

The H-1B Program and Its Effects on Information Technology Workers

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During the late 1990s, the information technology (IT) field was one of the fastest-growing sectors in the economy in terms of employment. The estimated number of IT workers increased by 20 percent during the 1998–2001 period, compared with an overall increase in employment of less than 5 percent.¹ A substantial fraction of these IT workers were foreign born, many of them working in the United States with temporary nonimmigrant visas issued under the H-1B program. The H-1B visa program has been the focus of considerable debate, with employers urging that the program be expanded and critics arguing that it hurts job opportunities for U.S. natives. This article provides background on the program and discusses its possible effects on information technology workers.

The H-1B program allows an employer to temporarily employ a foreign worker in the United States on a nonimmigrant basis in a specialty occupation. H-1B workers are professionals, and the visa generally requires at least a bachelor's degree or the equivalent in the specific specialty, such as computer programming or electrical engineering. The visa is issued for an initial period of up to three years and can be renewed once, making employment for up to six years possible. Up to 195,000 H-1B visas can currently be issued in a fiscal year.

Opinions on the program are mixed. Supporters argue that firms face a shortage of skilled workers, particularly in information technology fields, and the

program allows companies to fill positions that would otherwise go vacant. Critics charge that employers use the program to hire foreign workers at lower wages than U.S. natives and that H-1B workers displace natives, particularly older workers in information technology jobs. Critics also assert that, without a supply of foreign workers, firms would have to increase salaries and training opportunities for U.S. workers. Absent the H-1B program, critics charge, firms would create more opportunities for U.S. workers, particularly minorities, who are underrepresented in IT fields.²

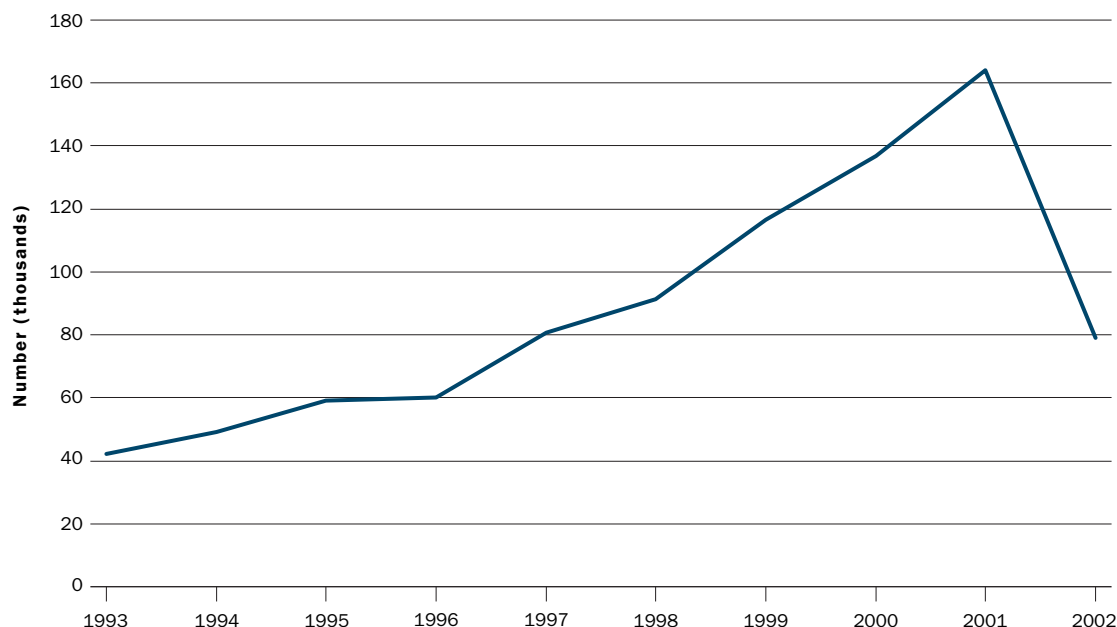
Despite the controversy over the H-1B program, economists have devoted little attention to examining its effects. The only comprehensive study to date, conducted by the National Research Council (2001), concludes that the magnitude of any effect the H-1B program has on wages is difficult to estimate with confidence. The report notes that the effect, if any, may not be to depress wages and employment opportunities for natives but rather to keep wages from rising as rapidly as they would if the program did not exist. Lowell (2001) similarly concludes that if the program has any effect on natives, especially minorities, the effect must be subtle because it does not appear immediately in the data.

