Center for Immigration Studies

Best? Brightest?

A Green Card Giveaway for Foreign Grads Would Be Unwarranted

By Norm Matloff

Knowing that the importation of foreign labor is unpopular with the public, Congress has often enacted legislation of this nature for the tech industry in "stealth" mode. This year seems to be no exception, with radical changes to laws on high tech work visas being hidden in a 300-page Senate bill that is supposed to be about illegal immigration. The industry lobbyists apparently believe that the latter topic is so controversial that the provisions on foreign high-tech workers will slip through unnoticed. Victor Johnson, associate executive director at the Association of International Educators even said so to the press, remarking "Hopefully there's enough support in the Senate for this that we can get this through while they're arguing about the other issues."[1]

As usual, the bill would increase the yearly cap on H-1B work visas. The H-1B program has long been criticized by U.S. programmer and engineering groups as a cheap labor program that adversely impacts job opportunities for American workers. The critics also charge that another reason industry is so keen on hiring foreign workers is that they are *de facto* indentured servants. This gives employers leverage which can be used, for instance, to force foreign workers to put in long evening and weekend hours, something it would be hard to get American workers to do.[2]

Yet in addition, the bill also includes an equally—perhaps even more—dangerous threat to the employability of American programmers and engineers, lurking in the arcane language of the bill. The bill would create a new F-4 visa category that would lead to an essentially automatic green card for any foreign student who earns a graduate degree in engineering or the physical sciences at a U.S. university.[3]

Such proposals have been floated via the press during the last few months. Even if the present legislation does not go through, it is highly likely that there will be further attempts in this direction either later this year or next year. Given that it would be a sea change in policy, a careful look at the notion of "free green cards for foreign students" is imperative.

The "free green card" proposals are aimed at giving foreign students incentives to come to the United States for graduate study and to stay here after completing their studies. Who wants this, and why?

First, these proposals arise in response to the longtime claim by Intel and other large technology companies that an insufficient number of U.S. students pursue graduate study in tech fields. This, say Intel *et al.*, is why they hire a number of H-1Bs from U.S. university graduate programs. Critics respond that this is just a pretext for hiring cheap, "indentured" foreign workers.[4]

The "free green card" proposals also comprise a response to the academic lobby, as U.S. universities have seen their foreign applicant pools for graduate programs shrink in recent years. Students in other countries are less interested in study here these days because the U.S. job market is poor while opportunities back home are burgeoning.[5] This is causing academics to panic, since their lucrative federal research funding depends on having the "bodies" to work in the labs. Graduate study at the PhD level is unattractive to American students because the graduate assistant stipend is so low, as is the salary premium paid to PhDs in industry.[6] Thus the universities view the drop in foreign applicants with great alarm.

This is also the reason for Victor Johnson's quote mentioned above. The full name of Johnson's organization is NAFSA: the Association of International Educators, where NAFSA is an acronym for the group's original name, which was more explicit as to its interests: the National Association of Foreign Student Advisers. As NAFSA has pointed out in the past, most foreign students in the tech area come to the United States in the hope of working here after graduation. If the United States did not have a liberal foreign worker program, there would be fewer

Norm Matloff is ....

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foreign students and many of NAFSA's members would be out of their jobs.

The F-4 proposal has also been endorsed by IEEE-USA, an electrical engineering professional organization. IEEE-USA has long criticized the H-1B program as reducing job opportunities for U.S. engineers, so it would seem odd that the group supports F-4. The explanation for this anomaly is that IEEE-USA has in recent years come under heavy pressure from the IEEE parent organization. The latter is dominated by leaders from industry and academia, and has pressed IEEE-USA to moderate its position on foreign workers. Thus IEEE-USA has, since the year 2000, advocated implementation of a greatly expedited green card process in lieu of H-1B.

However, the Programmers Guild and the AFL-CIO Department of Professional Employees (DPE), both of which share IEEE-USA's negative view of the H-1B program, are strongly opposed to measures such as F-4. They believe that the foreign workers would still be subject to exploitation under this visa, and that there is no shortage of engineers with graduate degrees to justify such a visa. They also point out that the F-4 proposal would be in addition to, rather than a replacement for, the H-1B program.
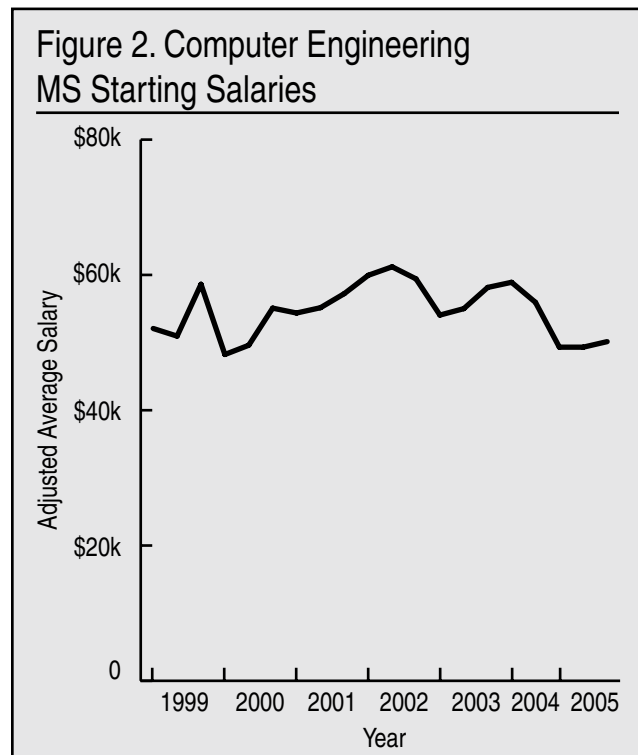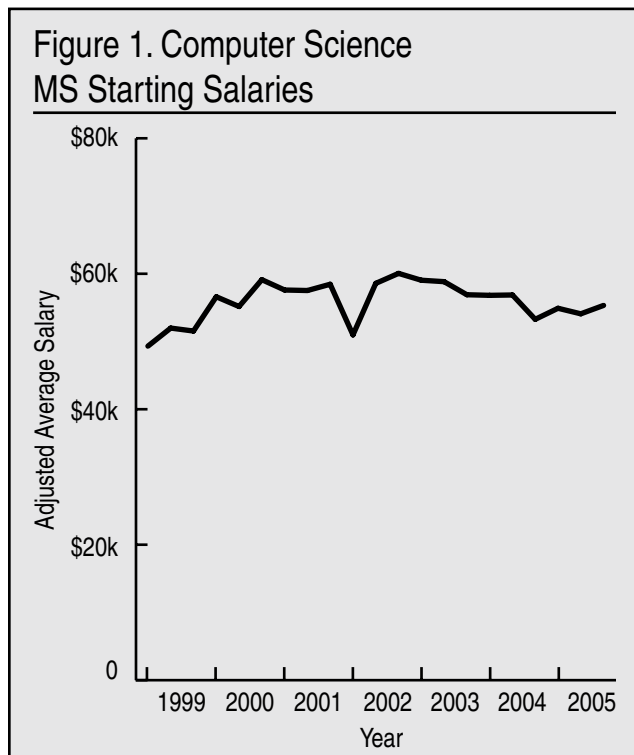
I myself have made a proposal for a streamlined green card process.[7] But my proposal is not predicated on student status, and is part of a tightly-integrated matrix of reforms which must be taken as a whole. I share the

