



A Missed Opportunity

Pro-Industry Report Defends “Temporary” H1-B Visa Usage, Fails to Deal with Fact that It Will Be Permanent

By Norman Matloff

In 1998, the high-tech industry, claiming a desperate shortage of computer programmers and other high-skilled workers, pushed Congress to nearly double the yearly quota of workers imported under the H-1B visa. Opponents countered that there was no shortage of tech workers, just a “shortage” of young and cheap ones. While agreeing to the doubling of the H-1B quota, Congress ordered two investigations into charges made by the critics.

The two investigations were coalesced into a single study conducted by the private, nonprofit National Research Council (NRC). That organization, which is industry-funded, then appointed a study committee comprised overwhelmingly of industry representatives and their allies. Not surprisingly, the committee’s final report’s findings were similar to the claims made by the industry in its lobbying of Congress:

- It found that massive usage of H-1Bs by U.S. employers is warranted.
- It essentially rejected the assertion that H-1Bs are subject to wage exploitation by employers.
- It sidestepped the question put to it regarding charges made that employers are shunning older American programmers while hiring H-1Bs.
- Though avoiding the term “labor shortage” on technical grounds, it consistently used euphemistic language which for all practical purposes had the same meaning (for example, “the demand is outstripping the supply”).

There was an egregious lack of balance in the report. Though the issues involved are complex and reasonable people may indeed disagree with each other, the committee at least had a responsibility to present both sides. It did not do so. It was highly selective in its coverage, making no mention of virtually any of the major findings in previous studies showing wage exploitation of the H-1Bs, employer disinterest in the older American workers and so on. Similarly, most major arguments made by critics of the H-1B program and

industry hiring practices were either not cited or were summarily rejected. The committee even dismissed the findings of its own commissioned study which showed major abuses of the H-1B program.

Most significant of all, the committee did not face up to the implications of its findings. In particular, though the committee only endorsed the H-1B program as a “temporary” stopgap measure, the inescapable implications of the various findings of the report are that the alleged labor “shortage” will be permanent, as will the industry’s heavy usage of H-1Bs. The committee heard testimony on this crucial point but did not address it.

Of, by, and for the Industry

If the tone and findings of the NRC report sound as if it had been written by the industry itself, it is because the report was indeed written by the industry and its allies.

The NRC Computer Science and Telecommunications Board, which oversaw the NRC project, lists as its current sponsors Cisco Systems, Sun Microsystems, Hewlett-Packard, Intel, Microsoft, Texas Instruments, and Time-Warner Cable. With the exception of Time-Warner, all of these firms have been in the forefront of lobbying for expansion of the H-1B program. It is not surprising, then, that the committee was chosen to consist overwhelmingly of pro-industry members.

The committee’s chair, Alan Merten, is president of George Mason University in Virginia (GMU). Academics have compelling incentives to toe the industry party line on the H-1B issue, such as dependence on industry contributions for research, scholarships and even new buildings, and this is especially the case for GMU. In 1998 Virginia governor James Gilmore announced a host of measures designed to strengthen GMU-industry ties, including appointing four computer industry executives to the university’s board.¹

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Merten not only has these incentives as a university president, but in addition he serves on the boards of several high-tech firms, such as BTG Inc., Comshare, and the Indus Group.²

At least one of those, BTG, hires H-1Bs at below-market rates. A Freedom of Information Act request revealed that BTG had hired a computer engineer at a salary of only \$30,000, project engineers at \$37,000, and programmer analysts at \$43,000, all far below market rates.³

The committee membership included representatives from Microsoft and Intel, and several others from industry as well. Most of the non-industry members of the committee had similarly vested interests in supporting the industry point of view. For example, Helen Wood served as a representative of the IEEE (Institute of Electrical and Electronic Engineers) Computer Society. Corporate and academic interests in IEEE-CS had been instrumental in 1999 in pressuring an affiliated group, IEEE-USA, into greatly reducing its lobbying activities against H-1B increases. Another member, Peter Saflund, is director of a technical education training center, a prime candidate for receiving training funds raised by the H-1B fees.

