data on the occupations of those jobs which employers are applying for. Interagency collaboration could permit the DOL's data on occupations to be used to identify the employer and occupation for whom a temporary or permanent visa is issued. This would permit us to know who are S&Es in the temporary admissions and the meaningfully track the changes in supply and demand.

Beside different levels of detail, the administrative agencies collect occupational data on immigrants using a different definitional schema.⁶ These can be translated from one to another with a large degree of success, but the greatest loss of information remains in the breadth of the INS categories. Yet another difficulty is that many occupations such as managers, teachers, part-time sales, etc., can be engaged in S&E type work, suggesting that additional information on activities might be of value. And even if the INS occupational data were richer, it couldn't overcome the fact that some portion of admissions will ultimately work in S&E occupations after admission.

Educational Data. Occupation does not capture all S&E workers. One way to get an idea of how many might be missed is to compare about three million persons with S&E occupations to the 11 million persons with college degrees in S&E fields. No information on education exists in any of the administrative data.⁷ At the least, it would be worthwhile knowing the years of education of temporary and permanent admissions, although we would ideally also want to know field of education, type of education, and country where a certificate or degree was received.⁸ How else can we evaluate whether or not we actually are admitting the most competitive foreign workers?

Changes and Adjustments of Status. Temporary migrants may change their status from one NIV status to another, from foreign student (F) to speciality worker (H-1B) for example. They may then further adjust their status from a nonimmigrant (NIV) to that of a legal permanent resident (LPR). In other words, many scientists and engineers have been in the United States, often in multiple visa statuses, for several years prior to their admission as permanent residents.

The only gauge we have of this process is at the tail end, e.g., upon adjustment to LPR status. As of FY 1994, about one-third of the H-1B adjusters report science or engineering occupations, while 90 percent of intracompany transferees (L) report executive or administrative occupations

⁶ The INS uses an abridged set of definitions following its own criteria, the Census bureau follows the Standard Occupational Classification (SOC) in Census and Current Population Survey data, the U.S. Department of Labor (including BLS) uses the Dictionary of Occupational Titles (DOT), while the BLS Occupation and Employment Survey currently uses yet another detailed classification scheme.

⁷ Years of education has been collected by DOS for permanent residents admitted under the diversity class of admission.

⁸ This information would help us supplement the NSF data as it would provide an estimate of the flow of non-U.S.-graduated foreign workers not captured in that data (see discussion below). We would ideally also want to know the years of experience of a worker in the field in which they are employed at time of admission to the United States.

upon adjustment. In contrast, neither foreign students (F) or exchange visitors (J) fall clearly into occupational grouping upon adjustment (Lowell 1996:8).

The LPR adjustment data do not tell us what proportion of temporary nonimmigrants make the transition from temporary NIV to LPR status. There is no existing data set that can capture that. If it were, it would make it possible to track occupation upon entry as a temporary immigrant and the occupation after permanent admission. How much do the occupations and earnings of temporary migrants change during their stay in the United States?

In addition, it is difficult from current data to know about the longer chains that exist — such as an NIV “change in status” from student to a speciality worker, followed by the “adjustment” into LPR status. One crude lower-bound estimate based on available data suggests, for example, that about one-fifth of the foreign students moved both from F directly, *and* indirectly through H-1B, to achieve any permanent status in FY 1996 (Lowell, 1996:8). With no regular and accurate information on change of status, it is not possible to examine whether or not increasing proportions of speciality workers (H-1B) were previously foreign students (F), which might signal changes in the academic market and graduate training.

Average Year-Round Population. This is the “average” population, reflecting just the portion of a year that all individuals spend in the United States. In terms of the permanent LPR numbers, we would want to know the numbers who emigrate in a given year which, as we know, is unavailable information.

For the temporary system, one useful measure also requires exit information, i.e., the person year population captures average duration stay. For example, the person-year population is the full-time equivalent contribution of working visas to the labor force — if there were 100 temporary workers with an average stay of one-half year, they would contribute 50 person-years’ worth of labor in that year. In 1994, the only year for which an estimate is available, a “year-round population” of 1.4 million temporary migrants was estimated, including some 48.8 thousand temporary workers and trainees, 89.7 thousand exchange visitors, and 20.8 thousand intracompany transferees.