objections that the Programmers Guild and DPE have made to F-4 and similar ideas. As I will show here, a "free green cards for foreign students" program is not warranted in terms of demand, and would not be any more effective at protecting U.S. citizen and permanent resident (hereafter, shortened to *American*) workers than the present H-1B program. In fact, in some respects it would be worse.

No Shortage of Master's and PhD Engineers

Central to F-4 and other similar proposals is the premise that there is a shortage of engineers with graduate degrees. A number of the large high-tech firms have made this claim, with Intel perhaps being the most strident. Intel states on its employment Web page that "[We] limit hiring of persons requiring visa sponsorship...to candidates at the MS and PhD levels (or those who have equivalent work experience)." In his testimony to the Senate, September 16, 2003, Intel Human Resources Attorney Patrick Duffy put it this way:[8]

> *[We hire H-1Bs] for those positions where we cannot find enough qualified U.S. workers with the advanced education, skills, and expertise we need to compete in this global economy. These positions include Design Engineers at the Master's and PhD levels in fields such as Electrical and Computer*

Figure 1. Computer Science MS Starting Salaries

Figure 2. Computer Engineering MS Starting Salaries

Engineering, as well as Process Engineers at the Master's and PhD levels in fields such as Chemical or Materials Engineering. The vast majority of the H-1B workers we sponsor are educated at U.S. universities...

Both the problem and the solution are found in U.S. university graduation statistics. Today, about half of the graduate students in the physical sciences in U.S. universities are foreign nationals...

Yet salary data show clearly that there is no shortage of engineers with graduate degrees. Figures 1, 2, and 3 show average starting salaries for new Master's graduates in Computer Science, Computer Engineering, and Electrical Engineering, adjusted for inflation.[9] These curves are flat, or even downward-trending. There is simply no indication of a labor shortage at the graduate level, the central premise underlying F-4 and similar proposals. Salaries would be rising sharply if there were a shortage. The curves are similar for the other main fields covered by the proposed legislation.

Nor does there appear to be a shortage in general in those fields. Figures 4 and 5 show employment figures for the last few years.[10] Again, the trend has been flat or downward, showing that the lobbyists' basic premise of a labor shortage is fundamentally incorrect.

The situation is worse once the impact of foreign workers is factored in. Unfortunately, no data are available for the number of H-1B workers in the United States at any given time, but a proxy is available in the form of the number of admissions to the United States by such visa holders. Since a foreign worker who leaves the United States and returns counts as two admissions, the absolute number of admissions itself is not of interest, but its trend over time should be a fairly good approximation to the corresponding trend in time for the number of H-1Bs in the United States. It is thus striking that there were 26 percent more H-1B admissions in 2004 than in 1999.[11]

In other words, not only has the number of jobs been roughly constant, but also *the number of jobs open to Americans has been on the decline*.[12] Expansion of the number of foreign workers is absolutely unjustifiable.

Furthermore, it is very significant that the proposed F-4 visa program would give a newly-graduated foreign student a full year to find work in the United States. If there were such an acute labor shortage, as claimed by the industry lobbyists, how it could it possibly take a year to find a job? This provision shows that the drafters of the legislation fully understand that there is no labor shortage.

Why Employers Hire Foreign Workers

Critics of the H-1B program have long held that employers' primary interest in hiring foreign workers has been as cheap labor. Though industry lobbyists

