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Is There a STEM Worker Shortage? A look at employment and wages in science, technology, engineering, and math

By Steven A. Camarota and Karen Zeigler

While employers argue that there are not enough workers with technical skills, most prior research has found little evidence that such workers are in short supply. This report uses the latest Census Bureau data available to examine the science, technology, engineering, and math (STEM) fields. Consistent with other research, the findings show that the country has more than twice as many workers with STEM degrees as there are STEM jobs. Also consistent with other research, we find only modest levels of wage growth for such workers for more than a decade. Both employment and wage data indicate there is no shortage of STEM workers in the United States.

- Using the most common definition of STEM jobs, total STEM employment in 2012 was 5.3 million workers (immigrant and native), but there are 12.1 million STEM degree holders (immigrant and native).
- Only one-third of native-born Americans with an undergraduate STEM degree holding a job actually work in a STEM occupation.
- There are more than five million native-born Americans with STEM undergraduate degrees working in non-STEM occupations: 1.5 million with engineering degrees, half a million with technology degrees, 400,000 with math degrees, and 2.6 million with science degrees.
- An additional 1.2 million natives with STEM degrees are not working — unemployed or out of the labor force in 2012.
- Despite the economic downturn, Census Bureau data show that, between 2007 and 2012, about 700,000 new immigrants who have STEM degrees were allowed to settle in the country, yet at the same time, total STEM employment grew by only about 500,000.
- Of these new immigrants with STEM degrees, only a little more than a third took a STEM job and about the same share took a non-STEM job. The rest were not working in 2012.
- Overall, less than half of immigrants with STEM degrees work in STEM jobs. In particular, just 23 percent of all immigrants with engineering degrees work as engineers.
- In total, 1.6 million immigrants with STEM degrees worked outside of a STEM field and 563,000 were not working.
- The supply of STEM workers is not just limited to those with STEM degrees. Nearly one-third of the nation's STEM workers do not have an undergraduate STEM degree.

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- Wage trends are one of the best measures of labor demand. If STEM workers are in short supply, wages should be increasing rapidly. But wage data from multiple sources show little growth over the last 12 years.

- Real hourly wages (adjusted for inflation) grew on average just 0.7 percent a year from 2000 to 2012 for STEM workers, and annual wages grew even less — 0.4 percent a year. Wage growth is very modest for most subcategories of engineers and technology workers.

Introduction

Prior Research. Reports by Georgetown University, the Economic Policy Institute (EPI), the Rand Corporation, the Urban Institute, and the National Research Council have all found no evidence that science, technology, engineering and math (STEM) workers are in short supply.[1] The press release that accompanied EPI's 2013 report was very clear that there is "no shortage of STEM workers in the United States."[2] After looking at the evidence from the EPI study, PBS entitled its story on the report, "The Bogus High-Tech Worker Shortage: How Guest Workers Lower US Wages".[3]

Rand's analysis looked backward in time and found that, "Despite recurring concerns about potential shortages of STEM personnel ... we did not find evidence that such shortages have existed at least since 1990, nor that they are on the horizon."[4] A 2013 resume analysis of American technology workers looking for employment and companies seeking to hire workers through the H-1B visa program found that there was a huge supply of qualified applicants for the vast majority of jobs that employers were seeking to fill with foreign workers. Steve Goodman of Bright Media, which conducted the analysis, conceded that, "We're Silicon Valley people, we just assumed the shortage was true. It turns out there is a little Silicon Valley groupthink going on about this, though it's not comfortable to say that."[5]

Hal Salzman, a public policy professor at Rutgers University and one of the authors of the EPI report, observed in a different article that, "The nation graduates more than two times as many STEM students each year as find jobs in STEM fields." In his research, he has emphasized the lack of evidence that STEM workers are in short supply, particularly the lack of wage growth.[6] After reviewing the same evidence as Salzman, B. Lindsey Lowell of Georgetown University's Institute for the Study of International Migration and a coauthor of the EPI report, has argued that, "Those who advocate increasing the supply of STEM talent should cool their ardor."[7]

In a March 2014 article for the *Atlantic Monthly* entitled "The Science and Engineering Shortage Is a Myth", demographer Michael Teitelbaum summarized much of the recent literature on STEM employment. For many years, Teitelbaum directed the Alfred P. Sloan Foundation's research on the science and engineering labor market. He is currently a researcher at the Labor and Worklife Program at Harvard Law School. In his *Atlantic* article he observed that, "No one has been able to find any evidence indicating current widespread labor market shortages or hiring difficulties in science and engineering occupations that require bachelor's degrees or higher."[8] While Teitelbaum thinks that primary and secondary schools should emphasize math and science more, and that a shortage could possibly develop someday, he is clear that there is not now, nor has there been a shortage of STEM workers. Although a significant body of research confirms this observation, employers and many in Congress continue to push for additional increases in the number of STEM workers allowed into the country.

In recent years, Bill Gates, Mark Zuckerberg, and other employers in technology have provided millions of dollars to lobby Congress to increase the number of workers, including those with STEM degrees allowed into the country. They have argued that the nation needs more of such workers.[9] The Chamber of Commerce and other employer groups have worked tirelessly to increase employment-based immigration, for both permanent (green card) and guest workers.[10] At the behest of employers, the Gang of Eight's Immigration bill that passed the Senate in 2013 (S.744) included very large increases in the number of both temporary and permanent STEM workers allowed into the country.[11] In the House of Representatives, a number of bills have been introduced designed to increase the number of both temporary and permanent STEM workers allowed into the country.[12] The incongruity between what the employment and wage data show and what employers and Congress want is difficult to reconcile.

Methods

Data Sources. This analysis draws primarily on the public-use files of the American Community Survey (ACS) collected by the Census Bureau and to a lesser extent on the Bureau's Current Population Survey (CPS).[13] The 2012 ACS has a sample size of 137,000 STEM degree holders and 57,000 individuals in STEM jobs with at least bachelor's degrees. As already indicated, the acronym STEM stands for science (life and physical), technology (computer science), engineering, and math. While there are other potential data sources for studying STEM employment, the Census Bureau data has a number of strengths: 1) the ACS sample is very large, providing robust estimates; 2) it is designed to be nationally representative; 3) it is available to the public, and results can be easily replicated by other researchers; 4) it is relatively consistent over time; and 5) because STEM employment, STEM degrees, and earnings all come from the same source, they are directly comparable.