There were some pro-labor members on the committee. However, they were not only outnumbered but also outgunned. The industry representatives had access to vast resources (data, extensively researched counterarguments, etc.) while the pro-labor members had nothing, and unlike the industry lobbyists, did not have much time to devote to the committee. Though it is apparent that they were able to attain some concessions, for example the (economically indisputable) statement in the report that the presence of the H-1B workers in the labor pool suppresses wage growth in the field, for the most part they were overwhelmed by the pro-industry majority.

Analysis of the H-1B Visa Program

By far the most controversial issue in the H-1B debate of recent years has concerned allegations that the H-1Bs are exploited by their employers, in terms of wages and work conditions. Yet the committee omitted any mention of previous findings of exploitation of H-1B programmers and engineers:

The study by an immigrant advocate, Professor Paul Ong of UCLA.⁴ This research, accounting for a host of variables, found that on average the foreign-born engineers were paid 33% less than comparable Americans.

The study by Demetrios Papademetriou, an immigration researcher with the Carnegie Endowment for International Peace, and Stephen Yale-Loehr, an immigration lawyer and law professor at Cornell University:⁵ In data from the labor certification applications for the sponsorship of foreign workers for green cards, the foreign applicants in Computer Programmer positions in New Jersey were being offered salaries which were on average 21% below the mean for that profession, with an 11% figure in Texas. In the Computer Systems Analysts and Scientists category, gaps of 30% and 21% were found in New Jersey and New York, respectively. By law the gap is supposed to be no more than 5%.

The audit performed by the Inspector General of the Department of Labor:⁶ This found that 19% of the H-1Bs were not even being paid the amount the employers had stated on the visa application. It also found 33% of the H-1Bs left their jobs within one year of getting a green card, illustrating the fact that they had been underpaid during the “indentured” period while waiting for the green card.

My own study:⁷ Using Census data on programmers and electrical engineers in Silicon Valley, this research showed that the immigrants were paid on average 15-20% less than natives of comparable age and education.

None of these findings was cited in the NRC report, even though the committee was aware of them, and had even cited a couple of the studies in other contexts. For example, the report does briefly mention the DOL audit in a footnote, but none of the audit’s statistical data are quoted, and the committee dismisses the audit simply on the grounds that it had been criticized by industry lobbyists. (The lobbyists did not dispute the DOL statistics I have quoted above.)

The committee downplayed the issue of H-1B exploitation so much that they did not even mention it in the report’s Executive Summary.

What is most interesting is that the committee actually commissioned a study on treatment of H-1Bs, conducted by Dr. Hal Salzman, a researcher at the University of Massachusetts at Lowell. Salzman’s findings were rather damning of the H-1B program, which the NRC report did concede:

*Salzman reported that H-1B workers requiring lower levels of IT skill received lower wages, less senior job titles, smaller signing bonuses, and smaller pay and compensation increases than would be typical for the work they did.*⁸

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Yet the NRC dismissed its own commissioned report. It postulated that H-1Bs with “low-level skills” — in Salzman’s context, those in jobs requiring just a bachelor’s degree rather than postgraduate work — might not be typical of H-1Bs in general. On the contrary, the vast majority of computer-related H-1Bs are indeed of the sort Salzman was describing. An INS document cited elsewhere in the NRC report⁹ shows that most H-1Bs have only a bachelor’s degree, and that 75% of the H-1Bs make less than \$55,000, with a median of \$45,000 (with values of \$54,500 and \$47,000 when restricted to programmers and systems analysts). Compare this to the median salary of \$60,000 for IT workers.¹⁰

The committee did concede that the presence of such a large number of H-1Bs in the IT labor pool is suppressing the growth of wages in the field. They correctly made this statement without appealing to empirical data, instead citing simple economic principles of supply and demand. Yet somehow the committee did not seem to notice that those same basic principles demonstrate wage exploitation of H-1Bs: As the committee itself notes, the H-1Bs whose employers are sponsoring them for green cards are de facto indentured servants; moving to another employer would mean starting the multi-year green card process over again, unthinkable for most of them. Thus an H-1B does not have the option of jumping ship to obtain better pay at another firm, or negotiating a higher wage with his present employer by threatening to leave. In other words, H-1Bs are generally not paid as much as they would get on the open market. Instead of begging the question as to whether many H-1Bs are underpaid, claiming a lack of good data, the committee should have noted that exploitation is economically obvious.

