Debunking the Top Ten Arguments Against High-Skilled Immigration

BY ADAMS B. NAGER AND ROBERT D. ATKINSON | APRIL 2015

Advocates have engaged in an organized campaign to cast doubt on the reality of the U.S. STEM shortage.

Until recently there was widespread agreement that the United States faced a shortage of science, technology, engineering, and mathematics (STEM) workers. However, that consensus has begun to fracture, largely due to an assertive campaign by some liberal economists more interested in protecting the salaries of high-wage professionals than in helping the broad base of American consumers and workers. In particular, in their single-minded campaign to eliminate the H-1B visa program, these advocates have engaged in a determined effort to cast doubt on the reality of the U.S. STEM shortage.

INTRODUCTION

For leading advocates who make this claim, such as Ron Hira, Hal Salzman, and Michael Teitelbaum, economic policy reflects a fundamental tension between capital and labor: if capital gets less, labor gets more. One way of ensuring capital gets less is to restrict the supply of labor so that businesses must bid up wages. To be sure, these labor advocates have every right to make this argument, but they should be upfront about their real agenda and its implications, including on progressivity. Engineers, for example, earn 2.5 times the median national wage with a median yearly income of $88,720.[1] This places them in the top 5 percent of single income earners.[2] Why is it progressive to raise their incomes by restricting the supply of STEM workers, when the result would be fewer jobs in the rest of the economy, higher prices for American consumers of all incomes, and reduced U.S. global competitiveness? Indeed, limiting the supply of STEM professionals in the United States will raise prices for consumers, reduce the output of U.S. firms in globally traded

sectors (like manufacturing and software), and cost the jobs of tens of thousands of Americans who work alongside engineers and IT professionals.

When pressed, some of these advocates will privately acknowledge that the United States would be better off with more STEM workers, whether from increased domestic education and training or more immigration, but their intense opposition to the H-1B high-skilled immigration program leads them to argue publically that there is an over-abundance of STEM labor. As such the "no STEM worker shortage" camp makes a number of claims that are simply not supported by the evidence.

Recent testimony from Hal Salzman and Ron Hira before the Senate Judiciary Committee provides a handy guidebook for these flawed claims.[3] According to them: 1) there is no unmet demand for STEM skills; 2) foreign STEM workers displace native STEM workers, especially recent graduates, competing for the same limited pool of jobs; 3) a rising supply of STEM labor depresses wages, harming American workers and discouraging students from entering STEM fields; 4) immigration is a foot in the door for foreign companies who want to compete in American markets; and 5) U.S. companies can remain competitive without high-skilled immigration. Unfortunately, all of those points are wrong or misleading. America faces a shortage of high-skilled STEM talent, especially in IT industries.

Given projected job growth and current graduation levels, the STEM shortage is likely to deepen rather than improve.

This report identifies these and other claims made by labor advocates and refutes each myth.

MYTHS SURROUNDING HIGH-SKILLED IMMIGRATION

Myth 1: Data disprove the STEM shortage

A common tactic for opponents of the H-1B program is to accuse industry of making up the STEM shortage in order to gain access to cheaper labor, claiming that the data proves that the shortage does not actually exist. For example, Salzman's testimony claims that a "preponderance of evidence" shows the STEM shortage is a myth, while he dismisses data supporting the shortage of STEM workers as "largely based on anecdotal evidence and testimonials from employers, rather than solid evidence."[4]

There are data sources that would seem to support Salzman's dismissal. However, many of these metrics are poorly constructed or intentionally misleading. Advocates for artificially constraining the STEM labor supply then adopt them, misinterpret them and present weak arguments as fact. For example, a Census Bureau definition of STEM which includes psychology and political science majors has been used to claim that STEM graduates do not go into STEM fields, and therefore the United States has excess labor. Hira's testimony uses anecdotal wage evidence to insinuate that H-1B workers are paid up to 49 percent less than native workers when in reality wages are comparable.[5]

In addition, many arguments against high-skilled immigration begin with stories about individuals in STEM fields who have been unable to find work. While this is indeed troublesome, the plural of anecdote is not data, and in reality these are relatively isolated incidents. Unemployment in STEM fields is actually very low.[6]

Myth 2: American universities will supply enough computer science graduates to meet workforce demand growth over the next 10 years

If the opponents of expanded high-skilled immigration can make the case that U.S. universities are producing enough domestic STEM talent to meet demand, then the case for high-skilled immigration is lessened. Salzman's testimony, for example, asserts that while IT jobs are growing, many do not require a bachelor's degree in computer science; thus, the shortage is imagined and the current graduation rate is sufficient.