STEM Occupations. Though there are other ways to define STEM jobs, we use the same formulation (based on the ACS) of what constitutes STEM occupations and degrees as the Department of Commerce has used in its analysis.[14] Table A1 in the Appendix at the end of this report lists in detail the occupations that are considered STEM. STEM, as defined in this report, includes those considered to be "STEM management". It should be noted that the Census Bureau reclassifies occupations every few years.[15] However, these changes are relatively minor and do not impact our 2012 analysis and also do not affect the broad STEM categories from 2000 to 2012.

While we employ the most common definition of STEM occupations, it is possible to define STEM more broadly. Some have suggested that high school and college teachers, some mangers (beyond STEM mangers), health professions, or even most social scientists should be considered STEM.[16] There are a number of problems with including occupations outside of the traditional STEM fields in an analysis of this kind. First, in the context of immigration, the argument for allowing in STEM workers is expressed in terms of a need for more engineers or scientists, not more sociologists or managers. Thus, at least when thinking about immigration policy, it makes sense to limit the analysis to traditional STEM fields.[17]

There are also limitations in the data that make a very broad definition of STEM difficult. For example, the ACS does not indicate an educator's subject area, such as math or history. The inclusion of social scientists also seems problematic because a good deal of research in the constituent fields (e.g. anthropology or political science) is qualitative or even normative in nature and goes well beyond even what is normally considered science. In terms of health care professionals, many do have biology undergraduate degrees, but a central idea behind examining STEM fields is that the workers are involved in some way with research and development rather than practitioners, such as nurses or physicians.[18] For those wanting to see a detailed analysis of the occupational distribution of native-born STEM degree holders working in non-STEM jobs, Table A5 provides this information.

Consistent with most, but not all, research in this field, we confine our analysis of STEM occupations to only those with bachelor's degrees or higher. However, the degree does not have to be in a STEM field. Defined in this way there were 5.3 million STEM workers in 2012.[19] Limiting the examination to those with at least a bachelor's degree makes sense because it confines the analysis to only more skilled STEM workers, for whom demand is presumably the highest. Moreover, programs like the H1-B visa as well as all proposals to admit more foreign STEM workers focus on those with at least a bachelor's degree. Thus, when thinking about STEM workers in the context of immigration policy, it makes sense to compare natives and immigrants with at least this level of education.

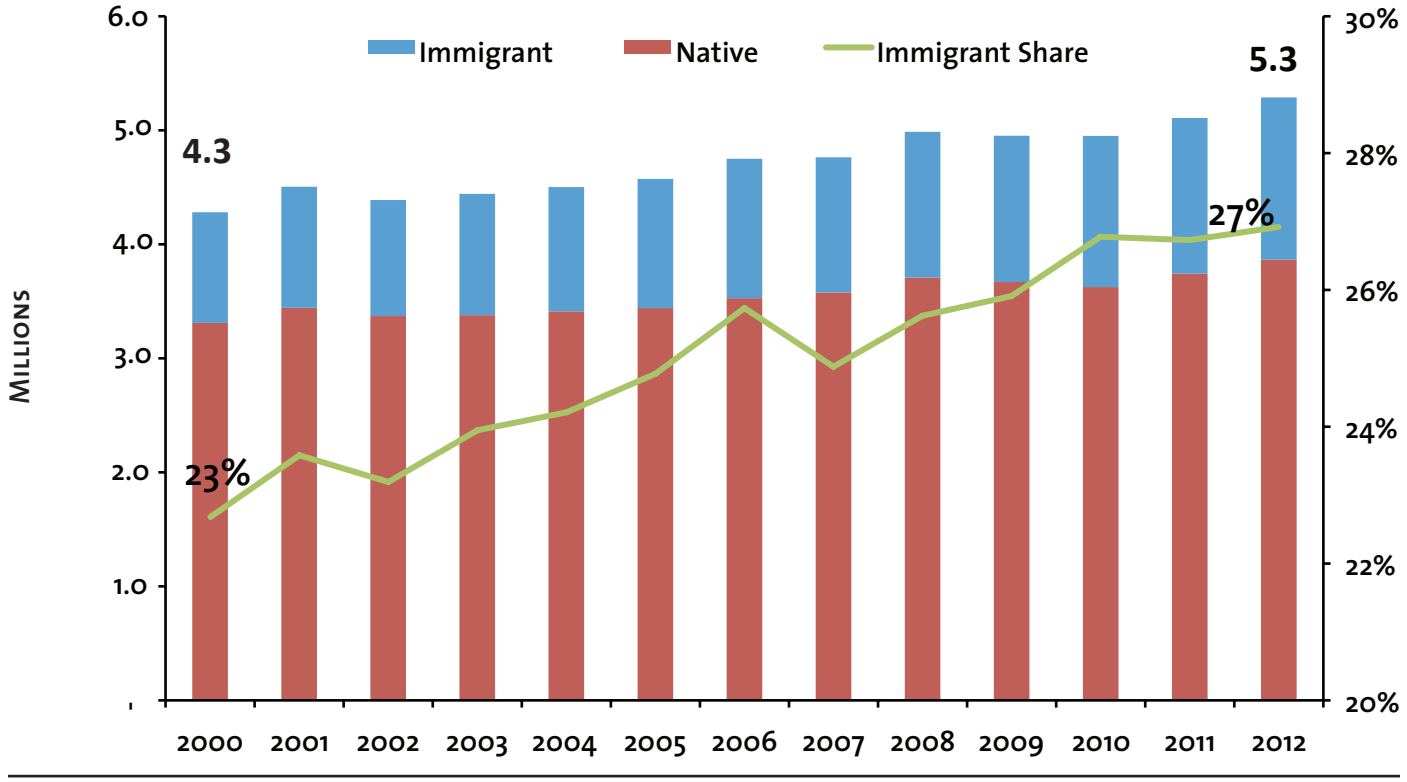
STEM Degrees. Beginning in 2009, the ACS began to ask those with bachelor's degrees about their undergraduate majors in college.[20] Table A2 in the Appendix shows the degrees that are considered STEM. Although the ACS records if an individual has a graduate degree, it does not record respondents' graduate field of study. As a result, throughout this report a STEM degree refers to an individual's undergraduate education only. The ACS shows that, of native-born Americans with STEM degrees holding any job (STEM and non-STEM), 59 percent have only an undergraduate degree. Of STEM degree holders employed in STEM occupations, 69 percent have only an undergraduate degree.

In this report, we focus on the number of STEM graduates not working in STEM jobs. We report figures for both native-born Americans and immigrants. We use the terms immigrant and foreign-born synonymously. The Census Bureau defines the foreign-born as individuals who are not U.S. citizens at birth.[21] We also use the terms native, native-born, and U.S.-born to mean those who are U.S. citizens at birth.