Figure 3. Electrical Engineering MS Starting Salaries

Figure 4. Programming Jobs
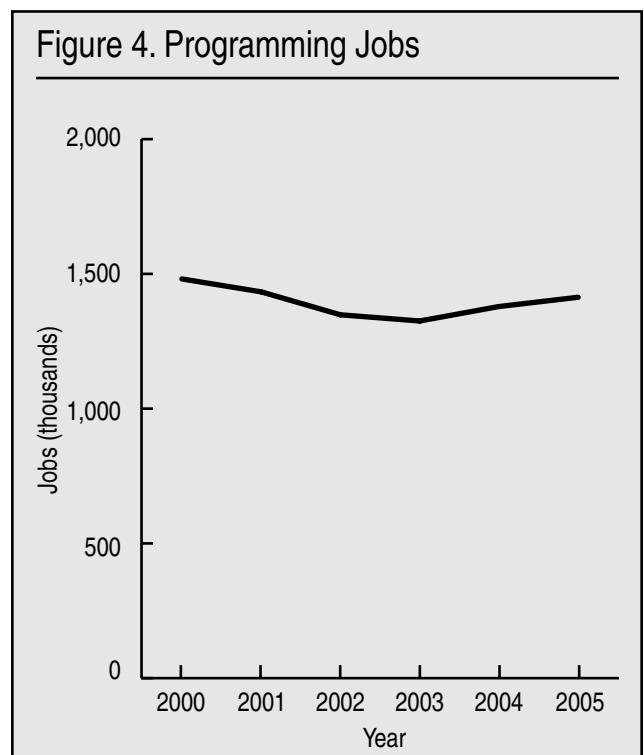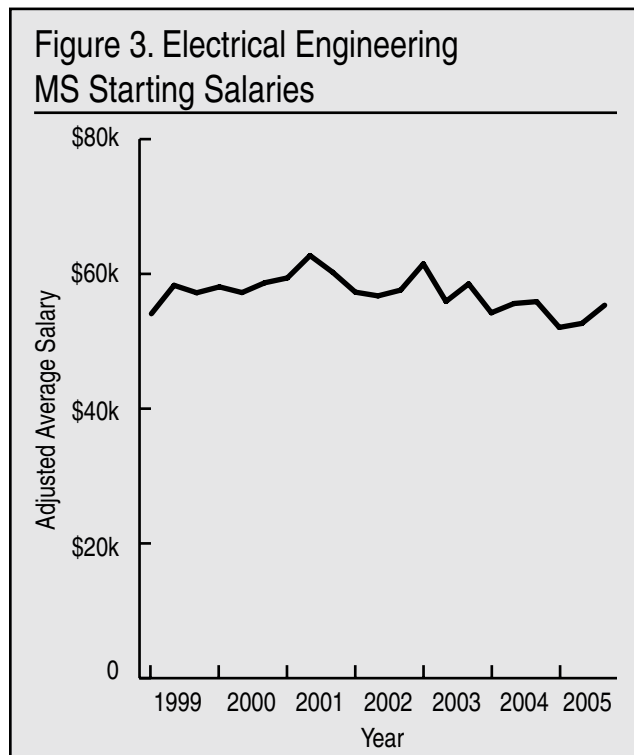
have attempted to dismiss such claims as "anecdotal," it is an established, well-studied fact. A number of statistical studies, both academic and in government, have confirmed that H-1Bs often are indeed paid less than Americans.[13]

It is important to understand that there are actually two major types of savings in labor costs which accrue to employers of H-1Bs. What I call Type I savings is the one most people mean when they discuss the issue of whether H-1Bs are used for cheap labor; it takes the form of paying an H-1B less than the norm for comparable American workers, i.e. Americans of similar educational background, experience, skill sets, and so on.

Type II savings stem from the fact that older workers are perceived as being more expensive than younger ones.[14] The congressionally-commissioned Nationl Research Council report[15] documented the industry's preference for younger workers. In many cases, when employers exhaust the supply of young American workers, they turn to hiring younger, cheaper H-1Bs in lieu of older (over age 35), more expensive Americans. In this manner, the H-1B program is again providing employers with cheap labor.

Savings from hiring H-1Bs includes workers with graduate degrees. For example, I analyzed the 2000 census data for software engineers in California. The census has no direct question on H-1B status, so as a proxy I looked at foreign-born engineers who are under

age 30 but who have been in the United States less than eight years, comparing them to natives under 30.[16]

The result was that the natives were paid approximately 13 percent more than the "H-1Bs." When combined with Type II savings—around 20 percent when comparing a 40-year-old to a worker of age 25[17] —the savings are even larger. If the H-1B is being sponsored for a green card, which can take as long as six years, the total savings over that time period can be $100,000 or more.

The big firms are just as interested in saving money as the small ones. I performed an analysis of the Department of Labor H-1B Web site's[18] records for Intel though September 2003. Again, recall that Intel hires H-1Bs only at the Master's and PhD level. Here are Intel's stated H-1B wages for Master's/PhD engineers, compared to national medians:

Data Category	Median Value
Intel wage	$64,480
Master's level engineers, nationwide	$82,333
PhD level engineers, nationwide	$105,500

So Intel is definitely saving money by hiring H-1Bs. The only question is whether the savings are of Type I or Type II. We can gauge this somewhat by noting first that the (noninflation-adjusted) starting salaries for new Master's graduates in 2003 were around $65K, according to the NACE data. At the PhD level, the salary for new graduates was about $80,000.[19] Given this and the table above, we can see that both Type I and Type II salary savings were involved in the Intel hires of H-1Bs.

It is of great importance to keep in mind that Intel is achieving these savings in full compliance with the law and regulations. The law states that the employers must pay "prevailing wages," but employers exploit major loopholes in the definition of that term. One should be no more surprised that an employer would aggressively exploit the H-1B loopholes than they would that the same firm would take advantage of loopholes in the tax code.

Section V of my university law journal article (Note7) goes into detail concerning some of the loopholes, but an example of a loophole especially relevant here is that prevailing wage pertains to the *job*, not the worker. For example, if the employer considers the job to require just a Bachelor's degree but hires a foreign national with a Master's, the prevailing wage can be calculated on the level of a Bachelor's degree.[20] The employer then ends up with a Master's-level worker for a Bachelor's-level price.