However, the facts do not support this claim. First, IT jobs are growing much faster than other occupations. Given projected job growth and current graduation levels, the STEM shortage is likely to deepen rather than improve. Over the last decade, the U.S. economy has added over 1.1 million new computer jobs, a 36 percent increase compared to just 3 percent in the overall job market.[7] While both computing and overall jobs took a hit in 2008, computing jobs began bouncing back the next year and by 2011 had surpassed 2008 levels.[8]

Estimates for job growth in computing occupations in the coming decade vary from 658,000 new jobs to 1.4 million.[9] If growth since 2005 remains steady, 150,000 computer jobs will be created each year over the next decade. In 2013, however, U.S. universities graduated just 50,962 computer scientists with bachelor's degrees—a high-water mark for recent years that reflects a possibly temporary spike in interest in computer science—and 24,603 computer scientists with advanced degrees.[10] Moreover, while only about 5 percent of bachelor's students in computer science are foreign born, 49 percent of graduate students in computer science are from abroad.[11] Without high-skilled immigration expansion, many of these advanced graduates will be forced to leave, limiting the number of workers with computer science degrees in the United States. Additionally, all computer science majors may not use their skills in traditional IT sectors and occupations, as advanced computer skills are universally desired in all corners of the economy. In short, current rates of supply will come nowhere near satisfying increasing demand.

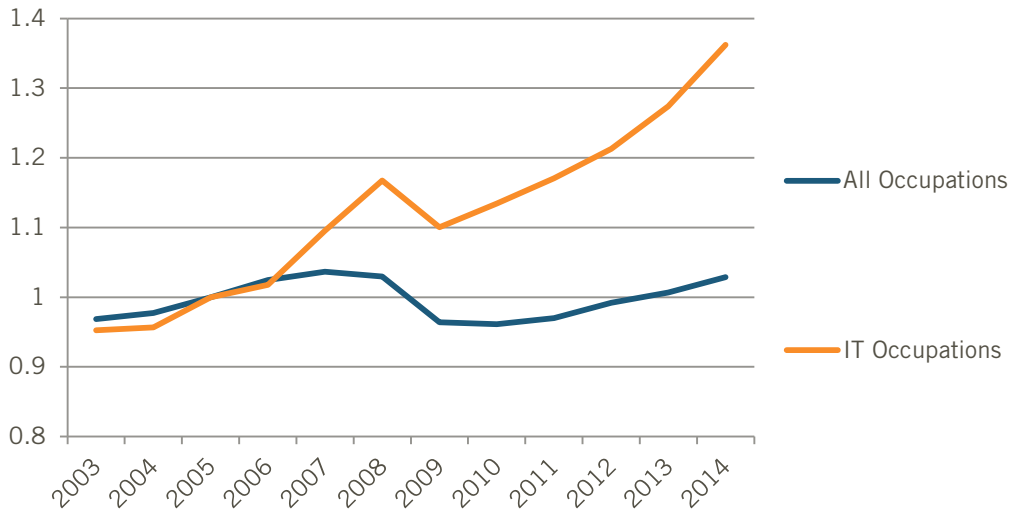

Figure 1: Job growth in IT and overall workforce (2005=1)[12]

Myth 3: STEM students do not use their skills after graduation

Advocates use the fact that not all students with STEM degrees go in to STEM fields as evidence of a surplus of STEM workers.[13] Moreover, the myth continues, many in STEM fields do not hold STEM degrees. If STEM degrees are in such high demand, why do more graduates not use their skills?