Recent Trends in STEM Occupations

Growth in STEM Employment. Figure 1 uses the American Community Survey (ACS) to show the total number of people employed in science, technology, engineering, and math jobs from 2000 to 2012. Table A4 in the Appendix provides numbers and percentages from 2000 to 2012 for immigrants and natives in STEM jobs in more detail than Figure 1. Overall, there were 5.3 million STEM workers (immigrant and native) in 2012, up from 4.3 million in 2000. In 2012, immigrants accounted for 1.4 million of the nation's STEM workers — 27 percent of the total. Immigrant STEM employment increased 453,000 from 2000 to 2012, accounting for 45 percent of the net gain in STEM employment in the last decade. Even though the number of immigrants entering the country since 2007 has slowed with the economy, immigrants still accounted for 45 percent of STEM employment growth from 2007 to 2012.

Figure 1. Growth in STEM Employment 2000 to 2012



Source: Public-use files of the 2000-2012 American Community Surveys. STEM employment is confined to those with a bachelor's degree or higher employed in a STEM field.

Over the last decade, 65 percent of employment growth in science jobs went to immigrants, in technology (computer science) 45 percent went to immigrants, in engineering 39 percent, and in math 18 percent. There is no question that immigration has had a very significant impact on STEM occupations over the last decade, especially in science and technology.

New Immigrants. In addition to the net change in the number of employed immigrants, we can also examine new arrivals. The ACS asks immigrants when they came to the United States to live. New arrivals and the net increase are not the same because there is significant churn in the foreign-born population as new immigrants arrive each year and some leave the country. Despite the economic downturn, the 2012 ACS shows that there were 704,000 immigrants with STEM degrees who arrived from the beginning of 2007 to the middle of 2012 — 129,000 new arrivals each year on average. These new arrivals are primarily new permanent residents (green card holders), guest workers, and others who have legally immigrated to the United States, as well as a small number of illegal immigrants with STEM degrees who are included in Census Bureau data. Because Census data of this kind tends to undercount immigrants generally and new arrivals in particular, the actual number of new STEM immigrants is higher than estimates from the ACS.[22] The ACS does not report immigration category or status

of these new arrivals, and we do not attempt to impute their statuses. We do know that the vast majority of these immigrants arrived with their STEM undergraduate degrees. That is, they did not earn their degrees in the United States.[23]

Of these post-2007 immigrants with STEM degrees, a little more than a third (249,000) took a STEM job, a similar share took a job outside of STEM (252,000), and the rest (203,000) were not working in 2012. It is also worth noting that a little over 37,000 post-2007 immigrants with non-STEM undergraduate degrees also found work in a STEM field. Although many do not find work in STEM jobs, the Census Bureau data show that in recent years the United States has admitted about 129,000 immigrants with STEM degrees each year, yet total STEM employment growth since 2000 has averaged only about 84,000 jobs each year (see Table A4). If we examine growth from 2007 to 2012, we find that STEM employment growth was somewhat higher, but it still averaged only 105,000 jobs annually. Thus, based on the ACS, the number of new immigrants with STEM degrees admitted each year is by itself higher than the total growth in STEM employment. This is truly extraordinary when one considers that the same data show that the number of U.S.-born STEM graduates is growing by 115,000 a year.[24] Given these numbers, it should not be surprising that most STEM graduates (immigrant or native) do not have STEM jobs.

Moreover, as we will see later in this report, there are 6.7 million natives and immigrants already here with STEM degrees working in non-STEM jobs. There are an additional 1.8 million STEM degree holders in the country not working at all. All of this calls into question the current level of STEM immigration. The dramatic increases in STEM immigration called for by employers and many in Congress would seem to be out of step with the absorption capacity of the STEM labor market. It is clearly the case that most new immigrants with STEM degrees are not finding STEM jobs.

The Total Potential STEM Workforce

Natives with STEM Degrees. The top of Table 1 (next page) reports the number of native-born Americans with STEM undergraduate degrees working in and out of STEM occupations, based on the 2012 ACS.[25] Table 1 reads as follows: In 2012 there were 558,000 natives with technology degrees (computer science) working in technology, 8,000 natives with technology degrees working in math occupations, and so on across the row. In total, there were 603,000 natives with technology degrees working in a STEM job of some kind and another 509,000 with such degrees working outside of any STEM field. Of course, the skills for one STEM job overlap with those from another. For example, someone with a math background can work in other fields requiring quantitative skills. But of all natives with a STEM degree, only about one-third (2.5 million) work in any STEM occupation, while 5.1 million work outside of STEM. (For a more specific information about the spread of natives across the occupations that comprise STEM, Table A9 in the Appendix reports figures for each occupation at the highest level of detail possible with the ACS.)

The right side of Table 1 reports the number of individuals with STEM degrees who are unemployed and those who are out of the labor market — not working or looking for work. If we add together those who are unemployed and those who are entirely out of the labor market (under age 65) to those with STEM degrees that work outside of STEM occupations, there are 6.3 million native-born Americans with STEM degrees not working at STEM jobs. This would seem to be a huge supply of potential STEM workers for the industry to draw upon. This is especially true given that the total number of people (immigrant and native) working in STEM occupations is only 5.3 million.

Of course, some natives with STEM degrees may not wish to work in STEM. But it would be incorrect to say that STEM jobs do not interest natives. Table A9 in the appendix shows that a majority of workers in all 48 STEM occupations in 2012 were native-born. Thus, it is not the case that there are STEM jobs in which natives show no interest.

Total Population with STEM Degrees. The middle section of Table 1 shows the same information as the top of the table except it reports figures for immigrants. The bottom of the table shows the numbers for immigrants and natives combined. Looking at the combined figures for immigrants and natives at the bottom of Table 1 shows that there are 10.3 million immigrants and natives working who have STEM degrees and another 1.8 million unemployed or out of the labor force. Of these, 12.1 million (10.3 plus 1.8 million) STEM degree holders, only 3.7 million have STEM jobs. The rest are working outside of any STEM job or are not working at all. (Later in this report we will discuss STEM workers who do not have STEM degrees.)