Background on the H-1B Program

The current H-1B program was established in 1990 to permit skilled foreigners to work in the United States. The program grew out of the H-1 visa

FIGURE

Annual Number of Initial H-1B Visas Issued



Sources: Lowell (2000) for 1993–99 data; INS (various years) for 2000–2002 data

program, which was created during the early 1950s to allow firms to hire into temporary jobs skilled foreign workers coming to the United States on a temporary basis. Beginning in 1970, employers were allowed to hire foreigners for permanent positions, and the number of visas issued increased as the U.S. economy boomed during the 1980s.

In 1990 Congress capped the number of H-1B visas at 65,000 per fiscal year.³ This cap was binding during the years 1997 through 2000, prompting Congress to twice increase the annual limit, first to 115,000 for fiscal years 1999 and 2000 (and to 107,500 for fiscal year 2001) and then to 195,000 for fiscal years 2001–2003. The limit will revert to 65,000 for the fiscal year beginning October 1, 2003, unless Congress acts again. The cap was not binding in fiscal years 2001 and 2002 because the slowdown in the economy, which was particularly pronounced in the IT sector, reduced the demand for workers; in 2001, the U.S. Immigration and Naturalization Service (INS) issued only about 164,000 H-1B visas that counted against the cap and only about 79,000 in fiscal year 2002.⁴ The figure above shows the approximate number of initial (nonrenewal) H-1B visas subject to the numerical cap issued each fiscal year during the 1993–2002 period.⁵

The vast majority of H-1B visa holders are from Asia and are highly educated. Table 1 shows the dis-

tribution of H-1B recipients in fiscal year 2001 across major countries and some characteristics of these workers. The most common country of birth for H-1B holders is India, which accounted for almost half the H-1B recipients in fiscal year 2001. The median income of H-1B recipients that year was \$55,000, and about 98 percent of H-1B recipients had at least a bachelor's degree. In contrast, about 26 percent of U.S. residents aged twenty-five and older had at least a bachelor's degree in 2000, and median earnings among workers with a bachelor's degree in 2001 was \$46,969, according to the U.S. Bureau of the Census.

An H-1B visa is one of several ways a foreigner can receive permission to work in the United States. Instead of an H-1B visa, a worker can receive an employment-based legal permanent resident (LPR) visa, or “green card,” which does not expire and allows an individual to apply to become a naturalized citizen in five years. Anecdotal reports suggest that most H-1B holders would prefer to have LPR status (Wayne 2001).⁶ However, the current cap on employment-based LPR visas is 140,000 per fiscal year, less than the current H-1B limit. In addition, this cap includes spouses, reducing the effective number of visas, whereas the spouses of H-1B workers are in a separate category and do not count toward the H-1B limit. Foreigners present in the United States

TABLE 1**Characteristics of H-1B Visa Recipients**

Country of birth	Percentage of H-1Bs	Median income (dollars)	Bachelor's degree or higher (percent)	Master's degree or higher (percent)
All		55,000	98	42
India	48.8	55,000	99	35
China	8.3	57,500	100	81
Canada	3.8	70,000	94	37
Philippines	3.1	44,765	99	12
United Kingdom	2.9	70,000	91	33
Korea	2.0	48,000	98	57
Pakistan	1.9	52,440	99	40
Japan	1.8	39,520	97	34
Taiwan	1.8	50,000	99	72
Russia	1.4	55,000	99	65

Source: INS (2002). Data are for fiscal year 2001.

with student or exchange visitor visas may also obtain permission to work, and there are special visa categories for intracompany transferees and for skilled workers from the other NAFTA countries, Canada and Mexico. There are also separate temporary worker categories for unskilled workers and nurses.