First, the data that advocates typically rely on for STEM graduates and occupations are severely flawed, and frequently include fields like social sciences and psychology in their definitions of STEM.[14] The picture for true STEM graduates, such as those with degrees in mathematics, physical and computer science, and engineering, is much different. Only 19 percent of STEM graduates are not in jobs closely related to their degrees, compared to 27.5 percent of overall graduates.[15] Even during the Great Recession, two-thirds of STEM graduates had jobs related to their degrees, and there were two job openings for every unemployed STEM worker.[16]

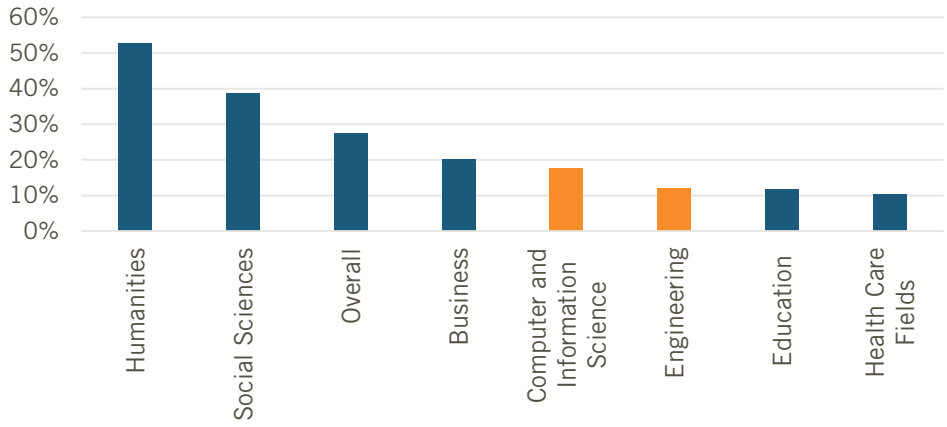

Figure 2: Percentage of graduates in jobs unrelated to major, by degree field[17]

Why is it that not every STEM major uses their skills? Some people get a degree in a STEM discipline only to realize that they do not want to be scientists or engineers for personal reasons having nothing to do with wages or job availability. Others go back to school to earn advanced STEM degrees. Still others apply their STEM skills to other industries, including finance.[18] Every sector of the economy demands workers with STEM skills, not just traditional technology-based industries.[19] For almost all STEM majors, especially for engineering and computer science majors, jobs utilizing their skills are readily available after graduation.

Myth 4: Previous claims of a STEM shortage never materialized

Advocates make the "boy who cried wolf" claim by asserting that since past warnings of an impending STEM shortage never materialized, the current cries will not either. Michael Teitelbaum refers to warnings raised by scholars and industry leaders since the late 1980s as a "long, embarrassing history" of industry lobbyists promoting their interests.[20]

Reports from the late 1980s—including from the National Science Foundation, hardly a hive of industry lobbyists—did indeed raise alarm about future STEM worker shortages.[21] But these forecasts were premised on two assumptions: first, that economy-wide R&D would continue to grow; and second, that rates of high-skilled immigration would not dramatically increase. Neither assumption held. Instead, federal R&D fell from 1.2 percent of GDP in 1990 to just 0.8 percent today, and high-skilled immigration rates increased after the H-1B cap was raised.[22] With higher-than-expected supply and lower-than-expected demand, the shortage was mitigated.

Evidence of an ongoing shortage is, however, apparent. Early warnings predicted that manufacturing and other traded industries dependent on STEM workers would go elsewhere if the United States could not supply the requisite workforce to support them. Manufacturing has done exactly that. The U.S. manufacturing sector lost a third of its jobs from 2000 to 2010, yet engineering and IT unemployment are still low.[23]

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Of course, the STEM shortage also contributed to the slower growth of U.S. technology jobs and lower R&D rates, as STEM workers were in short supply, making R&D more expensive. This, along with flagging commitment by the federal government to support R&D at the end of the Cold War, explains the stagnation and decline of R&D spending since the early 1990s.