Table 1. Employment by Occupation and Degree for Natives and Immigrants with a Bachelor's Degree or More (thousands)

Natives

	Occupations								
Degree	Technology	Math	Engineering	Science	Any STEM Job	Non-STEM Job	Total Working Who Have STEM Degree	Unemployed	Not in Labor Force <65 Years of Age
Technology	558	8	32	5	603	509	1,112	46	104
Math	89	11	15	9	123	426	549	23	92
Engineering	260	7	955	33	1,256	1,515	2,771	106	243
Science	104	9	77	319	509	2,630	3,139	115	461
STEM Degree	1,010	34	1,080	366	2,491	5,080	7,571	291	900
Non-STEM Degree	901	77	230	166	1,374	30,550	n/a	n/a	n/a

Immigrants

	Occupations								
Degree	Technology	Math	Engineering	Science	Any STEM Job	Non-STEM Job	Total Working Who Have STEM Degree	Unemployed	Not in Labor Force <65 Years of Age
Technology	273	4	18	5	301	196	497	24	79
Math	33	4	5	3	45	106	151	9	34
Engineering	307	4	310	31	651	717	1,368	59	177
Science	44	2	19	121	186	576	762	33	148
STEM Degree	657	14	352	160	1,183	1,595	2,777	125	438
Non-STEM Degree	155	9	35	41	241	4,236	n/a	n/a	n/a

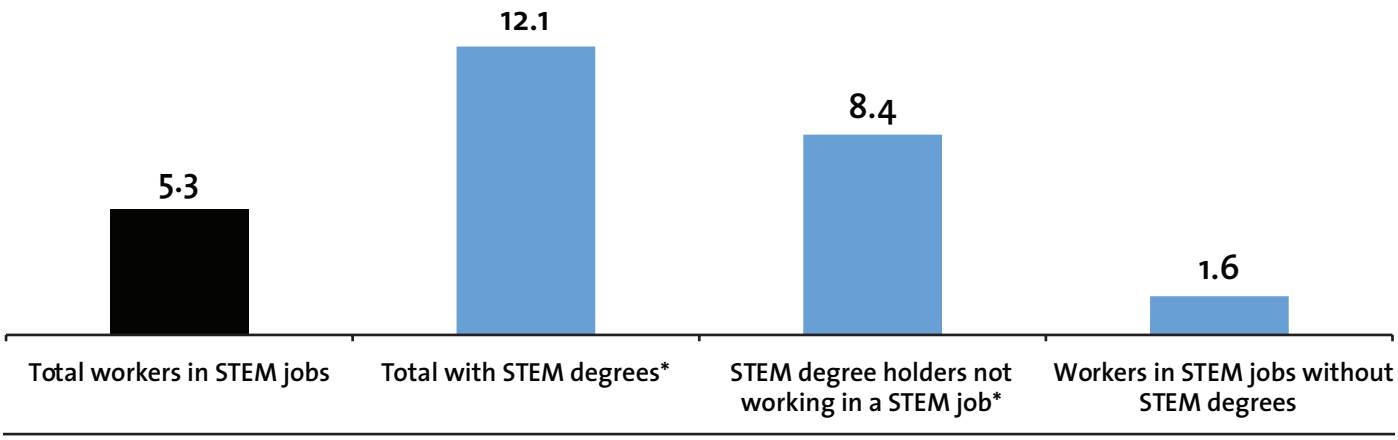
Natives and Immigrants

	Occupations								
Degree	Technology	Math	Engineering	Science	Any STEM Job	Non-STEM Job	Total Working Who Have STEM Degree	Unemployed	Not in Labor Force <65 Years of Age
Technology	830	12	51	10	904	705	1,609	70	182
Math	122	14	20	12	168	532	700	32	126
Engineering	567	11	1,265	64	1,907	2,232	4,139	165	420
Science	148	10	96	440	695	3,206	3,901	148	609
STEM Degree	1,668	48	1,432	526	3,673	6,675	10,348	415	1,338
Non-STEM Degree	1,057	85	265	207	1,614	34,786	n/a	n/a	n/a

Source: Public-use files of the 2012 American Community Survey. Analysis confined to those with a bachelor's degree or higher.

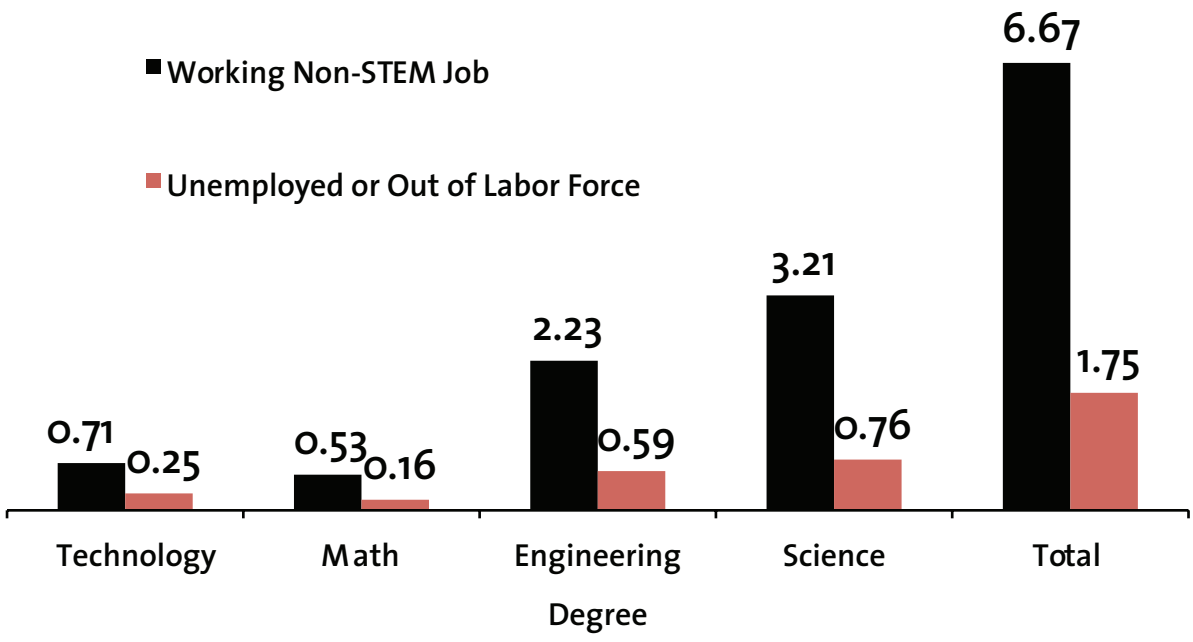
Figure 2 shows the large difference between the relatively modest number of STEM jobs and the much larger number of STEM degree holders (immigrant and native). Figure 3 shows the same numbers for the specific STEM degrees. Figure 3 reads as follows: There are 700,000 people with technology degrees not working in technology jobs and another 250,000 not working at all (unemployed or under age 65 and out of the labor force). The total number of people (immigrant and native) with STEM degrees is certainly very large and would seem to be more than adequate to meet the demand for the limited number of STEM jobs.