An employer who wants to hire an H-1B worker must follow several steps. First, the employer must submit a labor condition application (LCA) to the U.S. Department of Labor that includes the position, wage, and benefits to be offered to the H-1B worker. The LCA requires the employer to determine the prevailing wage for the position in the geographic area and the actual wage paid by the employer to other individuals with similar experience and qualifications for that type of work; the higher of the prevailing wage and the actual wage must be paid to the H-1B worker.⁷ The firm must also attest that the working conditions of U.S. workers similarly employed will not be adversely affected. A firm considered "H-1B dependent" must also attest that no

U.S. workers are laid off for the three months before and the three months after the hiring of an H-1B worker and that the company has made significant steps to recruit U.S. workers for the position. The Department of Labor reviews the LCA for accuracy and completeness but may not initiate investigations unless a complaint is filed against an employer (National Research Council 2001).

After the LCA is certified, the employer files a visa petition with the INS. The petition requires that the employer provide documents substantiating the potential worker's education and qualifications. The INS makes the final decision on whether a foreigner is qualified for an H-1B visa. After the INS approves the petition for a visa, the State Department issues visas for individuals living abroad, and the INS converts the visa status to H-1B for individuals already living in the United States. In fiscal year 2001, about 42 percent of initial H-1Bs were issued to people already residing in the United States, most commonly with a student visa (INS 2003).

1. This estimate is based on employment data from the U.S. Bureau of Labor Statistics (BLS) Web site (www.bls.gov) for computer programming, data processing, and other computer-related services and for total nonfarm employment.
2. See, for example, the discussion in Wayne (2001).
3. Workers for educational institutions and nonprofit or government research organizations are exempt from the limit.
4. As of March 2003, the former INS's functions were transferred from the Department of Justice to various agencies of the Department of Homeland Security, particularly the Bureau of Citizenship and Immigration Services. For simplicity, this article uses the INS designation throughout, even for current programs.
5. The INS first published the number of initial H-1B visas issued for fiscal year 2000. Prior to fiscal year 2000, estimates of the number of H-1B visas issued are from the U.S. Department of State visa office, as reported by Lowell (2000). The pre-2000 data may include H-1B visas that are not counted against the limit, causing the total number to exceed the cap some years.
6. Estimates from North (1996) indicate that the number of adjustments of LPR status from H visas relative to the number of visas issued in fiscal year 1994 was about 38 percent.
7. There are concerns that some firms pay H-1B workers less than the prevailing wage attested on the labor condition application (U.S. General Accounting Office 2000).

There are several reasons why employers use the H-1B visa program to hire workers. Employers reportedly hire H-1B workers because of difficulties recruiting qualified U.S. workers and because of the substantial lags in obtaining a green card for foreign workers (National Research Council 2001). Obtaining an employment-based green card can take several years whereas the approval process for an H-1B visa generally takes only a few months after the LCA is filed. The LPR application process also requires that a firm document its particular need for a worker (U.S. General Accounting Office 2000). In addition, as noted above, the limit on the number of employment-based LPR visas may be more binding than the limit on H-1Bs.

Many employers report that they would prefer to hire domestic workers rather than H-1B workers. Employers say that hiring domestic workers tends to be easier and less costly than hiring H-1B workers, who are not likely to stay with the company after the six-year visa period ends (Lowell and Christian 2000). Employers also note that hiring foreign workers involves attorney fees, visa fees, higher relocation costs, and “visa maintenance” costs (National Research Council 2001). The INS currently charges a \$96 base fee; most H-1B applications also require a \$1,000 fee that is used to fund training programs for U.S. workers.