Myth 5: IT wages are flat and low

If opponents can show that wages in the IT sector are not growing, they can more easily claim that there is no shortage. After all, they argue, a shortage should produce higher wages as companies bid for scarce talent. Conversely, low growth in wages must be evidence, they argue, of too many STEM workers. For example, Salzman asserts that the guest worker supply in the IT marketplace "is likely a factor in the flat wage levels in the IT industry."[24] Hira argues that companies that complain of shortages simply do not want to pay available workers the wages that they are worth.[25]

Over the past 11 years, average wages for all U.S. occupations, controlled for inflation, have fallen by 0.8 percent.[26] However, computer occupations have seen higher wage growth that exceeds inflation rates. For example, from 2003 to 2014, real wages for database administrators rose 10 percent and 6 percent for computer software engineers. Moreover, computer occupation salaries are 80 percent higher than the average U.S. wage.

There is an additional reason why this argument is faulty. Unlike the labor market for non-traded occupations like truck driving, the STEM labor market is much more global. As such, if U.S. wages rise too much, those jobs become too costly to be done in the United States. U.S. companies must either offshore or lose global market share to nations with STEM workers available at non-inflated wages.

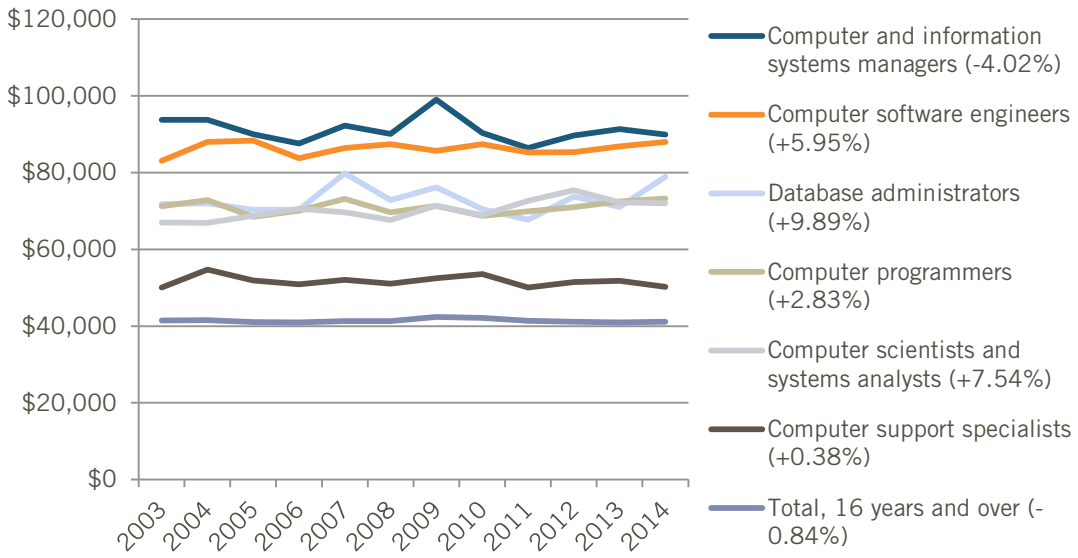

Figure 3: Wage increases, total and in computer occupations, in 2014 dollars, 2003-2014[27]

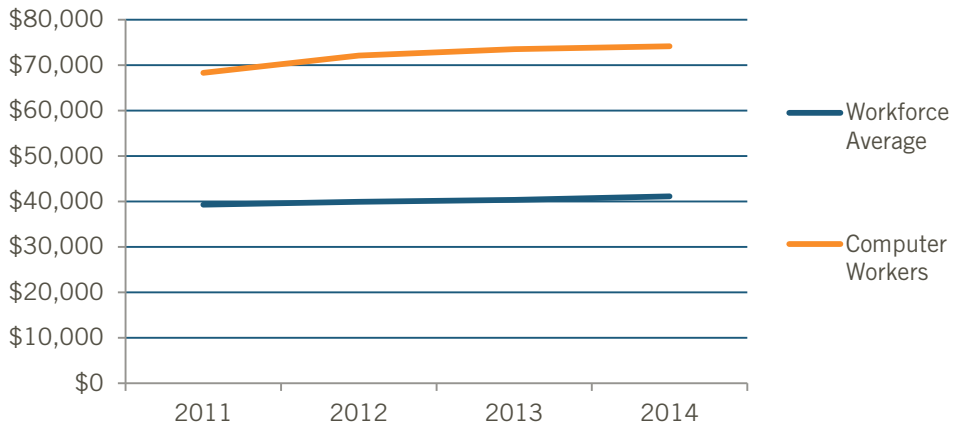

Figure 4: Average wage levels for computer occupations and all occupations[28]