Figure 2. The number of potential STEM workers (immigrant and native) vastly exceeds the number of STEM jobs.



Source: Public-use files of the 2012 American Community Survey. STEM employment is confined to those with a bachelor's degree or higher employed in a STEM field.
* Includes 1.8 million with STEM degrees unemployed, out of the labor market, and under age 65.

Figure 3. There are an enormous number of STEM degree holders (immigrant and native) not working or working outside of any STEM job.



Source: Public-use files of the 2012 American Community Survey. Analysis confined to those with a bachelor's degree or higher.

Share of Natives in Non-STEM Jobs. Table 2 uses the numbers from Table 1 to report the percentages of those with STEM degrees working in their field. Like Table 1, the top of the table reports figures for natives, the middle of the table reports figures for immigrants, and the bottom of the table is for both groups together. Table 2 reads as follows: 50 percent of natives with a technology degree have a technology job. The grayed boxes show the share of those working in the same field as their undergraduate degrees. Thus, only 2 percent of natives with a math degree have a math job, only 34 percent of the U.S.-born with an engineering degree work as an engineer, and 10 percent of those with a science degree have a job in science.

Table 2. Share of Degree Holders Working in and out of Their Fields

Natives

	Occupations				
Degree	**Technology**	**Math**	**Engineering**	**Science**	**Any STEM Job**
Technology	50%	1%	3%	0%	54%
Math	16%	2%	3%	2%	22%
Engineering	9%	0%	34%	1%	45%
Science	3%	0%	2%	10%	16%
STEM Degree	13%	0%	14%	5%	33%

Immigrants

	Occupations				
Degree	**Technology**	**Math**	**Engineering**	**Science**	**Any STEM Job**
Technology	55%	1%	4%	1%	61%
Math	22%	2%	3%	2%	30%
Engineering	22%	0%	23%	2%	48%
Science	6%	0%	2%	16%	24%
STEM Degree	24%	0%	13%	6%	43%

Natives and Immigrants

	Occupations				
Degree	**Technology**	**Math**	**Engineering**	**Science**	**Any STEM Job**
Technology	52%	1%	3%	1%	56%
Math	17%	2%	3%	2%	24%
Engineering	14%	0%	31%	2%	46%
Science	4%	0%	2%	11%	18%
STEM Degree	16%	0%	14%	5%	35%

Source: Public-use files of the 2012 American Community Survey. Analysis confined to those with a bachelor's degree or higher.

As already discussed, most Americans with STEM undergraduate degrees, including degrees in engineering, do not work in the field in which they earned their undergraduate degrees. The last column in Table 2 reports the share of those with each type of degree working in any STEM job. The table shows only 33 percent of all natives with an undergraduate STEM degree who hold a job do so in a STEM field. It is worth adding that all of these percentages would be lower if we included those with STEM degrees who are unemployed or out of the labor force.

Immigrants in Non-STEM Jobs. The middle section of Table 2 shows that, like natives, most immigrants with STEM degrees also do not work at a job that corresponds to their undergraduate degrees. Compared to natives, immigrants with technology degrees (computer science) are somewhat more likely to have a job in their field of study than natives with technology degrees — 55 percent vs. 50 percent. The share for immigrants (16 percent) and natives (10 percent) with science degrees who work in science jobs is very low. The percentage of immigrants and natives with math degrees working in math jobs is even lower, just 2 percent for both groups. It should be pointed out that the total number of math jobs is very small, less than 200,000. Therefore, there are not that many opportunities for employment in a math-specific occupation.

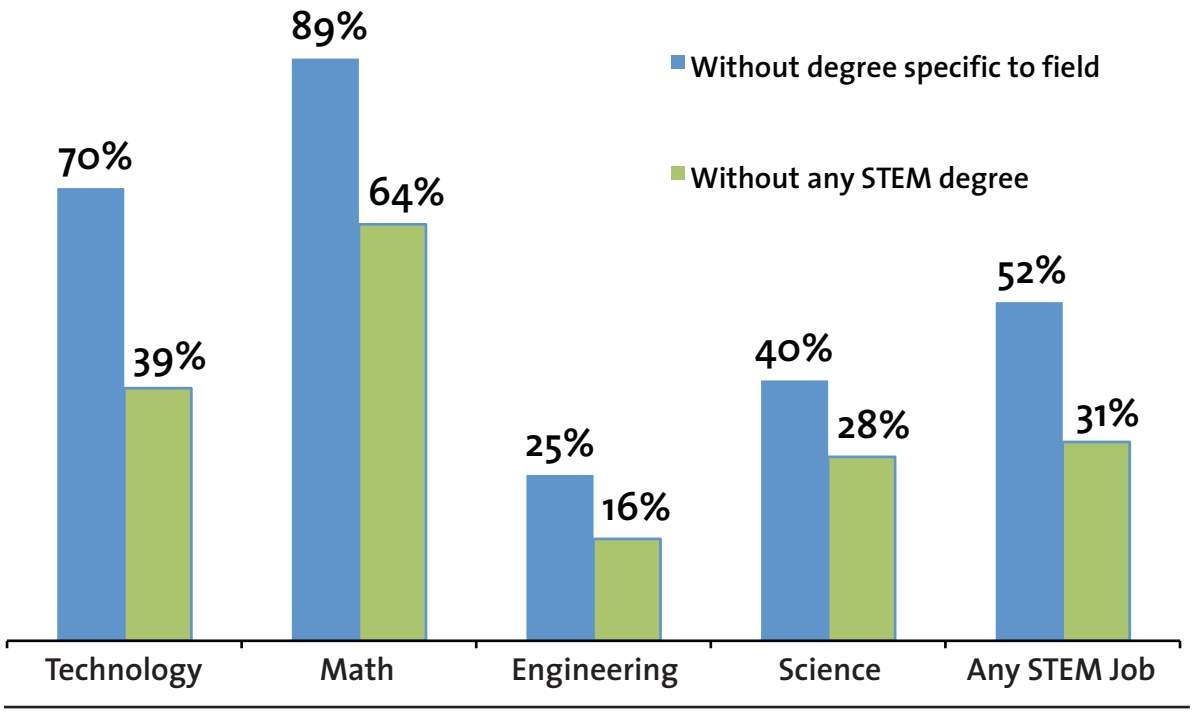
Because of a perceived need, there has been significant pressure to admit more immigrant engineers. But Table 2 shows that the share of immigrant engineers holding an engineering job is actually lower than natives — 23 vs. 34 percent. Even if more immigrant engineers are allowed into the country, the available evidence indicates that most will not find work as engineers. This indicates that increasing the number of immigrant engineers allowed into the country is not very efficient at increasing the number of people working as engineers. Overall, there are some differences between immigrants and natives with STEM degrees; however, the majority of both groups work outside of the area in which they earned their undergraduate degrees.