H-1Bs and the IT Workforce

H-1B workers are concentrated in information technology fields. Table 2 shows the distribution of initial and continuing (renewal) H-1B visas by occupation for fiscal year 2001. Almost 58 percent of H-1B visas were issued to workers in computer-related occupations. The primary industry employing these computer-related workers is computer systems design and related services, which accounted for 47 percent of total H-1B visas issued by the INS that year. H-1B workers also account for a substantial share of employment and employment growth in the IT field. Lowell (2000) reports that H-1B workers make up about 10 percent of the IT labor force, and Lowell and Christian (2000) estimate that new H-1B visa workers contributed about one-fourth of annual growth in the core IT workforce between 1995 and 2000. In 1999 alone, H-1B workers made up 54 to 60 percent of IT labor force growth (Lowell 2000).

There are several ways the H-1B program might affect native-born and other foreign-born workers. Standard economic theories predict that if H-1B workers are substitutes for other workers, then the availability of H-1B visas would depress wages and

TABLE 2

Distribution of H-1B Visa Recipients across Occupations

	Percent
Computer-related	57.8
Architecture, engineering, and surveying	12.2
Administrative specialties	7.2
Education	5.3
Managers and officials	3.8
Medicine and health	3.4
Life sciences	2.0
Social sciences	1.9
Mathematics and physical sciences	1.7

Source: INS (2002). Data are for fiscal year 2001.

wage growth by increasing the supply of labor. The program could also raise unemployment rates if some firms hire H-1B workers instead of other workers and if those other workers remain in the labor force but do not find jobs with other employers. If employers hire H-1B workers because of a labor shortage resulting from other qualified workers not being currently available, the effect might be to reduce training; absent the H-1B program, employers might instead train workers for those positions as well as pay higher wages to induce entry into those jobs. Any such effects are likely to be concentrated in the IT field since most H-1Bs are hired into computer-related occupations.

This article examines whether the H-1B program has a negative impact on the wages of workers in the IT field. Using data on LCAs filed with the Department of Labor, it investigates whether the number of H-1B workers in an area, relative to the total number of IT workers in that area, is negatively associated with the level of and change in average IT wages and the unemployment rate among IT workers in that area. The next section discusses the data on H-1Bs used to examine this issue. The article then discusses the empirical methodology and the results.

The Data

The Department of Labor makes data available from the LCAs filed by employers who sought to hire H-1B workers during the 2001 fiscal year. The data include the employers’ names and locations, the wage rates offered, the number of H-1Bs sought, the occupations in which the H-1Bs will be employed, and whether the LCAs were certified or denied. Table 3 provides descriptive statistics for the data.

TABLE 3**Descriptive Statistics for Labor Certification Applications**

Occupation	Percentage of LCAs	Certified (percent)	Median wage (annual \$)	Number of positions
Computer-related	48.0	87.5	50,730	899,885
Architecture, engineering, and surveying	8.3	82.9	58,200	155,105
Administrative specializations	8.1	87.6	46,265	152,222
Medicine and health	2.9	80.7	43,080	54,835
Managers and officials	2.7	83.4	60,000	50,379
Education	2.5	82.8	33,696	47,142
Social sciences	1.2	83.5	50,000	22,644
Life sciences	1.1	73.3	42,652	19,935
Mathematics and physical sciences	0.9	73.5	44,500	16,754

Source: Author's calculations from the LCA database, available at <www.flcdatacenter.com/casesearch.asp>. Data are for fiscal year 2001.

The majority of LCAs filed by employers were for computer-related occupations, which include programming, networking, and related jobs. Computer-related fields accounted for 48 percent of applications, followed by about 8 percent for occupations in architecture, engineering, and surveying. As indicated in the table, the Department of Labor certified the vast majority of applications. Median annual wages ranged from \$33,696 for positions at educational institutions to \$60,000 for managers and officials, and the median annual wage in computer-related fields was \$50,730.

There are both disadvantages and advantages to using the LCA data to examine H-1Bs. One disadvantage is that employers file LCAs for several times the number of visas eventually issued by the INS (Lowell 1999). Certain industries appear to be more likely to petition the INS for H-1B visas after obtaining LCA certification; in particular, the medical field accounts for a substantially lower fraction of H-1B petitions than of LCAs (Lowell and Christian 2000). However, the LCA data are the only available source of detailed information about H-1B visas. The INS reports the total number of H-1B visas approved and the number of entries by H-1B visa holders each fiscal year, but little additional detail is available.⁸ Other data sources typically used to examine foreign-born workers' effect on natives' employment outcomes, such as the decennial Census and the Current Population Survey (a large monthly survey conducted by the Bureau of Labor Statistics), do not ask visa status and therefore do

not allow investigators to distinguish between H-1B holders and other foreign-born workers.