Management of the System. Most observers of the administrative data system are not only aware of poor or lacking data, but the difficulties with successfully improving management of the system within and across the various agencies. During this past summer of 1998, the General Accounting Office (GAO) released three reports. The GAO (1998c) evaluated implementation of 1985 and 1996 National Academy of Science (NAS) recommendations, primarily at the INS,

most having to do with methodologies to collect better data and eliminate duplication and improve management. The GAO concluded that 15 of 19 recommendations have been partly to fully implemented by the various agencies. The GAO (1998a) made a systematic study of data gaps in INS and Census data. They noted a need at the INS for more accurate flow-data on entries and exits, and an inability to identify immigrant status (see below). Finally, the GAO (1998b) reported on the management/organizational structure of the statistical enterprise on immigrants at the INS and the Census Bureau. The GAO noted that the INS statistics branch has made progress in increasing its capacity, but that its capacity is limited because it reports on just 9 out of 16 data “elements” (such as the occupation of temporary migrants, etc.) listed in the Immigration Act of 1990. Also, an important aspect of a statistical division’s independence is its adherence to predetermined schedules for the release of data, which the Census Bureau follows and the INS is working on.

CENSUS AND SPECIAL SURVEY DATA (STOCK)

Other than the admissions or flow data collected by U.S. agencies, there are numerous data sources, typically collected for other reasons, that include the resident stock of foreign-born in the United States. General-purpose surveys most often get limited information on immigrant status distinguishing only naturalized and alien populations, but there are a few special-purpose surveys that get details on immigrant status.

Immigrant Status in the Census and Current Population Survey (CPS)

The Census and CPS are the pre-eminent sources of data on the U.S. labor market. They are rich in information, but contain limited detail on immigration status revealing identifying only naturalized citizens and resident aliens.

Naturalized Citizen. These non-native-born citizens must have continuously resided at least five years in the United States, passed citizenship exams, and pledged an oath to the United States. The naturalized citizen can vote, hold a job in the federal government, sponsor immediate family members without concern for the quotas that set up long queues in the preference categories of admission, and, since 1996, receive welfare benefits on the same basis as the native born.

Resident Aliens. In contrast, the alien designation refers to those who are not a naturalized citizen and the largest subcategories are:

- Legal Permanent Resident Alien
- Legal Temporary (NIV) Alien
- Provisional Legal Status Alien⁹
- Illegal or Unauthorized alien

For other than the LPR category, legal residence and work authorization is conditional upon the terms of their visa or ability to circumvent laws prohibiting illegal persons from working in the U.S.

The Census and CPS Data

The decennial U.S. Census is the predominant data source on the foreign-born in the United States. It has sufficient sample size to break out the foreign-born population by, importantly, country of birth, age, sex, considerable geographic detail, and basic variables such as employment status (e.g., full time), labor force status (e.g., unemployed), industry, occupation, years of education, self-reported English language ability, and yearly earnings. While lack of detail on alien status can be overcome to a limited degree by imputing status,¹⁰ these surveys are currently unable to track shifts in temporary workers. The Census is too infrequent to track rapid changes in admissions such as those experienced this decade.

Since 1994, the CPS has been one of the best sources of regular information on the foreign born. Its value is limited primarily by its sample size, which is actually sizable, but not sizable enough to consistently provide detailed information on subcategories of the foreign born. Scientists and engineers are included in very small numbers.¹¹ It contains the same general information as the Census, as well as more detailed labor force information and periodic CPS special topics such as displaced workers, education, etc. Most figures from the CPS are considered reliable, but it must be remembered that a broad band of error is involved in population estimates generated from small cell sizes.

⁹ There are several categories, such as Temporary Protected Status (TPS), etc., that fit here. Like TPS, there may be tens of thousands of persons covered.

¹⁰ See work done by Jeffrey S. Passell of the Urban Institute in Washington, D.C.

¹¹ The sample size since 1994 has been cut from around 65,000 households per year to 40,000 which exacerbates the problem.

Data on Students and Graduates from the National Science Foundation (NSF)

The NSF undertakes several different samples of scientists and engineers each with distinct sample and survey characteristics, but a sizable cache of variables for things such as education, labor force status and earnings, and temporary or permanent visa status. Data on funding sources for students, and their intent to return home, provide additional value.¹²

National Survey of College Graduates (NSCG). The NSCG is a biennial sample of persons with a bachelor's degree or more at the time of the 1990 census, reinterviewed in 1993, 1995, and 1997. It is a longitudinal survey that has data on the number and characteristics of individuals with training and/or employment in science and engineering in the United States.¹³ Information is collected on individual temporary and permanent residents, citizenship, country of birth, country of citizenship, age, sex, educational status and degrees, degree of field, labor force status, occupation now and five years ago, industry, primary work activity, and years of professional experience. It is a key data system for evaluating S&E education and employment.