Worse, the NRC committee followed a favorite line of industry lobbyists, arguing that exploitation “must” be relatively rare, given that the Department of Labor has not been able to document many violations of the law. This is disingenuous, since (a) neither the H-1Bs nor their American co-workers are in a position to complain about abuses, fearing recriminations, and (b) DOL has pointed out that Congress tied the DOL’s hands, severely limiting what they can do to investigate and prosecute alleged abuses. As DOL’s John Fraser put it, “There are really powerful reasons for H-1B folks not to complain. They are dependent on their employer to live and work in the U.S., and they are dependent on their employer if they want to live permanently in the U.S.”¹¹

Another favorite claim of the industry lobbyists which the NRC adopted is that the exploitation of H-1Bs occurs mainly in the so-called “body shops,” rent-a-programmer firms typically owned by Indian

immigrants. The claim is that large mainstream employers prefer to hire Americans, and resort to hiring H-1Bs only when efforts to find qualified Americans have failed. Given that the NRC committee had members representing mainstream employers like Microsoft and Intel, it is no surprise to see this notion pop up in the NRC report. Yet it is unwarranted.

Consider, for example, the comments of Steve Yurash, an engineering manager at Intel (and H-1B critic). Yurash discussed the fact that, as a manager at Intel, he had to take matters into his own hands in order to NOT hire an H-1B at Intel:

It’s a matter of what are the mechanisms, how does a hiring manager in Silicon Valley get a hold of resumes? What happens is, you get a lot of H-1B resumes. I had to go out myself, instead of relying on the Personnel Department, to go and advertise at several colleges where I thought I would be able to find some good employees. And lo and behold, I found a very good one at Cal Poly, Pomona.¹²

The dissident organization FACE Intel (Former and Current Employees of Intel) states that:

[Intel] HR representative Donna Hasbrouck presented to Microprocessor Technology (MT) staff, while J.C. Cornet (VP of MT) and Joseph Krauskopf (Director of Test) [were] present, as how to hire foreign students.

Ms. Hasbrouck told the MT group “after hiring the foreign student, delay the immigration paper work process, because when they get their greencard we lose them to companies like Sun Microsystems and Silicon Graphics, they pay them about 30% more.”

Intel and Hewlett-Packard also employ H-1Bs through Northwest Software, a firm that has hired many software engineers in Silicon Valley — one of the highest cost-of-living areas of the nation — at very low salaries of \$32,000, \$38,000 and \$40,000.¹³

Sun Microsystems, which claims to scour the world for “the best and the brightest,” seems to be also interested in the cheapest. It boasted to *The Los Angeles Times* that it had employed programmers in Russia “at bargain prices.”¹⁴

Disproving Shortage Naysayers

The NRC committee, citing (or taking refuge in) the complexity of the IT labor market and the lack of good data, chose not to declare a worker shortage in the field, settling for finding that there is “a tight labor market.” Nevertheless, all of the committee’s language, conclusions, and recommendations are presented in terms of a shortage. They speak for example of “the demand

outstripping the supply” of computer science graduates. They say that the growth of the IT industry would slow without H-1Bs. And they devote pages and pages to remedies to these problems, remedies which cannot be meant to address anything other than a shortage. Thus the distinction is merely semantic.

Once again, the committee was quite selective in its presentation of data sets and arguments concerning the shortage question. For example, the committee cites the 1997 Department of Commerce finding of an IT labor shortage, but does not mention that DOC later retracted the claim, saying in its report, “Digital Economy 2000,” that the data were insufficient to determine whether a shortage exists.

The committee bought into the industry line that American students have neither the mathematical background nor the interest to study technical subjects such as IT, engineering and science. This ignores the *New York Times* finding that overall college enrollment in technical fields has not declined¹⁵, and enrollment in computer science has risen and fallen over the years in almost perfect correlation with the IT job market¹⁶.