Figure 5. Hardware Jobs
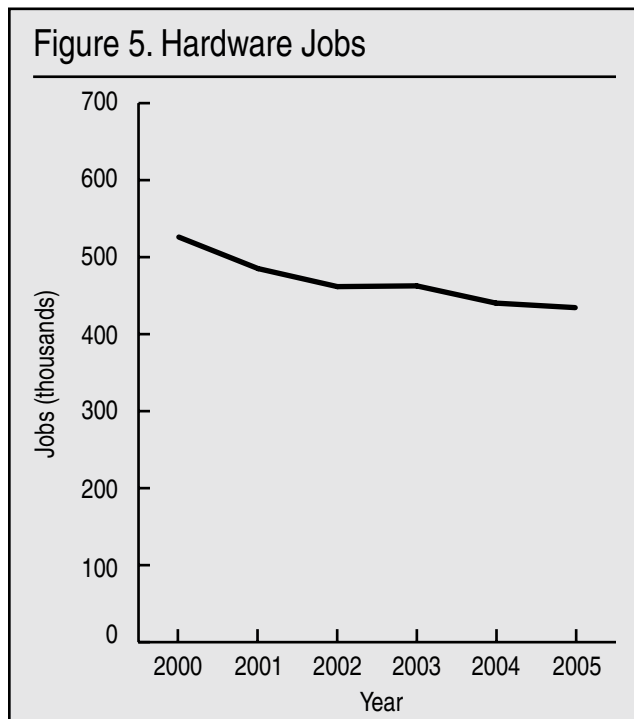
This is not to say that Intel is worse than the other firms. On the contrary, a governmental agency actually planned for this to occur as an industrywide phenomenon, as will be explained in the next section. But this Intel case study shows that the industry lobbyists' claims that the big firms don't underpay their H-1Bs, and that foreign workers with graduate degrees aren't underpaid, are clearly false.[21]

It should be kept in mind that besides cheap labor, another major attraction of H-1Bs from the employers' point of view is the "indentured servant" status of the workers. Indeed, that immobility has been extolled by immigration attorneys as "loyalty" to the employer, a major benefit for hiring H-1Bs. For example, the *Dayton Daily News* (July 11, 1999) reported that "[Immigration attorney Sherry] Neal said foreign nationals may appear to be more loyal workers because they aren't as mobile as other in-demand tech workers." Similarly, an article in a magazine for HR executives said that a virtue of hiring H-1Bs is that if the H-1B were to leave the employer, "...he or she has to start the immigration process all over again. As a result, most H-1B visa holders demonstrate remarkable loyalty."[22] To many employers, that "loyalty" is even more important than the salary savings. For instance, it gives the employers leverage to force their workers to put in long hours, as noted earlier.[23]

Our Government's Role in Providing Cheap Foreign Labor

It is crucial to understand that F-4 and other recent proposals to give "free" green cards to foreign Master's and PhD graduates at U.S. universities stem from a long-held plan of an agency of the federal government, the National Science Foundation (NSF). Incredibly, the NSF has explicitly advocated bringing in large numbers of foreign students in order to undercut American PhD salary levels. This was set forth in a 1989 policy paper by Peter House, Director of the Policy and Research Analysis Division of the NSF.[24]

In other words, it was actual government policy to swell the labor market with foreign nationals in order to hold down wage levels.[25] This also enabled the Type II savings described above. Furthermore, the NSF lobbied Congress to create the H-1B program, which Congress did in 1990. This led to the Type I savings.

Thus F-4 and other recent proposals are actually the culmination of a nearly two-decade-long campaign by the NSF to make cheap foreign labor a central component of U.S. science and engineering work. Indeed, the current proposals for "free" green cards for

foreign graduates would be a fulfilment of a pipe dream held by the NSF back in 1989. The NSF said at the time, "Another approach is to grant permanent resident status or immigrant status to foreign students successfully completing PhD degrees at U.S. institutions."

Just as we see occurring in Congress today, the NSF pitched its H-1B plan to Congress by using the "S word"—shortage. Yet soon after Congress enacted H-1B, a major glut on the labor market occurred. To its credit, Congress then angrily called the NSF on the carpet to explain itself. Yet Congress has been happy to oblige the industrial and academic lobby ever since then, and always responds whenever the S word is invoked. As we saw above, there is no shortage, but there has been no major objection in Congress to the F-4 proposal.

The situation, in which our own government has been deliberately acting to reduce wages and job opportunities for American programmers and engineers, sounds too bizarre (or Kafkaesque) to be true, yet sadly this is precisely what has been occurring.

Government Policy Role in the Numbers of American Students in Graduate Programs

The NSF also noted that a natural consequence of the unattractive wage levels would be that many American students would opt not to pursue PhD study:

> *[If] doctoral studies are failing to appeal to a large (or growing) percentage of the best citizen baccalaureates, then a key issue is pay. The relatively modest salary premium for acquiring a [science and engineering] PhD may be too low to attract a number of able potential graduate students. A number of these will select alternative career paths outside of [science and engineering], by choosing to acquire a "professional" degree in business or law, or by switching into management as rapidly as possible after gaining employment in private industry. For these baccalaureates, the effective premium for acquiring a PhD may actually be negative.... To the extent that the best U.S. citizen baccalaureates are choosing to avoid doctoral studies, more room will be available for qualified foreign students.[26]*

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This of course is exactly what did occur, as Intel's Patrick Duffy described above. But while Duffy made it sound like there was "something wrong" with American students for their failure to pursue graduate studies, the

American students are simply making sound economic decisions, as the NSF knew they would. Indeed, the above statement by the NSF notes that even *the best* American students would see the financial advantage of opting out of PhD studies.

Most F-4s Would Not Be "the Best and the Brightest"

Industry lobbyists have often made the argument that the H-1B program is working well for those who have graduate degrees, as they are the top talents from around the world. The lobbyists' claim is that these H-1Bs are being hired for their superior abilities, not for cheap labor. We saw above that the H-1B program in fact is used as a source of cheap labor even at the graduate level, so the lobbyists' argument already fails. But let's set that aside for a moment and address the quality issue itself.

Some foreign PhD students are indeed the world's "best and brightest." I fully support the immigration of such individuals, and have played an active role in the hiring of outstanding foreign nationals from China, India, and other countries to my department's faculty at the University of California, Davis. However, only a small percentage of all foreign PhDs are of this caliber, as will be seen below.

Remarkably, even some analysts who have been critical of industry's usage of imported engineers for cheap labor are nevertheless susceptible to the industry lobbyists' "best and brightest" argument. They extrapolate from a few success stories to a romantic, starry-eyed view that all the foreign students are Einsteins.