Those Working Outside Their Field. What about STEM degree holders who are not employed in STEM jobs? Table A5 in the Appendix reports the occupational categories of native-born STEM graduates who are not employed in STEM jobs. Overall, healthcare and non-STEM management tend to be the most common non-STEM jobs held by STEM graduates. However, these occupational categories account for only 41 percent of non-STEM employment for STEM degree holders. For those natives with technology degrees, management, office and administrative support, and sales occupations account for about half of their non-STEM employment. For native holders of math degrees, roughly one-fifth teach in high school or college and roughly the same share are in management. About one-third of natives with engineering degrees working at non-STEM jobs are employed in non-STEM management occupations. For natives with science degrees working at non-STEM jobs, about one-third are in some kind of healthcare job and one-fifth are doctors. In general, Table A5 shows that some occupations are more common than others for U.S.-born STEM graduates working outside of STEM occupations. But STEM graduates are spread out in many different occupations, including 66,000 in community and social service jobs, a similar number in protective services (e.g. security guard), 62,000 in food preparation and serving, and 45,000 in building cleaning and maintenance occupations.

Non-Degree Holders in STEM Fields. As we have seen, there are many more STEM degree holders than there are STEM jobs. Another aspect of this issue that is sometimes overlooked is that many workers in STEM jobs do not have undergraduate degrees in the areas in which they work. When the argument is made that the country needs more workers with technical skills, it is sometimes assumed that to work in a STEM job one has to have a STEM degree. Figure 4 (next page) shows this is not the case. Figure 4 reads as follow: in technology, 70 percent of workers (immigrant and native) do not have a technology undergraduate degree, and 39 percent do not have a STEM degree of any kind. Overall, 52 percent of STEM workers do not have an undergraduate degree in the specific field in which they hold a job. Moreover, 31 percent of all STEM workers do not have a STEM undergraduate degree of any kind. Again, it must be remembered that these individuals do have bachelor's degrees, just not in a STEM field. The large share of STEM workers who do not have an undergraduate STEM degree certainly indicates that the supply of STEM workers is much larger and more flexible than is sometimes thought.

The 1.6 million STEM workers without STEM degrees must have gained their training on the job or in some other way. Some surely went back to school and earned a graduate degree in a STEM field. As already discussed, the ACS does not identify the field of study for those with graduate degrees, though it does record that a person has a graduate degree. We do know that the overwhelming majority of non-STEM degree holders who work in STEM jobs do not have graduate degrees. Of the 1.6 million people without STEM undergraduate degrees working in a STEM field, 1.1 million or 70 percent have only an undergraduate degree.

Figure 4. Many STEM jobs are filled by workers (immigrant and native) without a degree specific to the occupation or without any STEM degree.



Source: Public-use files of the 2012 American Community Survey. Analysis confined to those with a bachelor's degree or higher.

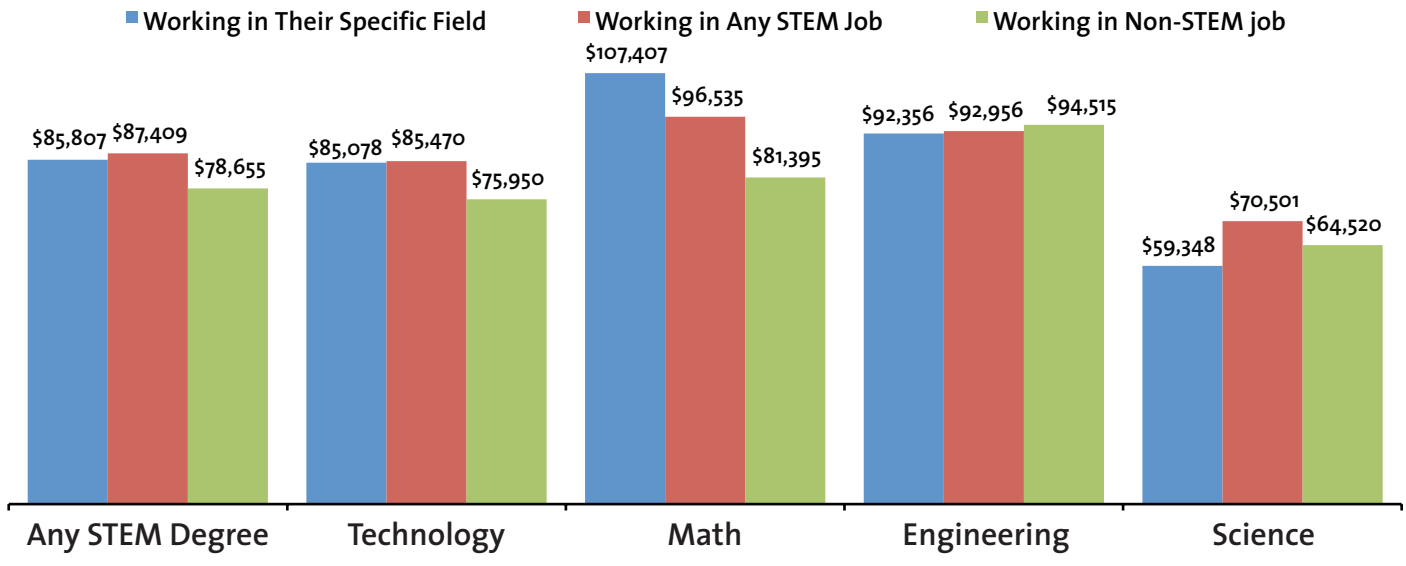
It is worth pointing out that the vast majority (85 percent) of those working in STEM occupations without STEM degrees are native-born. This indicates that allowing in large numbers of immigrants who seek STEM employment may create competition for natives who themselves do not have STEM degrees, but who can do such work nonetheless. The large share of STEM workers who do not have a STEM degree of any kind is a clear indication that it would be a mistake to think that the supply of STEM workers is limited only to those who have a STEM degree.

Wages for Those Outside of Their Field

While most natives and immigrants who have STEM degrees do not have STEM jobs, this does not necessarily mean that they earn less because of this. It is entirely possible that STEM degree holders who work in non-STEM jobs earn more than those employed in STEM occupations. This may partly explain why so many work in non-STEM fields. On the other hand, it is very possible that immigration is reducing wages or employment opportunities for natives in STEM jobs. This would make non-STEM employment more attractive by default. If this is the case, non-STEM jobs may pay STEM degree holders more than STEM jobs, but this is due to the concentration of immigrants in STEM occupations. We do not know what STEM jobs would have paid absent immigration. We can, however, compare the current wages of natives with STEM degrees who work in their fields with those who work outside of their fields.