In addition, critics of industry shortage claims had previously pointed out that computer science enrollment is misleading anyway, since only about one-fourth of computer programmers have computer science degrees. The NRC committee dismissed this, claiming that only a computer science graduate is technologically equipped to write modern software. They offered no evidence for this, and conceded that even an industry trade group had found that only 20% of managers surveyed thought a college degree (of any kind) was important. Moreover, though they presented material from a Department of Education study¹⁷ to support their pro-industry position in other aspects, they omitted this study’s data showing that large numbers of non-computer science majors take at least mid-level courses in computer science.

Also, the committee did not address the fact that fewer than half of computer science graduates are hired as programmers, often being shunted into semitechnical jobs such as customer support while H-1Bs are hired for the programming work. The committee did, however, point out that many employers seeking new graduates recruit only at the most prestigious universities, even though the committee correctly admonished that “there is no evidence to suggest that those who do not attend top schools are less qualified or less productive.”

The NRC report does not cite an earlier study showing the short-lived nature of programming careers¹⁸. National Science Foundation data show that twenty years

after graduation from college, only 19% of computer science majors are still employed as programmers. This compares, for instance, to the 57% of civil engineering majors who are still working as civil engineers 20 years after leaving school¹⁹.

Clearly, then, there is a very large pool of former programmers which could be drawn upon to remedy a programmer labor “shortage.” Yet the committee assumed that only 1,010 of these would return to programming if given a chance, a number that just doesn’t pass the “sanity test.”

Moreover, if we are worried about a programmer shortage, shouldn’t we take steps to avoid such wastage of programmers in the future? If the committee had been seriously concerned about a possible programmer shortage, they would have viewed the extremely low 19% retention rate for computer science graduates with alarm, and would have recommended strong measures for raising that rate. Yet the NRC committee did not even mention this issue.

Missing the Core “Shortage” Issue

The employers claim to be “desperate” to hire, yet their actions show otherwise. Cisco receives 20,000 applications per month but hires only five percent of the applicants. Inktomi hires only one percent, Microsoft two percent, Qualcomm five percent, Red Hat Linux one percent, and so on. This phenomenon holds across the board, from large firms to small ones, in all regions of the country²⁰.

Similarly, employers only extend offers to a small fraction of those whom they interview, and indeed readily admit that they reject the vast majority of their applicants without an interview at all.

As the committee (and the Department of Commerce) discovered, available data simply cannot tell us whether there is a shortage of programmers. But what we do know, from the low hiring/interview rates, is that there is no “desperate” shortage; on the contrary, employers are extremely picky.

The NRC committee summarily dismissed as irrelevant the critics’ data concerning employer pickiness. They said for example that a single applicant could apply for a dozen jobs, falsely making the applicant pool appear 12 times its actual size. Yet I had pointed out to the committee in their Silicon Valley hearings that this explanation fails, due to the data showing low interview (not just low hiring) rates.

The hyperselective nature of the industry’s hiring policies is indisputable, and is the underlying cause of the “labor shortage.” It is reflected, on the one end of the age

spectrum, in the disinterest shown by employers toward most older applicants. On the other end, this pickiness is seen in the shunting of more than half of new computer science graduates into semitechnical positions like customer support while hiring H-1Bs for programming, and in most employers' limiting their recruiting efforts only to a few prestigious universities.

It is not that employers should hire any programmer who applies; professional competence must be the criterion used in hiring. But employers should be casting their nets far more widely in the domestic labor pool before demanding a subsidy from Congress in the form of imported workers. Regrettably, there is no statement to this effect in the NRC report, and as discussed below, the committee's stance is tantamount to endorsing the hiring of younger H-1Bs instead of older Americans.

Employers explain their hyperselectivity in terms of a "need" to hire only programmers who have work experience in the very latest software skills. This is often a pretext for shunning the older American applicants in favor of younger, cheaper Americans, and for even shunning many younger Americans in favor of the still cheaper, indentured-servant H-1Bs. Some employers do sincerely believe that previous work experience in certain skills is a must. But in either case, the skills issue is central.