Survey of Doctorate Recipients (SDR). The SDR is a biennial stratified-random, longitudinal survey, begun in 1973, on S&E research doctorates residing in the United States.¹⁴ The Doctorate Records File (DRF) of the National Academy of Sciences serves as the sampling frame. Recent research doctorates are added with each new survey and those over age 75 are dropped. Information is included on temporary and permanent residents, citizenship, country of birth, country of citizenship, age sex, race/ethnicity, educational history and country of degrees, labor force status, occupation now and five years ago, postdoctorate status, primary work activity, earnings, and years of professional experience.

National Survey of Recent College Graduates (NSRCG). This is a biennial probability sample of recent S&E baccalaureate and master degree recipients of U.S. institutions to study early career patterns.¹⁵ Information is included on temporary and permanent residents,

¹² Many if not most of the foreign-born who report temporary status were likely on F visas; however, following graduation it may not be possible to precisely impute F, J, or H, etc. status.

¹³ The survey serves as a baseline for the 1990s and there are plans to follow S&E individuals in the survey biennially between 1995 and 2001. Because of changes in sample characteristics, it is not advisable to make comparisons between the 1990s and the 1980s.

¹⁴ The SDR samples about 8 percent of doctorate recipients and the response rate was 85 percent in 1995. Due to changes in sampling procedures comparison over time are problematic.

¹⁵ There are plans to follow S&E individuals in the survey biennially between 1995 and 2001.

citizenship, country of birth, country of citizenship, age sex, race/ethnicity, educational history and country of degrees, labor force status, occupation now and five years ago, postdoctorate status, primary work activity, earnings, and years of professional experience.

Scientist and Engineer Statistics Data System (SESTAT). A complex combined sample of the three preceding NSF surveys (NSCG, SDR, NSRCG) with the same information on education, occupation, demographic, and other background characteristics. This combined sample is able to generate population figures for all resident graduates of U.S. institutions. But while it follows up on graduates of foreign institutions who were present in 1990, it does not include newly arrived immigrants who graduated from foreign institutions. It also requires a complex weighting schema and certain information, due to reasons of confidentiality, may not be available for public access.

Survey of Earned Doctorates (SED). This is a yearly census of the research doctorates awarded at U.S. universities during the academic year, conducted by the National Research Council.¹⁶ It includes information from each of about 375 academic institutions on citizenship, country of birth, country of citizenship, age, sex, race/ethnicity, field of degree and source of financial support, postgraduate plans, and field of employment in science and engineering. The SED is linked to the Doctorate Records File (DRF) and serves as the sampling frame for the Survey of Doctorate Recipients (SDR).

Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS). A survey of graduate departments by the National Science Foundation (NSF), this survey collects information on the training of future scientists and engineers currently enrolled in U.S. graduate schools. Information is gotten from graduate departments at 730 institutions. It assesses future supply and demand. Postdoctoral appointees and other nonfaculty researchers in academic programs are covered. A count of foreign temporary students is gotten.¹⁷

Special Purpose Surveys

New Immigrant Survey (NIS). This is a 1996 pilot survey of greencardholders, e.g., newly admitted legal permanent residents. It is a trial for a longitudinal survey, but at present provides a small sample and an exploratory survey instrument that provide a wealth of information. The NIS

¹⁶ Response rate about 95 percent.

¹⁷ No information on LPRs is collected from the departments.

includes more detail on occupation than that available in INS's LPR database, years of education, labor market status, earnings, English language ability, as well current and previous immigrant statuses and prior U.S. experience.

GAO Survey of H and L Visas. The General Accounting Office — in response to Congressional inquiry about the relationship between nonimmigrant admissions, backlogs, and permanent adjustments — drew a sample of 1,825 businesses and organizations that filed applications for H-1 or L-1 nonimmigrants.¹⁸ The overall study design included the analysis of existing INS, DOS, and DOL agency data. Survey results included information on the application-business' industry, U.S. or foreign ownership, number of employees, and assets of the firm. For NIVs employed by the firm information was gathered on occupations and country of citizenship, nature of activity or duty in U.S. firm, duration of job, and intention of job permanency.