Harvard economics professor Richard Freeman is a prime example.[27] On the one hand, he agrees that

> *...the huge influx of foreign students and workers keeps wages and employment opportunities below what they would otherwise be. This discourages U.S. citizens from investing in science and engineering careers...*

Yet he then says

> *[the U.S.] has attracted large numbers of the best and brightest students, researchers, and science and engineering workers from foreign countries. According to the 2000 Census of Population, 38 percent of Ph.D.s working in science and engineering occupations were foreign-born—a massive rise over the 24 percent foreign-born figure for 1990.*

Apparently Freeman considers all or most of those 38 percent to be "the best and the brightest." But the reality is quite the opposite.

Posssesion of a graduate degree does not imply that one has outstanding talent—far from it. The fact is that virtually anyone with a Bachelor's degree can be accepted into *some* graduate program. Thus one should not assume that workers with graduate degrees are "smarter."

In fact, foreign PhD students are disproportionately enrolled in the academically weaker universities:[28]

Department Quality	Percent Foreign-Born
highest quarter	37.2 %
second quarter	44.5 %
third quarter	47.5 %
lowest quarter	50.6 %

Industry lobbyists say that the H-1Bs are needed to retain the industry's technological edge, but the fact is that the vast majority of technological advances in the computer field have been made by U.S. natives. This can be seen in rough form, for example, in the awards given by the Association for Computing Machinery (ACM). Of 63 recipients of the ACM System Software Award through 2005 (this is the award most closely associated with innovation in practice), only seven have been foreign-born.[29]

Again, outstanding individuals should be welcomed to the United States, but existing programs are quite sufficient to handle this group. There already exist special visa categories for those of outstanding talent, namely the O-1 visa for temporary work and the EB-1 program for green cards. Thus there is no need for a new visa program, such a F-4, in this regard. And note that the authors of the F-4 proposal again contradict their premises, in this case by actually reducing the percentage of employment-based green cards in the EB-1 category for "the best and the brightest."

Just as having a PhD is not a sufficient condition for being of outstanding talent, it is not a necessary condition for it either. There is very little correlation between having a PhD or a Master's and doing outstanding work in the computer field. Even lack of a Bachelor's degree is no obstacle. Neither Bill Gates, Larry Ellison, nor Steve Jobs, founders of Microsoft, Oracle, and Apple/Pixar, respectively, even has a Bachelor's degree. Linus Torvalds developed the Linux operating system while he was an undergraduate, and does not have a graduate degree. Tim Berners-Lee, the inventor of the Web, has only a Bachelor's degree, and it is not in computer science.

Adverse Impact of a Green Card Giveaway on Americans Over 35

As explained above, the industry wants young workers, as they are cheaper. In addition to hiring young American workers, the industry hires young foreign workers. In other words, when employers exhaust the supply of young American workers, they turn to hiring younger H-1Bs in lieu of hiring Americans over 35. It is unfortunate that most discussions of foreign labor in the tech area neglect this aspect. It actually will be a key point with regard to the F-4 visa and other similar proposals.

To make the point on age concrete, consider "David," a student of mine some years ago.[30] David, a U.S. native, made his immigrant parents proud. He earned a Master's degree in Computer Science, has patents to his credit, and his work was even mentioned in a major national newspaper. He is articulate and well-liked. Yet he has not found steady engineering work since being laid off by a major firm a couple of years ago. This is occurring while the industry claims it cannot find enough American engineers with graduate degrees. David has such a degree, but the problem, of course, is that David is now about 35.

In other words, the "shortage" is of *young* engineers with graduate degrees. Indeed, when asked recently what kinds of people Intel is currently hiring, Intel Director of Global Staffing Dorenda Kettman said, "[We're looking for] PhD candidates with semiconductor experience."[31] PhD *candidates* is an academic term which refers to students who are currently completing their PhD studies. Intel wants *young, new graduates*—not people like David.

This becomes especially relevant here, in the context of the F-4 visa and similar proposals. The new foreign graduates who would be covered are almost all young, so the proposals would give the industry abundant opportunities for Type II savings. In this light, it is not surprising that H-1Bs tend to be young. The Indian IT giant Tata Consultancy Services states that 50 percent of its programmers are under age 25, and 88 percent are under 30, as seen in Figure 6.[32]

Thus F-4 and similar proposals to give "free" green cards to foreign nationals hired from U.S. graduate programs are tailor-made for the industry, and would amount to congressionally-sanctioned age discrimination. This would have a major adverse impact on American programmers and engineers over the age of 35.
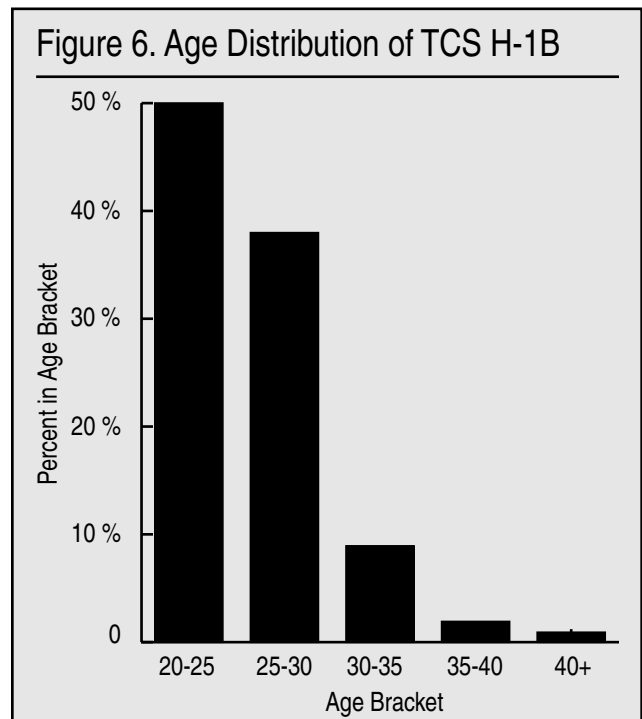
In addition, note also that these foreign workers become permanent fixtures in the labor market. Thus even if F-4 were to be modified so that it applies only during boom periods, when the subsequent bust comes, there would be a large surplus of workers competing for a paltry number of jobs. My former student "David" mentioned above, for instance, is not only handicapped by his age-35 status but also by the fact that he is competing for work with literally hundreds of thousands of engineers who were given green cards during the 1990s. In this sense, F-4 would actually be worse than H-1B.