In other words, while the industry lobbyists have described the situation as one of a shortage of "bodies" — people with experience and training as programmers — what they actually mean is a shortage of skills. Thus the committee greatly erred in devoting so much of their report to priming the educational system to produce more programmers (a favorite stall tactic of the industry lobbyists). No matter how many programmers the system produces, by definition it will always be the case that the vast majority of programmers do not possess the latest skills, given the rapidity of technological change. The committee should have conducted an in-depth investigation as to how to make use of the programmers we already have, with focus on the issue of dealing with the rapid change in desired skill sets. It is here that the committee's failure was perhaps the most profound.

The first aspect of this failure concerns the committee's assessment as to whether the employers' obsession with skills is economically warranted. The committee rejected testimony presented by programmers and academics that any competent programmer can become productive in a new programming language quite quickly. The report contended, for example, that programmers cannot become proficient quickly in the Java programming

language, as its object-oriented style represents an "abrupt change in the paradigms of programming." This is absurd, and it is sad that the committee made no real effort to get to the bottom of this key issue. Those of us "dinosaurs" who have been programming since way back in the days of punched cards have heard claims of "abrupt paradigm changes" many times as programming languages have evolved over the years. The claims have always simply been hype. Programming is programming is programming, and it has always been a straightforward matter to quickly become effective in a new language²¹.

The committee does say that the skills issue is crucial for the older programmers, and concedes that for the most part, employers are not willing to subsidize retraining in new skills. (This subsidy could be direct, via formal training, or indirect, via learning on the job.) The committee thus recommends that older workers retrain on their own. However, this ignores testimony presented to the committee that employers are not willing to hire retrained programmers anyway; the employers insist on actual work experience in the new skill, not coursework or self-study.

The skills issue relates to another point considered by the committee as well. The committee, like the industry itself, expressed a desire to see more African-Americans and Latinos in the computer industry. But the committee again followed the industry party line on this issue, which boils down to a long-term stall: Encourage more minority youth to prepare for high-tech careers. The committee said that it found "no evidence" that employers' easy access to H-1Bs is reducing industry efforts to recruit existing minority workers. Yet the committee was aware of exactly such evidence, presented to Congress by John Templeton of the Coalition for Fair Employment in Silicon Valley²².

Templeton had conducted a "sting" operation, sending real resumes of well-qualified minority programmers and engineers to Silicon Valley firms which hire large numbers of H-1Bs. Templeton found that "Not one of the companies responded to the resumes." Though the likely reason for the nonresponse is not the applicants' minority status, which may not be apparent from their resumes, the applicants did suffer from the same problem that older nonminority applicants encounter — employer overemphasis on specific skills. Thus Templeton's experiment shows clearly that employers' obsession with specific skills is causing them to miss good minority prospects.

Sidestepping the Age Issue

As noted earlier, Congress originally called for two separate studies, one on the problems of older IT workers, and the other on the IT labor market. Though the two studies were

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later combined into a single investigation, it is clear that Congress intended that special attention be paid to the age issue, as one of two major questions to be addressed. Yet the NRC committee sidestepped the age issue.

The exact wording in Public Law 105-227, Sec. 417 was that the NRC shall “conduct a study, using the best available data, assessing the status of older workers in the information technology field.” Yet the committee chose to focus mainly on the far narrower question of age discrimination as defined under the law. This is quite significant, as the law does allow employers to shun older workers as a means of reducing labor costs, and thus such shunning would be outside the NRC committee’s self-imposed scope of study on the age issue. In short, the committee ducked the question Congress put to them.

The NRC report omits any mention of well-known studies and surveys demonstrating clearly that older programmers and engineers do indeed often face problems in the labor market, such as:

- The finding by American University professor Laura Langbein that the time needed to find another job for laid-off engineers increases three weeks for each additional year of age²³.

- The Informationweek survey showing that only 2% of hiring managers would seek a worker having more than 10 years of experience²⁴.

- The Network World survey data showing that the younger the managers, the less likely they are to hire people over 40²⁵.