Myth 6: More students would major in STEM if wages in these fields were higher

Opponents like to make the seemingly logical argument that higher wages will induce more students to enter the field. Salzman argues that this is exactly what happened when there was a shortage of petroleum engineers during the 1980s oil boom, and that this process will effectively adjust the supply of STEM graduates in the future.[29]

There are three problems with this claim. First, as noted above, wages are already high and STEM fields such as computer science and engineering already have the best return on investment of any major, with an estimated 12 percent 20-year annualized return on investment in an engineering or computer science degree.[30] Despite this premium, bachelor's degrees in computer science have actually decreased by 14 percent since 2004.[31]

The fluctuations in computer science majors that we do see are more closely tied to exciting technologies in the field that motivate and inspire students, not to changing wages.

Second, there are significant frictions that limit students' reactions to wage incentives in the education system. In college, introductory STEM survey courses are designed to weed out potential majors.[32] This and related factors, not low wages, is why 48.3 percent of declared STEM majors do not finish their STEM degree.[33]

The initial decision to major in STEM is closely tied to a number of other factors, including intelligence and personality. The reality is that if STEM wages doubled tomorrow, many students would not or could not pursue a STEM degree. In addition, STEM degrees depend heavily on STEM exposure in high school, where decisions of what to study are far removed from labor market forces. Students who took the AP Computer Science exam are eight times more likely than other incoming freshmen to major in computer science. Even if students do not take the class themselves, the presence of a computer science course in high school alerts students to computer science as a possible career path, and increases the likelihood of them experimenting with the discipline later.[34]

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Myth 7: U.S. companies can remain competitive without high-skilled immigration

Advocates still regard companies as greedy for not bidding up prices for scarce STEM talent. As Salzman states, "[Companies] may not be able to find [STEM workers] at the price they want. But I'm not sure that qualifies as a shortage, any more than my not being able to find a half-priced TV."[35]

For many companies, computer specialists and engineers work to produce globally traded goods or services that compete with the goods and services from companies in other nations. If wages go too high, companies at the margin will either offshore or they will lose market share to other nations with a larger relative supply of STEM workers.

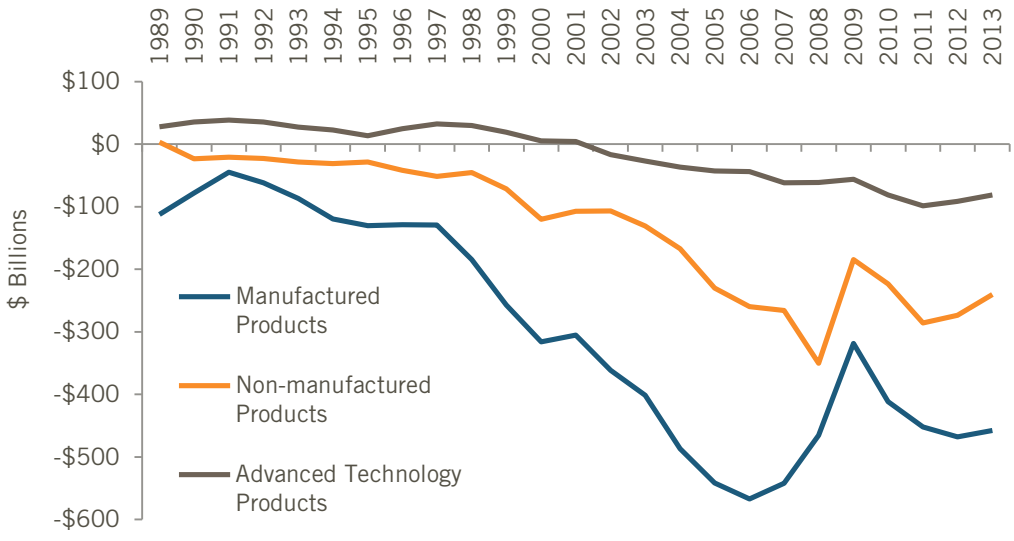

Figure 5: United States annual trade deficits in manufactured, non-manufactured, and advanced technology products, 1989–2013[36]