Adverse Impact of a Green Card Giveaway on New American Graduates

As seen above, F-4 would not solve H-1B's problem of Type II salary savings, and in fact would worsen it, thus adversely impacting Americans over age 35. But what about Type I, which has an especially adverse effect on younger Americans? As I explained above, a major factor with H-1Bs is their relative lack of mobility, which allows employers to underpay and overwork them. At first glance, it would appear that F-4 would not have this problem. But in fact the mobility of the F-4s would be limited too.

You don't have to be an economist to understand that some compensation in one's job is nonmonetary. One might take a job with a lower salary for a variety of nonmonetary reasons. The job may be closer to home, it may have flexible hours, the work site

Figure 6. Age Distribution of TCS H-1B

(Percent in Age Bracket vs. Age Bracket: 20-25 ≈ 50%, 25-30 ≈ 38%, 30-35 ≈ 9%, 35-40 ≈ 2%, 40+ ≈ 1%)

might include attractive recreational facilities and so on. For many foreign workers, the supreme form of nonmonetary compensation is a green card. As noted by Stephen Seideman, dean of the New Jersey Institute of Technology's College of Computing Science, the foreign students "will do everything they can to stay here."[33] The NSF policy paper discussed above observed,

> *A growing influx of foreign PhD's into U.S. labor markets will hold down the level of PhD salaries to the extent that foreign students are attracted to U.S. doctoral programs as a way of immigrating to the U.S.*

For that reason, the foreign workers are willing to take lower salaries than what the Americans are getting.

Note that universities are employers too. The graduate students receive a modest stipend for their work on university research projects. This stipend is too low to attract many American students, just as the NSF predicted. In other words, universities are just as addicted to cheap foreign labor as is industry, not only for the low cost itself but also for docility, as the dean pointed out.

Under the proposed F-4 program, visa holders would automatically be granted a green card after three years of work in the United States in their field. Thus, borrowing Dean Seideman's words, the F-4s would "do everything they can" to stay employed in their field for that magic three-year period. That means choosing the most stable job they can find, and then "lying low" for three years. They would be reluctant to ask for raises or do anything else that might jeopardize losing their employment status. Accordingly, though F-4s would on paper have greater mobility than H-1Bs, they would be reluctant to switch jobs. A prospective new employer may offer a higher salary, but at a cost of lower stability. This would be an unattractive tradeoff in the eyes of the F-4, as stable employment is hard to find.[34]

Employers are keenly aware of these things, as the quotes of Wentworth and Seideman so starkly illustrate. Armed with this knowledge, the employers would offer the F-4s lower salaries, which as mentioned earlier they would be willing to take because of the nonmonetary compensation of the green card. The employers would also attain that all-important "loyalty" described earlier. For these reasons, many employers would prefer to hire foreign workers instead of Americans.

This preference for foreign workers under F-4 or other similar programs would have a significant adverse impact on employment opportunities for young Americans. Another obvious adverse impact would arise due to the swelling of the labor market at the entry level.

Moreover, the current bill would allow foreign students greater opportunity to work off campus while they are in school. This may seem innocuous but it is very significant. Here's why: For the last 5-10 years, industry firms have typically had a policy under which a new graduate is not considered for a development software position unless he acquired internship/co-op experience during his student years. And if you don't get into a development position at the beginning of your career, it is quite difficult to get one later. Thus internship/co-op experience is crucial to access a development career. Moreover, often in internship/co-op positions a bond develops between the employer and student, making it much easier for the student to get a permanent job with the employer after graduation.

Thus, by making it easier for foreign students to obtain internship/co-op positions, the current bill would directly reduce opportunities for domestic students to ever get into software development careers.

One Argument Involving Entrepreneurship

One common argument made by industry lobbyists is that unless we have a liberal green card program, the foreign students in U.S. universities will take the training we give them back home, where they will start businesses to compete with us. This argument has never made sense, for two reasons.

First, if this is a realistic fear, why do those who make this argument advocate bringing in so many foreign students in the first place? It would seem counter to the national interest to train so many foreign students. Thus it is clear that the industry's argument is just a pretext for bringing in cheap labor, which the NSF advocated explicitly.

Second, Professor Annalee Saxenian of UC Berkeley has shown that many foreign graduates who get green cards eventually go back home and start businesses there to compete with us anyway. In fact, Saxenian found that even those who do not return home actively help the development of industry in their native countries.[35]

After surveying members of Silicon Valley networking groups such as the Asian American Manufacturers Association and the Indus Entrepreneurs, Saxenian found that half of those who run startup companies here have set up subsidiaries, joint ventures,

or other business operations in their home countries. Most respondents are from India, China, and Taiwan.

Whether they run their own business or not, half of foreign-born professionals travel to their homelands on business every year, the study found. More than 80 percent said they share information about technology with people back home.

"The most interesting findings are the extent of the ties that these immigrants are building between Silicon Valley and their home countries, not only transferring information but advising companies, arranging contracts, investing in startups, working with governments, and even starting companies in their home countries," Saxenian said.

So again, if the lobbyists were truly concerned with foreign business competition in the tech industry, they would be advocating a large reduction in the number of foreign students, not incentives to increase that number.

The industry lobbyists also are fond of pointing to prominent businesses founded by immigrants, with Intel and Google being two commonly cited examples. The lobbyists claim that this shows the importance of having so many foreign students. Let's look more closely at that claim.

First, neither Intel nor Google's founders came here as foreign students. Google cofounder Sergey Brin immigrated to the U.S. with his family when he was five years old. Andy Grove, frequently described as a cofounder of Intel,[36] also immigrated with his parents, as a refugee.