- My finding, mentioned earlier, that 20 years after graduation, only 19% of computer science graduates are programmers, while 57% of civil engineers are still in the field at that time.

The committee did point to data suggesting that the older IT workers are laid off more often than younger ones, and that older laid-off IT workers on average experience a reduction in pay when becoming re-employed — while younger laid-off IT workers actually get a raise in their new jobs. But the committee then quickly diverted attention to the legal arena, saying that these data may be perfectly consistent with “legal conduct by employers.”

Elephants in the Room

Perhaps the most troubling aspect of the NRC report is its failure to face the implications of its findings. Several major questions beg for answers:

- The “labor shortage,” under the terms defined by the industry, will be permanent. This is due to the fact that the technology will continue to evolve rapidly, and

thus at any given time, by definition most programmers will not have work experience with the newest skills. Note that this will be the case no matter how many programmers the educational system produces, since the new graduates quickly become obsolete as the technology changes.

Question: Is the committee comfortable with this permanent nature of the “labor shortage,” and permanent large-scale usage of H-1Bs in this key industry?

- The committee points out that it is legal for employers to shun older workers in order to reduce labor costs, and that this is a “legitimate business reason” as well. The committee also believes that most H-1Bs are not underpaid, given their age, experience, education and so on. Even if that were true — or if legislation could be enacted which really put teeth into the prevailing-wage requirement of H-1B law²⁷ — the young H-1Bs, whose median age is 28, would still be cheaper than the older Americans.

Questions: Putting these points together, it would seem that the committee endorses the notion of employers hiring young H-1Bs in order to avoid hiring the older, more expensive Americans, even if the latter have the same skills. Is that true? If so, what is their rationale for it? If not, what legislation is needed to prevent it?

- Approximately 10% of H-1Bs in the computer area are recruited as foreign students studying for MS or PhD degrees at U.S. universities²⁸.

This is not a large fraction, and very few computer jobs truly require a postgraduate degree. However, major firms in the computer software and hardware industries, such as Intel and Sun Microsystems, claim that they need to hire H-1Bs with postgraduate degrees, as there are insufficient numbers of Americans with this background.

Given the prominence of these firms, the issue demands attention, and the committee made a good start, by performing some calculations concerning financial incentives/disincentives facing American students considering postgraduate study in computer science. If a new bachelor’s graduate elects to pursue such study instead of immediately working in industry, he/she forgoes a rather high income during the period of study.

The committee found that it takes 10 years for a student to make up for this loss in the case of a master’s degree, and a staggering 50 years for a Ph.D. The salary premium for a Ph.D. over a bachelor’s degree for computer science is only 38.7%, much lower than for fields with relatively small numbers of foreign students,

such as economics (salary premium of 116.0%) and political science (150.0%)²⁹.

Questions: Is the large pool of foreign students artificially depressing wages at the master's and Ph.D. levels? Does the committee think it is desirable to have a wage structure which strongly discourages American students from pursuing graduate study³⁰?

These points are especially relevant when it is noted that most foreign students pursuing a PhD are paid from federal research grants.

A Missed Opportunity

All sides of the H-1B controversy agree that the high-tech field is one of the top bright spots in our economic future. An impartial, well-executed study of the high-tech labor market conducted at the request of the U.S. Congress would have been quite useful. Unfortunately, what the NRC presented to Congress was biased and highly selective, and ducked the tough questions about future trends. Rather than shedding light on this vital issue, it will add to the confusion.

Endnotes

1. *Atlantic Monthly*, March 2000, and *The Washington Post*, June 22, 1998.

2. *Washington Technology*, August 29, 1996.

3. <http://www.zazona.com/ShameH1B>.

4. "The State of Asian Pacific America," Paul Ong (ed.), LEAP Asian Pacific American Public Policy Institute and UCLA Asian American Studies Center, 1994, p.179-180.

5. "Balancing Interests: Rethinking U.S. Selection of Skilled Immigrants," Carnegie Endowment for Int'l Peace, 1996.