IEEE Survey of Members. The IEEE (Institute of Electrical and Electronics Engineers) professional association regularly surveys its membership. The most recent survey, in 1997, was a random sample of some 170,550 members.¹⁹ The survey collects information on age, sex, and race/ethnicity, as well as detailed labor market information — employment status, voluntary nature of unemployment, full and part time work, years of experience in the field, areas of technical competence, occupation and industry, earned income and benefits, as well as job satisfaction. Immigrant status variables are naturalized citizen, permanent resident, H-1 temporary worker or other visa holders.

Open Doors Report on International Exchange. An annual census and report by the Institute of International Education of about 450,000 foreign students at U.S. institutions. Data is collected from administrators on U.S. campuses. Information is collected on temporary and permanent status, economic data, cost-of-living estimates, and job creation per state. It includes extended analyses of student mobility nationally and internationally.

¹⁸ The sample was drawn from applications made to the northern and eastern INS regions between October 1998 and March 1990. There was a 74 percent response rate. The GAO estimates that the sample represents about 60 percent of the businesses in the United States. The two regions were chosen because they were the only two with fully automated databases at that time (GAO 1992).

¹⁹ The final sample size was 5,600 for a response rate of about 23 percent.

Major Data Needs and Survey Data

The two major data issues with survey data have to do with the lack of detailed immigrant status in Census and CPS data, and the lack of information on those educated abroad in the NSF data. Of the many issues pertaining to special-purpose surveys, such as the NIS or professional-society surveys, sampling issues is a leading problem. However, in a more general sense, the sampling problems are generic to the method of data collection and there is no few-set of “major” issues that can be addressed here.

In fact, the major problems with current and standard survey data are not easily solved. Standard surveys, most especially the U.S. Census and the monthly Current Population Survey, do not determine more than foreign-born status and alien or naturalized. Not only is it likely that unauthorized aliens would not report their illegal status, and that such a question would sensitize the target survey-population, but a perhaps greater source of error lies in the fact that many aliens simply do not know their technical status. Methods to identify immigrant status are welcome, but are likely too costly and problematic to be a regular part of the CPS much less the Census.²⁰

The NSF data has its primary value for S&Es in and out of our educational system — both because the primary sampling frames are of students at U.S. institutions, and because subsequent samples for the SESTAT statistical system continue to contain only graduates of the U.S. institutions (with the caveat that graduates of foreign institutions who were in the initial 1990 sample are subsequently followed in the biennial surveys). This information is updated regularly which is of tremendous worth, but the follow-up samples do not include foreign-born S&E residents who got their education abroad. It is estimated from the earliest samples that about one-half of the foreign residents with a baccalaureate degree have their degree from a foreign institution; and that about one-third of the foreign residents with a doctorate degree have their degree from a foreign institution. Depending upon the occupation, this may mean that a substantial portion of foreign-born workers are not represented in the NSF data. Including them in future samples would introduce difficult logistical and significant financial costs.

²⁰ The GAO has proposed a three-card method for survey instruments that might help partition legal status and, possibly, temporary visa class. Not knowing legal-resident status may not be an issue among a scientific and engineering population which is predominantly legal, but knowing detailed visa classes is desirable. Simply identifying, for example, that an individual in the CPS is indeed a legal temporary of some sort as the three card does is an advantage. But sample sizes tend to be small and this presents problems in estimating variance for S&Es (GAO 1998a:74).

CONCLUSION

There are multiple data sources for studying foreign-born scientists and engineers which divide roughly into data on flow (administrative data) and data on stock (general and special-purpose surveys). Administrative data should, in principle, permit us to fully track changes and adjustments in status, but do not. However, even if we could follow this trail across various changes of temporary visas and, in some cases, on through to adjustment of status, the administrative data can only tell us about flow. The final adjustment of status to LPR only signals the start of an ongoing process where some find new employment, possibly in S&E occupations, and others possibly emigrate all together.

General purpose and special-purpose give us a much better idea of how the population is employed. However, the most widely used data for analyzing the labor market, the U.S. Census and CPS, suffer from oftentimes small samples and the crudity of distinguishing only between naturalized citizens and resident aliens. The NSF special-purpose surveys are extremely valuable for tracking the U.S. educational system, and they have some detail on visa status, but the most generalizable NSF data exclude S&Es educated in other than U.S. institutions. This misses many foreign workers who work in the U.S. and were trained abroad.