Natives with Only Bachelor's Degrees. Figure 5 (next page) compares the average annual wages of natives with only STEM bachelor's degrees working in and out of their fields.[26] In 2012, 38 percent of natives with only a STEM bachelor's degree worked in a STEM job. (As already discussed, if we include those with graduate degrees, the figure for natives is 33 percent in Table 2). Figure 5 shows that, in general, those with STEM bachelor's degrees working in STEM fields do better than their counterparts in non-STEM fields. Overall, STEM graduates earn about 10 percent ($8,754) more in STEM occupations compared to those employed in non-STEM occupations.

Figure 5. Natives with only STEM bachelor's degrees generally earn more if employed in a STEM job.



Source: Public-use files of the 2012 American Community Survey. Analysis confined to natives with only a bachelor's degree under age 65.

There is some variation across categories. Those with computer degrees and science degrees tend to do better when they have STEM jobs, but are employed outside of their particular fields of study. In engineering, the differences are modest across categories, but those with engineering degrees tend to have slightly higher earnings (1.7 percent) when they work outside of a STEM field. In general, the wage data do not support the idea that those with STEM degrees do much better when they work at non-STEM jobs, at least for those with only undergraduate degrees. Thus, higher wages outside of STEM occupations do not seem to explain why so many STEM graduates work in non-STEM jobs, at least for the 59 percent of native STEM degree holders who have only an undergraduate degree.

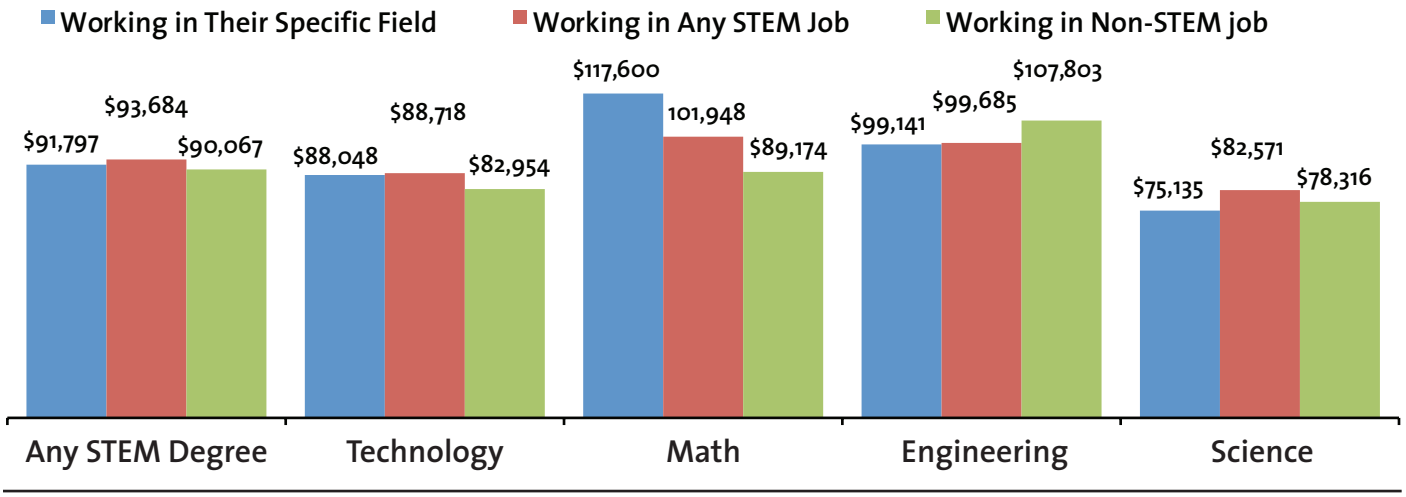
However, it must be pointed out that Figure 5 is only a simple comparison; it does not control for things such as age or gender. But, these findings do indicate that it might be relatively easy to attract a significant share of STEM degree holders into STEM jobs by raising wages if, for example, the supply of immigrant STEM workers entering the country was curtailed.

All Natives with STEM Degrees. As already mentioned, one of the limitations of the degree data from the ACS is that it only relates to respondents' undergraduate degrees. This means we do not know the respondents' graduate fields of study, only that they have one. Those with graduate degrees include doctors and lawyers, as well as those with master's and PhDs in both STEM and non-STEM fields. When we examine wages for all those with STEM degrees working outside of STEM occupations the results are heavily influenced by the modest number of doctors who are highly paid. Of the entire population of natives with STEM undergraduate degrees working in a non-STEM field (5.1 million), about one-tenth (528,000) work as doctors, most having undergraduate degrees in biology. Being a doctor is generally not considered a STEM occupation and they are not treated as one in this analysis.[27] Figure 6 (next page) reports annual earnings for all STEM, including those with graduate degrees, but excluding doctors.

Like the figures for those with only undergraduates degrees, Figure 6 shows that, overall, native STEM degree holders do somewhat better when working in a STEM job, earning about 4 percent more ($3,617). But this difference is not very large and is an indication that natives with STEM degrees (excluding doctors) earn about the same in and out of STEM fields, but with significant differences across degrees and occupations.

Unlike those with only undergraduate degrees, the picture is more muddled in Figure 6 when we include those with graduate degrees. Nonetheless, it is hard to argue, with the notable exception of doctors, that most natives with STEM undergraduate degrees work in non-STEM jobs because the jobs pay so much more than the field in which they earned their degrees. In general, this is not the case. One reasonable interpretation of the data is that STEM employment is not that attractive, at least

Figure 6. Natives with bachelor's STEM degree or higher generally earn about the same in or out of a STEM job.



Source: Public-use files of the 2012 American Community Survey. Analysis confined to natives with a bachelor's degree or higher, under age 65, excluding doctors (physicians, surgeons, podiatrists, dentists, and optometrists).

in terms of wages relative to non-STEM jobs. If STEM workers were in short supply, we would expect to see a significant wage premium for STEM degree holders working in STEM fields compared to those working outside of STEM. But Figure 6 shows this is not the case.