Already, the United States faces a steep trade deficit totaling $678 billion, including an $81 billion deficit in advanced technology goods. (See Figure 5) Economic theory dictates that to be competitive, we should have an even balance of trade. However, the United States simply does not have the STEM workers required to produce enough goods and services to balance our trade deficit. Even if companies wanted to reshore jobs from China and elsewhere, the U.S. workforce is ill-equipped to take on new production.

The very people able to balance the trade deficit are the ones that the United States does not let into the country. Industries are unable to produce, compete, and innovate without human capital inputs. Going without an adequate supply of high-skilled workers means conceding a significant advantage to foreign competition, which means fewer jobs, less innovation, and less economic growth for the United States.[37] Companies facing this shortage too often come to the conclusion that the United States is not a competitive place to produce.

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Myth 8: High-skilled immigrants are substitutes for native workers

It is easy to convince a layperson that immigration, even high-skilled immigration, is harmful to American workers by claiming that immigrants take jobs that would otherwise be filled by an American. For example, a common strategy among advocates is to display H-1B numbers and the numbers of unemployed Americans side-by-side to imply that all native workers would find jobs if H-1B visas were cut.

This is wrong for several reasons. First, unemployment in STEM fields is very low at just 2.7 percent for computer and mathematical occupations and 3.1 percent for engineering and architectural fields, compared to a national average of 6.2 percent in 2014.[38] At these levels, unemployment is considered structural, meaning that the STEM sector is at or very near full employment. Indeed, there are currently five job openings for every one unemployed computer worker, and employer surveys reveal that companies accrue high costs from hiring difficulty and from losses due to unfilled positions.[39]

Second and more importantly, this claim falls victim to what economists call the lump labor fallacy, which is the assumption that there are a finite number of jobs available. Under this logic, any job that was filled by a robot or an immigrant would take away one job from a native worker. This ignores dynamic effects. When a company fills a job with a high-skilled immigrant, that worker spends much of their salary locally, creating jobs with their demand for goods and services. Because wages for STEM immigrants are high, so is the multiplier effect. A technology worker moving into a city can generate 4.3 local service jobs and drive increases in wages for native workers.[40]

Also, IT and other guest workers do not operate in a vacuum. If IT jobs are outsourced for want of scarce labor, the United States also loses all the non-IT personnel who worked alongside IT professionals, including accountants, managers, secretaries, and other support staff. By one estimate, every H-1B visa denied because the cap was reached would have created 1.3 high-paying jobs for native workers in the United States working alongside guest workers.[41] Applications for H-1Bs in fiscal year 2016 totaled 235,000, for 85,000 visa spots.[42] Applying this statistic, not accepting them all could cost the U.S. almost 200,000 jobs in companies that could not acquire H-1B visas.

Finally, STEM immigrants create jobs through innovation. Forty-four percent of Silicon Valley entrepreneurs are immigrants (though that number has decreased in the last decade with the supply of immigrants), and companies like Google, eBay, and Brightstar were all founded by immigrants.[43]

Myth 9: H-1B visas allow foreign companies to compete in American markets

According to the narrative, H-1B visas enable offshoring that would not have otherwise occurred by allowing companies to bring in foreign labor, force native workers to train their replacements, and then move to other countries.

In fact, exactly the opposite phenomenon occurs. The limits on H-1B visas force many companies to leave, costing Americans an estimated half million jobs each year.[44] Companies that file for large quantities of H-1B visas do so because they have numerous IT positions that they cannot fill with domestic labor. However, H-1Bs are temporary visas, so employees can only stay for a few years.[45] Rather than lose these productive workers after the allotted time, companies explore the option of setting up foreign offices, even though they would rather have employees remain in the United States. This is why nations like Canada are trying to exploit our limits on high-skilled immigration so they can attract that talent.