The remainder of this analysis focuses on computer-related, or IT, fields because this area accounts for most H-1Bs.⁹ Any impact of H-1Bs on wages or other employment outcomes is likely to be most evident in this field. In addition, any effect should be concentrated in the geographic area where the H-1B workers are employed. The LCA includes the city and state in which prospective H-1Bs will be employed; this analysis is conducted at the state level because of the difficulty of aggregating city data up to metropolitan statistical areas.

The first column in Table 4 lists the distribution of certified LCA applications in fiscal year 2001 across the top ten states of employment for computer-related LCAs. Almost 22 percent of the LCAs for computer-related occupations were for positions in California, followed by New Jersey with almost 12 percent. The geographic distribution of computer-related LCAs differs from that of all computer-related workers, which is shown in the second column of Table 4, with LCAs disproportionately located in California and New Jersey. Lowell and Christian (2000) similarly observe that large employers of H-1B holders are disproportionately located in California and New Jersey relative to the distribution of all IT firms.

There are several reasons why firms in certain geographic areas might have a disproportionately high demand for H-1B workers. First, IT workers could be in short supply in those areas. If excess

8. In addition, the INS has occasionally released lists of the "top 20" and "top 100" companies filing petitions for H-1B workers.

9. In fiscal year 1999, workers approved for H-1B visas in computer-related fields were less likely to have an advanced degree, were younger, were more likely to be from India, and were less likely to already be in the United States than other H-1B workers (U.S. General Accounting Office 2000).

TABLE 4

**Geographic Distribution of Labor Certification Applications
and All Workers in Computer-Related Fields**

	Percentage of LCAs	Percentage of IT workers	Average weekly earnings of IT workers (\$)
California	21.7	16.3	1,306
New Jersey	11.8	4.6	1,205
Texas	9.2	7.8	1,070
New York	6.4	5.7	1,147
Illinois	5.6	5.2	1,118
Massachusetts	5.2	3.9	1,205
Michigan	3.3	3.3	1,100
Pennsylvania	3.0	3.9	1,004
Virginia	3.0	5.4	1,128
Florida	2.9	4.1	967

Source: Author's calculations from the LCA database and the October 2000–September 2001 Current Population Survey (CPS) outgoing rotation groups. Computer-related fields in the CPS are defined as computer systems analysts and scientists and operations and systems researchers and analysts.

demand for IT workers exists in certain areas, then IT wages should increase in those regions relative to the rest of the United States. Economic theory predicts such relative wage increases would prompt IT workers to move to those areas and reduce the labor shortages, or other workers might retrain to work in IT jobs if wages are high for such positions relative to other fields. However, both adjustments might take time. Alternatively, as some critics of the H-1B program charge, employers in areas with high IT wages might seek H-1B workers if such workers can be hired for less than it would cost to hire other workers. The figures in the last column in Table 4, which reports average weekly earnings among IT workers for major H-1B states, provide some support for the idea that firms in high-wage areas disproportionately hire H-1Bs. The relationship between wages and H-1Bs is examined further in the next section.

Methods

This analysis uses the LCA data and Current Population Survey (CPS) data to examine the association between the number of H-1Bs and earnings and unemployment in computer-related fields. The ordinary least squares (OLS) regression technique is used to estimate the relationship between average earnings, average earnings growth, and the unemployment rate in IT occupations in a state and the relative number of H-1Bs in that state:

$$Outcome_s = \alpha + \beta H-1B_s + \delta X_s + \epsilon_s,$$

where $Outcome_s$ is either the log of average weekly earnings, the earnings growth rate, or the unemploy-

ment rate in IT occupations in state s . The variable $H-1B_s$ is the number of LCAs for computer-related occupations filed for state s relative to total IT employment in that state. The number of computer-related LCAs (which proxies for the number of new H-1Bs in IT occupations) is divided by the number of IT workers in a state in order to scale the number of LCAs; the impact of LCAs on wages and unemployment should depend on the relative magnitude of LCAs. The measures of earnings, the unemployment rate, and total employment are derived from the outgoing rotations groups of the CPS.¹⁰