Much more importantly, no firm in the computer industry has been pivotal to the development of the field. Intel and Google have certainly not been indispensable. Back in 1981 when IBM needed to select a CPU chip for its new PCs, IBM had many alternatives to its choice of Intel as a CPU supplier. Actually, the IBM engineers who designed the original PC favored a competing chip by Motorola.[37] And though Google arguably is more fun to use than other search engines, they are all about equally effective in their search capabilities.[38]

Conclusions

The central premise on which F-4 and similar proposals are based, that there is a shortage of programmers and engineers with graduate degrees, is obviously false. Salaries and jobs have been stable in recent years, showing clearly that there is no shortage of such workers. Indeed, many American programmers and engineers with graduate degrees cannot find work in their field. And while the number of jobs has been flat since 1999, we have more H-1Bs and L-1s today than in that year, so the number of jobs available to Americans has declined. Thus Congress should not be entertaining any kind of increase in the number of foreign tech workers in the United States, including at the graduate level.

The F-4 legislation's own authors contradict the claims made by the industry lobbyists. First, they disprove their claim of a labor shortage, by giving foreign graduates a full year in which to find a job. Second, they refute their own claim that F-4 would bring in "the best and the brightest," by reducing the percentage of green cards in the EB-1 category, which is specifically for outstanding talents.

F-4 would be a "free giveaway," not only for the foreign workers but also for the employers, who would use it as an abundant source of cheap, young labor. It would have a major adverse impact on American workers, both new graduates and the ones at the more advanced career levels. Concerning the latter, F-4 would amount to government-sanctioned age discrimination.

Always aware that "pushing the education button" is a sure way to obfuscate the tech foreign labor issue, the industry and university lobbies have been manipulating public opinion in this regard for years. They have been actively aided in this regard by the governmental National Science Foundation (NSF), which has explicitly called for expansive immigration policies in order to suppress salaries in engineering and science.

Instead of making it easier for foreign tech graduates to be hired in U.S. industry, Congress should make it more difficult. It should enact genuine H-1B reform, addressing both Type I and Type II salary savings. While it should retain the EB-1 category for those of outstanding abilities, Congress should reduce, rather than expand, the total yearly number of employment-based green cards. Congress should also warn the NSF that further undermining of American engineers and scientists may jeopardize the NSF's funding.

End Notes

[1] "Tech Firms Eye Immigration Debate," *The New York Times* (Associated Press), March 28, 2006.

[2] Most programmers and engineers are exempt from overtime pay.

[3] The provision does impose conditions, but they would be very easily satisfied, as explained below.

[4] The employers could get such workers from abroad rather than from U.S. university campuses. However, employers who like having foreign workers prefer hiring from U.S. universities because foreign applicants can be interviewed in person to gauge their abilities.

[5] Jen Lin-Liu, "A Chinese University, Elite Once More: Tsinghua U., once stripped of its science programs, now competes with America for graduate students," *Chronicle for Higher Education*, July 9, 2004; Liz Reisberg, "Where Did All the International Students Go?" *International Higher Education,* Fall 2004.

[6] See the NRC report, page 245, cited in Note 15 below, and also Edwin S. Rubenstein, "Piled Higher and Deeper," *American Outlook,* Fall 1999.

[7] See N. Matloff, "On the Need for Reform of the H-1B Nonimmigrant Work Visa in Computer-Related Occupations," *University of Michigan Journal of Law Reform,* Fall 2003, Vol. 36, Issue 4, 815-914.

[8] See http://judiciary.senate.gov/testimony. cfm?id=913&wit_id=2610.

[9] The Master's data here are from the National Association of Colleges and Employers (NACE), the standard source for such figures. There is not much data available at the PhD level, though one data point will be cited below.

[10] Data are from the Bureau of Labor Statistics. For the Programming Jobs data, I summed the numbers for the job categories Computer Software Engineer and Computer Programmer. Note that these two job titles describe the same job; the title Programmer is older, and the industry has been moving to the title Software Engineer.

Figure 5 shows the sum of job numbers for Computer Hardware Engineers and Electrical Engineers.

[11] The data are from Figure 1 in J. Kirkegaard,*Outsourcing and Skill Imports: Foreign High-Skilled Workers on H-1B and L-1 Visas in the United States*, Institute for International Economics, December 2005. The trend for the L-1 visa is similar. Kirkegaard also discusses possible limitations of the data.

[12] This is in stark contrast to the rosy picture painted by the recent study by the Association for Computing Machinery. The ACM is dominated by academics. As mentioned earlier, academia is alarmed at the decline in the number of foreign students in U.S. graduate programs. In addition, computer science enrollment at the undergraduate level has been plummeting, due to student worries about H-1Bs and offshoring of programming jobs. (This is a major factor in the decline in foreign student enrollment at the graduate level too. Most foreign students hope to live and work in the United States. after graduation, and they see that their long-term prospects for a career in the United States are poor.) Thus the ACM study was aimed at reassuring the nervous undergraduates and encouraging them to stay in the field, and accordingly presented a very optimistic view. The study was badly flawed. In addition to misusing the jobs data, it failed to account for the impact of the H-1B and L-1 work visa programs on the employability of U.S. workers, as seen here.

[13] My law journal article (Note 7), Section V, presents an extensive literature survey on the various studies. See also J. Miano, "The Bottom of the Pay Scale: Wages for H-1B Computer Programmers," Center for Immigration Studies *Backgrounder,* December 2005; http://www.cis.org/ articles/2005/back1305.html

[14] Actually, many older programmers would be willing to take a pay cut when they cannot find programming work, but employers either assume otherwise or believe that if hired, the older worker would soon leave when he found a job with pay commensurate with his experience. Moreover, health insurance costs more for the older workers, both because of age itself and also because they are more likely to have dependents.

[15] National Research Council, *Building a Workforce for the Information Economy*, National Academies Press, 2001.