Nonetheless, there are substantial data available to evaluate the magnitude and characteristic of foreign-born S&E workers in the United States. A few general observations suggest themselves from this state of affairs. At the least, it should perhaps be a priority to collect reliable occupation data for temporary and permanent admissions. Reliable entry and exit data on individuals may soon be available, for its security and enforcement value, but hopefully also for its analytic value for debates over changes in the measure of the supply and demand of S&E workers. Finally, fully linking the status trails of the immigrant system — changes and adjustments of status — should be doable and is essential for evaluating how legislative intent is unfolding on the ground.

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SELECTED DATA

Exhibit 1. Temporary Nonimmigrant Visa Issuances and Admissions: Individuals and Count of All Nonimmigrant Trips

	Person- Year Population 1994	Visa Issuances			Admissions		
		1992	1996	1996/ 1992	1992	1996	1996/ 1992
All classes	1,444,319	5,368,437	6,237,870	1.16	20,793,847	24,842,503	1.19
Foreign officials (A)	30,997	62,674	78,078	1.25	102,645	118,157	1.15
Temporary visitors (B)	107,027	4,272,120	4,947,899	1.16	19,238,240	22,880,270	1.19
Transit aliens (C)	4,520	155,040	186,556	1.20	345,610	325,538	0.94
Treaty traders & investors (E)	54,657	31,805	29,909	0.94	152,416	138,568	0.91
Students (F1, M1)	245,319	223,309	247,432	1.11	241,093	426,903	1.77
Students' spouses/children (F2, M2)	27,876	22,325	21,518	0.96	33,431	32,485	0.97
International representative (G)	22,773	25,162	30,258	1.20	69,985	79,528	1.14
Temporary workers & trainees	48,815	79,573	119,334	1.50	163,262	227,440	1.39
Registered Nurses (H-1A)	n.a.	7,377	1,745	0.24	7,176	2,046	0.29
Specialty occupations (H-1B)	31,092	44,290	58,327	1.32	110,223	144,458	1.31
Performing services n.a. (H2)	8,562	18,997	23,204	1.22	34,442	23,980	0.70
Agricultural workers (H-2A)	3,328	6,445	11,004	1.71	16,390	9,635	0.59
Unskilled workers (H-2B)	5,234	12,552	12,200	0.97	18,052	14,345	0.79
Industrial Trainees (H3)	n.a.	2,069	1,877	0.90	3,352	2,986	0.89
Extraordinary ability (O1, O2)	2,131	674	4,359	6.47	714	9,289	13.01
Athletes & entertainers (P1,2,3)	1,822	4,319	23,885	5.53	4,769	33,633	7.05
Exchange & religious (Q1, R1)	2,516	1,847	5,946	3.22	2,586	11,048	4.27
Spouses (H4, O3, P4, R2)	16,943	25,194	38,496	1.53	40,009	53,572	1.34
Exchange visitors (J1)	89,651	145,020	171,164	1.18	189,940	215,475	1.13
Spouses/children of exchange (J2)	29,035	32,470	33,068	1.02	42,031	41,250	0.98
Intracompany transferees (L1)	20,765	17,345	32,098	1.85	75,347	140,457	1.86
Spouses/children of transferees (L2)	24,207	21,358	37,617	1.76	45,501	73,305	1.61
Professionals, North American Free Trade Agreement (TN)	n.a.	n.a.	n.a.	n.a.	n.a.	26,987	1.36

Sources: Admissions (INS Yearbooks), Visa Issuances (DOS Yearbooks), Person-Year Population (U.S. INS 'Statistics Branch' 1996).

Notes: Categories may not equal totals because of omitted categories. N.A. means not available.