If H-1Bs reduce wages or wage growth, as critics charge, then the ratio of LCAs to total IT employment should be negatively related to measures of earnings. However, the OLS regression results might indicate a positive relationship between LCAs and earnings because of reverse causality. If high wages or high wage growth signal a labor shortage that prompts firms to seek to hire H-1Bs, then the regression would pick up such a positive relationship. The instrumental variable (IV) regression technique is therefore used to control for such endogeneity. IV regressions require an instrumental variable that is associated with the endogenous right-hand-side variable (here, the ratio of LCAs to total IT employment) but not associated with wages or changes in wages. Analogously, the expected relationship between the relative number of LCAs and the unemployment rate should be positive, if critics of the program are correct, but might be negative in the OLS regressions because of reverse causality. The same IV technique is used to control for endogeneity in the unemployment rate regressions.

This analysis uses the fraction of the adult U.S. population born in India that lives in a given state as an instrument for the ratio of computer-related LCAs to all IT workers in a state. There are two rationales for using this instrumental variable. Foreign-born workers willing to come to the United States with H-1B visas are likely to want to live near other immigrants from their country; because almost half of H-1B workers are from India, H-1B workers are likely to want to live near other persons born in India. In addition, immigrants from India may be more familiar with the H-1B program, causing firms in areas with large numbers of Indian immigrants to be more likely to hire H-1B workers. The distribution across states of persons born in India is derived from the 1998–2001 CPS data.

Average wages, wage growth, and the unemployment rate in IT occupations in an area also reflect characteristics of workers in that area, as represented by the vector X_s in the equation above. For example, areas with more educated workers are likely to have higher wages and lower unemployment rates. Some specifications therefore control for the fraction of IT workers with a bachelor's degree and with a master's degree or higher, for average age and age squared, and for the percentage that are women. In addition, wages and wage growth may reflect the cost of living in an area and other local factors, such as the quality of schools and the weather. Some wage specifications include average wages or wage growth in non-IT occupations in order to control for such factors, and some unemployment rate specifications include the non-IT unemployment rate in an area. These variables are also derived from the CPS.

For the regression results discussed next, observations were weighted by total IT employment in a state.¹¹ The error terms were White-corrected for heteroscedasticity.

Results

Panel A of Table 5 reports regression results for the models of average weekly earnings levels in IT occupations. The first three columns show OLS results, and the second three columns show IV results. None of the results suggest that an influx of H-1Bs, as proxied by LCAs filed relative to total IT

employment, lowers contemporaneous average earnings. Indeed, many of the results indicate a positive, statistically significant relationship. The IV results are considerably larger (more positive) than the OLS estimates, the opposite of the expected result if high wages create employer demand for H-1B workers and if the IV technique corrects for this endogeneity. In the OLS results, average earnings are positively associated with the fraction of IT workers with at least a master's degree (column 2) and with average non-IT earnings (column 3).

H-1B workers also do not appear to depress contemporaneous earnings growth. Panel B of Table 5 reports the OLS and IV results for the regressions

Study results provide little support for claims that the H-1B program has a negative impact on wages. However, some results do suggest a positive relationship between the number of LCA applications and the unemployment rate a year later.

examining average earnings growth in IT occupations. The OLS results indicate a positive but insignificant relationship between the relative number of H-1B applications and earnings growth, and the IV results indicate a significant positive relationship. In the OLS results, average age is the only significant determinant of earnings growth included in the model (columns 2 and 3).