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Figure 6: Billboard in California advertises the relative ease of the Canadian immigration system[46]

For example, Microsoft is planning a new development center in Vancouver, Canada, just across the border from their Redmond, Washington headquarters, citing more flexible immigration rules that give them access to a world-class labor force as the primary motivation for the move.[47] In essence, companies use H-1Bs as stop-gap measures to address the glaring STEM-skills shortages. However, this is a temporary fix that pushes IT departments to look for permanent solutions overseas.

Estimates put total current offshoring numbers at between 30,000 and 40,000 jobs a year, with a similar number coming back to the United States.[48] While it is plausible that a company planning to offshore might make use of H-1B visas to smooth the transition,

guest workers do not create the motivation for offshoring. The root cause of the departure is too little STEM labor, not too much. Moreover, the solution is not to stop immigration, but to provide pathways for these workers to become permanent residents.

Myth 10: Guest workers are paid less than native workers

Advocates assert that H-1B visas are a tool to limit U.S. STEM wages by replacing native workers with lower cost replacements from abroad. For example, Ron Hira's testimony states that Americans fired from Southern California Edison were replaced by H-1B guest workers earning 43 percent to 49 percent less, and asserts that "simply put, the H-1B program has become a cheap labor program."[49]

There are a wide variety of scholarly studies on this question finding that H-1B guest workers are in fact paid more than the average native worker in most occupations.[50] One such study by Magnus Lofstrom and Joseph Hayes found that H-1B guest workers on average earn more than native workers when controlling for occupations and age.[51]

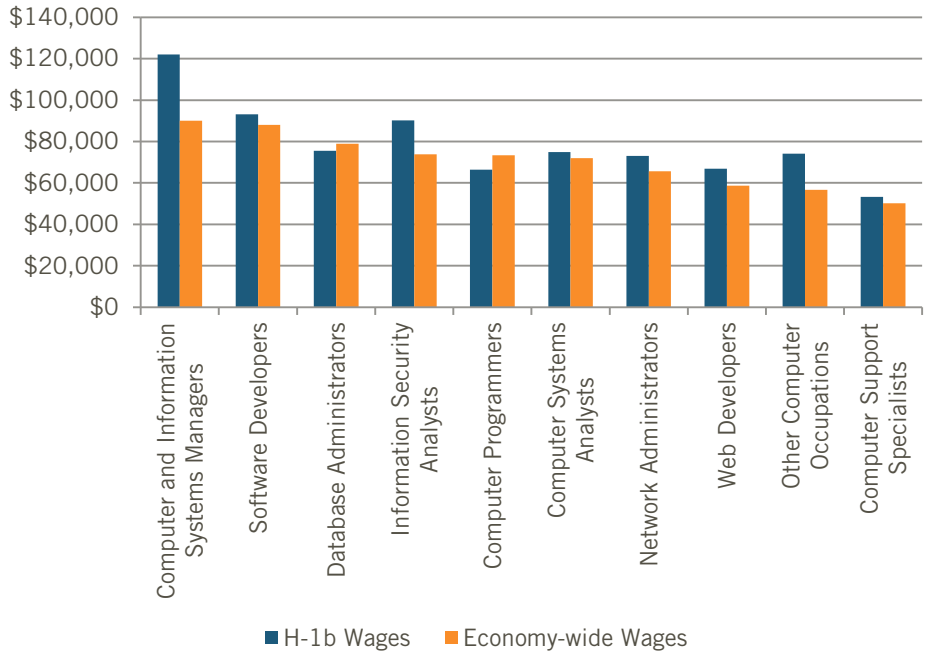

Figure 7: Computer occupation wages for H-1B guest workers and economy-wide[52]

Simply examining H-1B wage data in various IT occupations, it is clear that for most jobs, H-1B wages and prevailing wages are comparable. For database administrators and network administrators, wages for H-1B workers earn approximately 5 percent lower than economy-wide wages. However, for other computer occupations, H-1B wages are higher than national averages, some substantially so. Guest worker managers earn 35 percent more than average, and information security analysts make 22 percent more.