Exhibit 2. Permanent Admissions by INS Occupational Category, FY 1996

Occupation at Admission	Employment Based		Family Based	
	(Number)	(Percent)	(Number)	(Percent)
All occupations	51,600	6%	864,300	94%
Professional, Technical, and Kindred	25,293	49%	49,974	5%
Specialty and Technical Occupations	8,581	17%	10,783	1%
Architects	95	0%	477	0%
Engineers, surveyors, mapping scientist	4,145	8%	7,603	1%
Mathematical and computer scientists	2,042	4%	1,239	0%
Natural scientists	2,299	4%	1,464	0%
Health Professionals	7,692	15%	11,950	1%
Doctors and others	1,947	4%	5,139	1%
Nurses and others	5,745	11%	6,811	1%
Other Professionals	9,020	17%	27,241	3%
Teachers (postsecondary)	1,583	3%	3,181	0%
Teachers (except postsecondary)	770	1%	8,051	1%
Counselors (educational & vocational)	60	0%	197	0%
Librarians, archivists, and curators	24	0%	203	0%
Social scientists & urban planners	146	0%	699	0%
Social, recreation, religious workers	2,443	5%	1,311	0%
Lawyers and judges	64	0%	992	0%
Writers, artists, entertainers, and athletes	1,563	3%	4,968	1%
Technologists (health)	200	0%	869	0%
Technologists (except health)	2,167	4%	6,770	1%
Executive, administrative and managerial occupations	11,186	22%	20,664	2%
Sales occupations	378	1%	14,939	2%
Administrative support occupations (incl. clerical)	1,026	2%	20,672	2%
Precision production, craft, and repair occupations	2,909	6%	20,958	2%
Operator, fabricator, and laborer occupations	1,629	3%	75,214	8%
Farming, forestry, and fishing occupations	233	0%	14,342	1%
Service Occupations	8,065	16%	54,061	6%
No occupation	692	1%	551,432	57%
Homemaker	28	0%	135,333	14%
Unemployed or retired	301	1%	121,896	13%
Students and/or children under age	16,363	1%	294,203	31%
Unknown or not reported	189	0%	42,044	4%

Source: INS 1996 Yearbook.

Exhibit 3. General Occupational Categories, Current Population Survey, 1998

Occupational Category	Foreign Born 1998	Native Born 1998
1 Officials & administrators, pub. admin.	26,316	615,148
2 Other executive, admin. & managerial	1,109,662	11,638,227
3 Management related occupations	331,181	4,188,829
<u>4 Engineers</u>	<u>288,278</u>	<u>1,677,560</u>
<u>5 Mathematical and computer scientists</u>	<u>255,780</u>	<u>1,414,776</u>
<u>6 Natural Scientists</u>	<u>89,931</u>	<u>378,838</u>
7 Health diagnosing occs.	197,721	807,543
8 Health assessment and treatment occs.	271,532	2,552,803
9 Teachers, college and university	191,616	675,600
10 Teachers, except college and university	250,633	4,625,326
11 Lawyers and judges	52,551	799,410
12 Other professional specialty occs.	413,921	4,262,176
13 Health technologists and technicians	161,414	1,557,193
<u>14 Engineering and science technicians</u>	<u>107,627</u>	<u>1,173,506</u>
15 Technicians, exc. health,engin.&science	141,986	972,993
16 Supervisors and proprietors, sales occs	486,138	4,009,503
17 Sales reps, finance and business serv.	175,028	2,252,796
18 Sales reps, commodities, exc. retail	74,911	1,428,907
19 Sales workers, retail & personal serv.	705,433	5,954,999
20 Sales related occs	3,011	105,357
21 Supervisors, admin. support	36,407	579,440
<u>22 Computer equipment operators</u>	<u>32,901</u>	<u>300,553</u>
23 Secretaries, stenographers, and typists	190,699	3,352,768
24 Financial records processing	162,016	1,989,551
25 Mail and message distributing	103,939	886,142
26 Other admin support, inc. clerical	841,360	9,678,707
27 Private household service occs	300,706	582,476
28 Protective service	130,108	2,129,289
29 Food service	1,225,530	4,823,597
30 Health service	365,409	2,010,051
31 Cleaning and building service	653,819	2,425,533
32 Personal service	341,027	2,470,229
33 Mechanics and repairers	445,759	4,104,295
34 Construction trades	632,478	4,662,821
35 Other precision prod., craft, & repair	680,216	3,338,108
36 Machine opertrs and tenders,exc precis.	1,001,552	3,785,978
37 Fabricatrs,assemblrs,inspectrs,samplrs	463,676	2,357,305
38 Motor vehicle operators	444,493	3,329,320
39 Other transp. & material moving occs	114,192	1,059,385
40 Construction laborers	146,971	530,574
41 Freight, stock & materials handlers	206,885	1,731,012
42 Oth handlrs,equip.cleanrs,helprrs,labrrs	347,349	1,664,926
43 Farm operators and managers	39,892	987,400
44 Farm workers and related occupations	552,072	1,155,221
45 Forestry and fishing occs	6,748	80,155

Source: Tabulation of the employed Population, March 1998 CPS on DOC Website.

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