H-1Bs do not appear to have an adverse impact on contemporaneous unemployment rates. Table 6 shows the regression results for the unemployment rate specifications. In the OLS specifications, the unemployment rate for IT workers is not significantly associated with the relative number of LCAs. In two of the IV specifications, the two variables are significantly associated, indicating that areas with more LCA applications have lower unemployment rates. Another unexpected result is that the unemployment rate is positively associated with the fraction of IT workers who have at least a master's degree.

10. The wage and unemployment rate variables are calculated based on reported occupation. IT occupations in the CPS are defined as computer systems analysts and scientists and operations and systems researchers and analysts. If workers lost IT jobs and found positions in other occupations, they would not be considered unemployed in this analysis. Wages are deflated using the monthly consumer price index (CPI) for urban workers.

11. Observations in the unemployment rate regressions were weighted by the total number of IT workers (employed and unemployed).

TABLE 5

Regression Results for Average Earnings and Earnings Growth in IT Occupations

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
A: Average Weekly Earnings						
H-1B applications relative to total employment	.244* (.105)	.153 (.114)	.062 (.090)	.655** (.180)	.729** (.280)	.742 (.395)
Percent with bachelor's degree		.006 (.188)	.026 (.171)		-.347 (.318)	-.352 (.361)
Percent with at least master's degree		.870** (.184)	.288 (.289)		-.020 (.820)	.010 (.628)
Average age		.152 (.237)	.047 (.193)		-.071 (.242)	-.066 (.246)
Average age squared		-.002 (.003)	-.001 (.003)		.001 (.003)	.001 (.003)
Percent female		-.118 (.219)	-.083 (.194)		-.113 (.381)	-.115 (.410)
Average non-IT wage			.837** (.298)			-.058 (.702)
B: Average Earnings Growth						
H-1B applications relative to total employment	.052 (.075)	.136 (.075)	.133 (.071)	.234* (.105)	.436** (.148)	.551* (.249)
Percent with bachelor's degree		-.134 (.167)	-.133 (.169)		-.317 (.225)	-.365 (.286)
Percent with at least master's degree		-.451 (.237)	-.472 (.313)		-.913 (.481)	-.643 (.469)
Average age		.266* (.115)	.262* (.116)		.151 (.172)	.194 (.209)
Average age squared		-.003* (.002)	-.003* (.002)		-.001 (.002)	-.002 (.003)
Percent female		.084 (.168)	.086 (.170)		.087 (.212)	.066 (.267)
Average non-IT wage			.031 (.253)			-.519 (.497)

Note: * indicates $p < .05$; ** indicates $p < .01$. Average earnings are calculated based on the October 2000–September 2001 Current Population Survey (CPS) outgoing rotation groups. Average earnings growth is calculated based on the difference between the CPS outgoing rotation groups for October 1999–September 2000 and the groups for October 2000–September 2001. Earnings are deflated using the consumer price index for urban workers. The regressions also include a constant. The data are state-level for a total of fifty-one observations. Robust standard errors are in parentheses.

TABLE 6

Regression Results for Unemployment Rate in IT Occupations

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
H-1B applications relative to total employment	.003 (.010)	-.009 (.013)	-.009 (.012)	-.024 (.018)	-.056* (.025)	-.067* (.027)
Percent with bachelor's degree		.074 (.038)	.073 (.039)		.112* (.048)	.130* (.048)
Percent with at least master's degree		.090* (.042)	.090* (.042)		.161* (.072)	.187* (.078)
Average age		.083* (.037)	.083* (.038)		.108 (.058)	.108 (.059)
Average age squared		-.001* (.001)	-.001* (.001)		-.001 (.001)	-.001 (.001)
Percent female		-.017 (.039)	-.017 (.040)		-.012 (.049)	-.013 (.054)
Average non-IT unemployment rate			.031 (.253)			.310 (.338)

Note: * indicates $p < .05$; ** indicates $p < .01$. Unemployment rates are calculated based on the October 2000–September 2001 Current Population Survey (CPS) outgoing rotation groups. The regressions also include a constant. The data are state-level for a total of fifty-one observations. Robust standard errors are in parentheses.