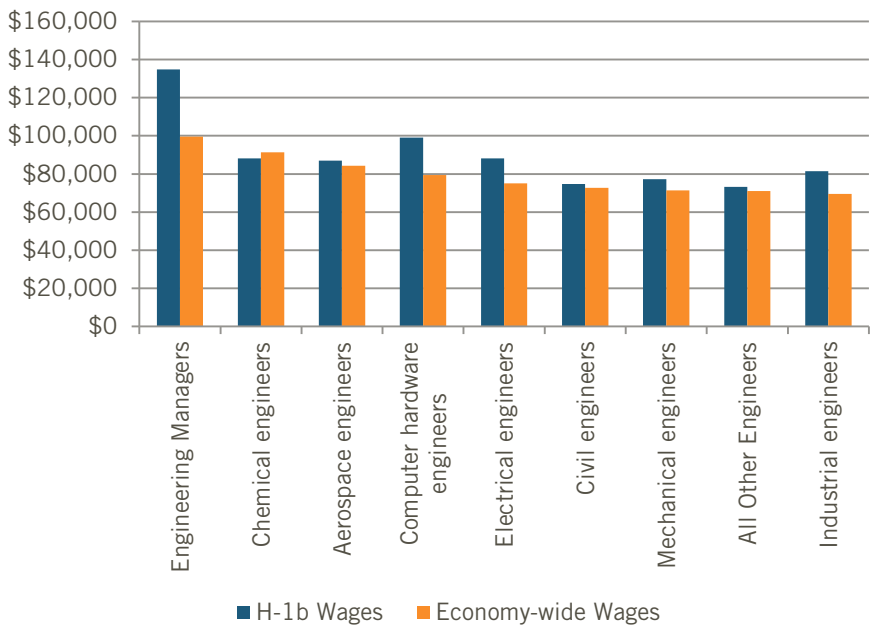

Figure 8: Engineering occupation wages for H-1B guest workers and overall[53]

Our high-value added, innovation-based sectors that could revitalize the American economy lack the labor force they need to compete on a global scale.

Engineering wages tell a similar story. Engineering managers on H-1B visas earn 35.4 percent more and industrial engineers earn 17 percent more.[54] Native chemical engineers earn slightly higher wages than their H-1B counterparts, but like in most engineering occupations, H-1B wages are close and comparable to prevailing wages. To the extent that certain companies are abusing the H-1B program to pay lower than prevailing wages, there are existing rules against this practice and they should be enforced by the U.S. Department of Labor.

Sector	H-1B Average Wage	Economy-Wide Average Wage	H-1B premium
Engineers	$92,433	$84,154	9.8%
Computer Specialists	$78,514	$74,918	4.8%
All Occupations	$71,006	$41,132	72.6%

Table 1: Average wages for H-1B guest workers compared to overall prevailing wages, using consistent occupational distributions, 2013-2014[55]

CONCLUSION

The United States faces a problem with a straightforward and simple answer. Our high-value added, innovation-based sectors that could revitalize the American economy lack the labor force they need to compete on a global scale. The solution is twofold. In the short run we need to expand high-skilled immigration, including for H-1B visas. For the longer

term we need to boost STEM education, particularly in high school and college.[56] This does not mean that the H-1B program should not be reformed. Reforms allowing spouses of H-1B workers to also look for work in the United States, which will go into effect in the fall, are long overdue. In addition, stronger oversight to make sure that all companies pay fair, prevailing wages and to shut down degree mills producing H-1B candidates with spurious credentials is needed. Furthermore, provisions should grant H-1B guest workers the ability to more easily change jobs. Whatever the problems of the H-1B program, debate around it should focus on optimizing the effectiveness of the United States' high-skilled immigration program, not on dismantling it.

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ABOUT THE AUTHORS

Adams Nager is an Economic Research Analyst with the Information Technology and Innovation Foundation. He writes on innovation and American competitiveness in global advanced industries. Mr. Nager received his bachelor's in economics and his master's in Political Economy and Public Policy from Washington University in St. Louis.

Dr. Robert Atkinson is the President of the Information Technology and Innovation Foundation. He is also the author of the book, *The Past and Future of America's Economy: Long Waves of Innovation that Power Cycles of Growth* (Edward Elgar, 2005). Dr. Atkinson received his Ph.D. in City and Regional Planning from the University of North Carolina at Chapel Hill in 1989.

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