[16] These conditions are crucial. Without something like the eight-year criterion, we would be including all the foreign-born who immigrated with their families as children, and who then would not be subject to exploitation when they entered the work force. Without the under-30 criterion, we would be including former H-1Bs who later got green cards and thus were not subject to exploitation. The underpayment effects of H-1B would be washed out by such inclusions. A number of studies cited by the industry lobbyists have suffered from these crippling flaws.

[17] Based on regression analysis on the census data. See Note 7 above.

[18] See http://www.flcdatacenter.com/CaseH1B.aspx.

[19] This is actually for 2001, the only year for which I was able to obtain NACE data. See http://physics.ucsd.edu/ ~griest/salarymastersstart01.html.

[20] Dept. of Labor Employment and Training Administration, *Prevailing Wage Determination Policy Guidance, Nonagricultural Immigration Programs,* May 9, 2005: "All prevailing wage determinations shall start with an entry level wage and progress to a wage that is commensurate

with that of a qualified, experienced, or fully competent worker only after considering the experience, education, and skill requirements of an employer's job description (opportunity)."

[21] It is interesting to note that the figures Intel cites in the Wage Rate I column, i.e. the wage to be paid to the H-1Bs (and the basis for our data in the table above), are 5 percent lower than those of the Prevailing Wage column. This 5 percent difference reflects the fact that it was legal to pay 5 percent below official prevailing wage. This is only a small part of their cost savings, but it does illustrate that Intel aggressively makes use of the loopholes.

Some lobbyists have argued that the wages employers specify in the Wage Rate I column in the Labor Condition Application (LCA) are actually lower bounds, and that in some cases an employer will actually pay a higher wage once the Department of Labor approves the visa. Though this may conceivably occur in some cases, in general the LCA data track quite well with actual wage data. For example, the 25th, 50th and 75th percentiles of the LCA wage data are similar to those in the annual H-1B reports published by the federal Bureau of Citizenship and Immigration Services. Also, the census data discussed earlier show an underpayment percentage at the Master's level that is similar to what we see for Intel above. Moreover, the LCAs show that what Intel considers to be the prevailing wages are much lower than the market, demonstrating again that the loopholes are huge.

[22] John Wentworth, "Stop-gap Measures for the IT Staffing Crunch," *Workforce Magazine*, May 1999. The 2000 legislation made some technical changes that increased H-1B mobility somewhat, but they are still largely immobile, especially if they are being sponsored for green cards.

[23] It is the mechanism driving the underpayment of H-1Bs as well. Indeed, basic economic principles imply that if a worker is immobile, he will in general not get as a good a salary as he would if he could move about in the labor market. In this manner one could see that H-1Bs are in general underpaid, even if we did not have the statistical studies which have shown it.

[24]   From Eric Weinstein, *How and Why Government, Universities, and Industry Create Domestic Labor Shortages of Scientists and High-Tech Workers*, NBER working draft, MIT, 1998. On the Web at http://nber.nber.org/~peat/PapersFolder/Papers/SG/NSF.html. See also Daniel S. Greenberg, "A Shortage of Scientists and Engineers," *The Washington Post*, August 18, 1991.

[25] For a detailed (though highly technical) analysis of the size of these effects, see George Borjas, *Immigration in High-skill Labor Markets: the impact of foreign students on the earnings of doctorates*, Harvard University, 2004.

[26]   Need cite

[27] Richard Freeman, "Stimulating Careers in Science and Engineering," *IEEE Spectrum*, June 2004.

[28] See David S. North, *Soothing the Establishment: The Impact of Foreign-Born Scientists and Engineers on America,* University Press of America, 1995, page 48.

[29] The ACM also gives awards for the best PhD dissertations in computer science. The proportion of foreign-national recipients has been roughly similar to—though somewhat lower than—the proportion of foreign students in U.S. doctoral programs in the field.

[30] I have used a pseudonym here but the other aspects are real.

[31] "Face to Face: Interviews with Hiring Professionals at Places You Want to Work," *San Francisco Chronicle,* February 19, 2006.

[32] TCS recruiting page, originally at http://www.usa-tcs.com/careers/whyjoin.html. It was subsequently removed by Tata (possibly in response to the citation of it in my article), but can be found in the cache at http://web.archive.org/web/20041010223626/www.tcs-america.com/careers/whyjoin.html.

[33] From Patrick Thibodeau, "Foreign Students Fill Computer Science Graduate Programs," *Computerworld,* February 28, 2005.

[34] Recently an American student gave me an interesting illustration of that point. The student, who will soon graduate, told me that she felt lucky that she had not accepted a certain job offer a couple of months ago. It turned out that not long afterward she learned that the firm had decided to offshore the entire department in which she would have worked.

[35] Carrie Kirby, "Silicon Valley Immigrants Build Ties to Homelands," *San Francisco Chronicle,* April 19, 2002.

[36] Grove did not found the company but he was an early employee.

[37] Charles Ferguson and Charles Morris, *Computer Wars,* Times Books, 1993.

[38] Saxenian has also studied entrepreneurship by immigrants in Silicon Valley. Her findings have been much cited by the industry lobbyists, but in fact her data show that per capita the immigrants have been actually less entrepreneurial than the natives. See Note 7 above for details.

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which leg-isla-tion?

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Backgrounder

Best? Brightest?
A Green Card Giveaway for Foreign Grads Would Be Unwarranted

By Norm Matloff

Knowing that the importation of foreign labor is unpopular with the public, Congress has often enacted legislation of this nature for the tech industry in "stealth" mode. This year seems to be no exception, with radical changes to laws on high tech work visas being hidden in a 300-page Senate bill that is supposed to be about illegal immigration. The industry lobbyists apparently believe that the latter topic is so controversial that the provisions on foreign high-tech workers will slip through unnoticed. Victor Johnson, associate executive director at the Association of International Educators even said so to the press, remarking "Hopefully there's enough support in the Senate for this that we can get this through while they're arguing about the other issues."

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Center for Immigration Studies
1522 K Street, NW, Suite 820
Washington, DC 20005-1202
(202) 466-8185
center@cis.org
www.cis.org