The failure to find significant adverse effects may be surprising given the predictions of standard economic models. However, other studies that have examined immigration's effect on skilled workers have also failed to find a substantial negative impact. Orrenius and Zavodny (2003) investigate the impact of LPRs on wages in low-, medium-, and high-skilled occupations and find a negative effect only in low-skilled occupations. Schoeni (1997) finds either an insignificant relationship or a positive relationship between immigration and the change in wages between 1980 and 1990 for workers who had at least some college education (although he finds a negative relationship for the 1970–80 period). He also does not find negative effects on employment among these workers.

There are several reasons why immigration might not have a negative impact on employment outcomes among skilled workers. Immigrants might not be very substitutable for natives in skilled occupations. For example, foreign-born IT workers might have skills that differ from those of their U.S. counterparts, such as familiarity with

different programming languages. Firms might hire foreign-born workers if they need skills not readily available in the U.S. workforce, but doing so would have relatively little impact on U.S. wages or unemployment because the foreign-born workers do not compete with U.S. workers. Skill transferability, the degree to which immigrants can use human capital acquired in their home country at U.S. jobs, tends to be lower for skilled positions than for unskilled jobs (Gallo and Bailey 1996). As skilled immigrants assimilate over time, they may become more substitutable for native workers and may create adverse wage effects in the longer run.

Several important caveats accompany this analysis. The data reflect LCAs made to the Department of Labor, not the actual number of new H-1B workers. The two variables are likely to be well correlated because an LCA application is the first step toward the issuance of an H-1B visa, but there is no way to ascertain this correlation because data on the number of new H-1Bs working in IT occupations in an area are not available. If the probability that

firms file LCAs for positions that are not filled with H-1B workers is systematically associated with wages or the unemployment rate, this measurement error would cause the estimates to be biased toward zero. Another caveat is that the instrumental variable, the distribution of Indian immigrants across states, may not be exogenous in the wage and unemployment rate regressions, and therefore the IV estimates may not correct any bias present in the OLS estimates.

A final caveat to the article's results is that a lag exists between the date the LCA is certified and the date the INS approves the H-1B petition, so not all LCAs filed in fiscal year 2001 are for H-1B holders who begin work during that period. If instead the regression models are estimated using earnings and unemployment rate data for fiscal year 2002 (October 2001 to September 2002), some of the results are quite different from those reported in Tables 5 and 6. The pattern of results for average earnings per week is similar to that in Table 5, but the estimated coefficients for the LCA variable are about one-half the magnitude of the estimates using the fiscal year 2001 data. In the earnings growth regressions, all of the estimated coefficients for the LCA variable are negative although none are statistically significant. The unemployment rate IV regressions indicate a positive relationship between the relative number of LCAs and the unemployment rate for IT workers. These results suggest that the number of H-1B workers does not depress wages or wage growth but may have an adverse effect on unemployment.

Discussion

The IT industry is a substantial employer of H-1B workers, who are professional specialty workers admitted to the United States for up to six years. Critics charge that the H-1B program reduces employment opportunities and wages for U.S. workers in the IT sector. Proponents, in contrast, argue that the program helps alleviate labor shortages in the IT industry.

Using data on labor condition applications—the first step in getting an H-1B visa—in fiscal year 2001, this study examines the relationship between LCAs and earnings, earnings growth, and the unemployment rate in the IT sector at the state level. The results provide little support for claims that the program has a negative impact on wages. However, some results do suggest a positive relationship between the number of LCA applications and the unemployment rate a year later. The failure to find an adverse wage effect does not necessarily indicate that H-1B workers do not depress wages but perhaps that any effect is difficult to find, as concluded by previous studies.

A final caveat to these findings is that employers are increasingly using L-1 visas, which are intracompany transfers of workers from overseas branches or subsidiaries, to bring in foreign workers (Hafner and Preysman 2003). Unlike H-1B visas, L-1 visas are not capped and do not require employers to pay the prevailing wage. The increasing use of L-1 visas instead of H-1B visas may reduce the measured impact of H-1Bs on native workers but not the total impact of foreign workers. If data on L-1 visa holders become available, this possibility merits analysis.

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