6. "The Department of Labor's Foreign Labor Certification Programs: The System is Broken and Needs to be Fixed," Final Report No. 06-96-002-03-321, Joseph Fisch, Assistant Inspector General for Audit, http://www.oig.dol.gov/public/reports/oa/pre_1998/alien_cert_semi.htm

7. "Debunking the Myth of a Desperate Software Labor Shortage," <http://heather.cs.ucdavis.edu/itaa.html>.

8. Salzman's report itself is available at <http://www.uml.edu/centers/CIC/publications.htm>.

9. "Characteristics of Specialty Occupation Workers (H-1B)," U.S. Immigration and Naturalization Service, February 2000.

10. DataMasters, <http://www.datamasters.com>.

11. *San Francisco Chronicle*, September 21, 2000.

12. "Straight Talk," TV show sponsored by the Santa Clara County Democratic Club, June 10, 2000.

13. See *The Oregonian*, September 5, 2000, and <http://www.zazona.com/ShameH1B>.

14. *Los Angeles Times*, November 15, 1993, and also July 15, 1996.

15. *The New York Times*, September 6, 2000.

16. "Economic Snapshots," Economic Policy Institute, December 8, 1999.

17. "Leading, Concurrent or Lagging: the Knowledge Content of Computer Science in Higher Education and the Labor Market," Clifford Adelman, U.S. Dept. of Education, May 1997.

18. "Debunking the Myth of a Desperate Software Labor Shortage," Matloff, <http://heather.cs.ucdavis.edu/itaa.html>.

19. The industry lobbyists try to rationalize the high attrition rate for computer science graduates by speculating that they go into management. But civil engineers become

managers too, and in fact the NSF data show that a higher percentage of them go into management than do the computer science graduates.

20. "Debunking the Myth of a Desperate Software Labor Shortage," Matloff, <http://heather.cs.ucdavis.edu/itaa.html>.

21. Object-oriented programming is hardly new, by the way. It extends back to the 1960s, in the SIMULA language, and the Smalltalk and C++ languages were developed in the early 1980s, though the concept did not become popular in industry until the 1990s.

22. Testimony to the House Subcommittee on Immigration, May 25, 2000, <http://www.house.gov/judiciary/temp0525.htm>.

23. "An Analysis of Unemployment Trends among IEEE U.S. Members," September 1998.

24. Informationweek, July 5, 1999.

25. Network World, September 14, 1998.

26. "Debunking the Myth of a Desperate Software Labor Shortage," <http://heather.cs.ucdavis.edu/itaa.html>.

27. As noted earlier, much, though certainly not all, of the wage exploitation of the H-1Bs arises from their de facto indentured-servant status. The legislation enacted in 2000 theoretically would seem to ameliorate the problem, since technically it does make movement among employers much easier for H-1Bs. However, this will not be the case in practice. H-1Bs who are being sponsored for green cards will still not dare switch employers, as it would mean starting the multi-year green card process all over again.

28. "Debunking the Myth of a Desperate Software Labor Shortage," <http://heather.cs.ucdavis.edu/itaa.html>.

29. *American Outlook*, Fall 1999.

30. The National Science Foundation, which paid for the NRC study, actually planned it this way. An NSF internal document advocated bringing in foreign nationals in science and engineering in order to hold down PhD salaries. And the document recognized that this would result in reductions in the number of American students enrolling in postgraduate programs, while foreign students would have the nonmonetary incentive of sponsorship for green cards by U.S. employers after graduation. See "How and Why Government, Universities and Industry Create Domestic Labor Shortages: An Introduction to the Real NSF 'Shortage' Study," by Eric Weinstein, Harvard University, Dept. of Economics, <http://nber.nber.org/~peat/PapersFolder/Papers/SG/NSF.html>.

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Backgrounder

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There was an egregious lack of balance in the report. The committee at least had a responsibility to present both sides. It did not do so. It was highly selective in its coverage, making no mention of major findings in previous studies showing wage exploitation of the H-1Bs, employer disinterest in the older American workers and so on. Similarly, most major arguments made by critics of the H-1B program and industry hiring practices were either not cited or were summarily rejected. This *Backgrounder* addresses the issues that were ignored by the committee.