Wage Trends

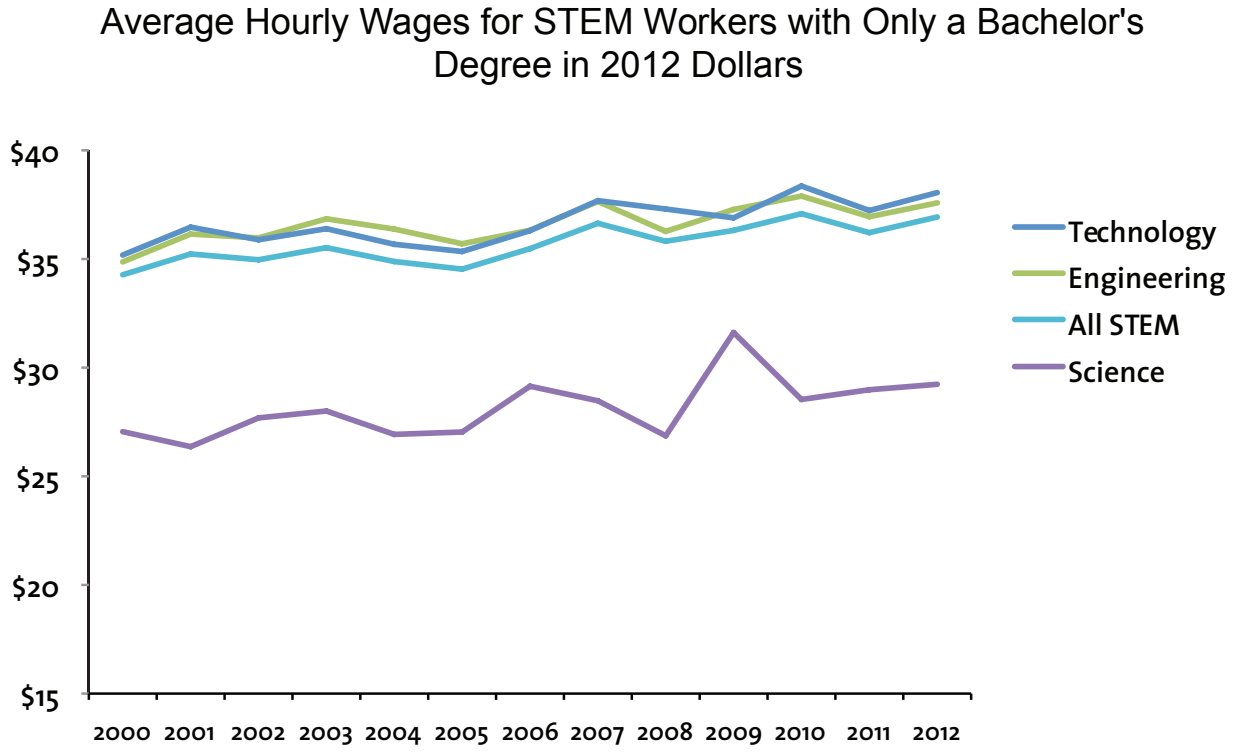
While Census Bureau data from the ACS on those with STEM *degrees* only go back to 2009, data on wages for workers in STEM *occupations* go back much further. Wage trends are a key measure of labor demand. As already discussed, those that want to allow more foreign STEM workers into the country argue that the demand exceeds the supply of such workers. One clear sign that demand for workers is outstripping supply would be rapidly rising wages as employers try to recruit and retain the limited number of workers available.

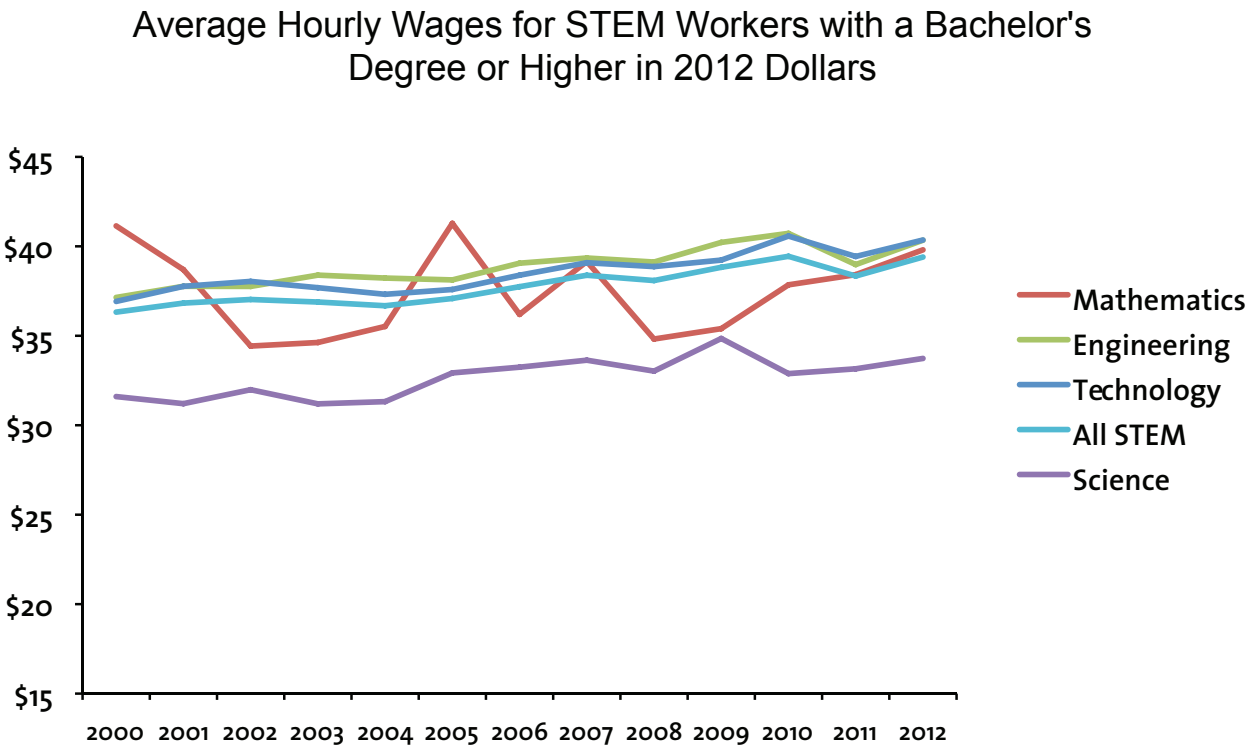
Hourly Wages. Figure 7 (next page) reports average hourly wages for STEM workers from 2000 to 2012 based on the monthly Current Population Survey (CPS). The CPS is collected by the Census Bureau and is similar to the ACS, but it is smaller and collects data on a monthly basis; it is the primary source of information on unemployment and wages. Table A7 in the Appendix reports more detailed information on average hourly wages for sub-categories of STEM workers using the CPS. (Unlike the ACS, the CPS does not ask about degree field.)

The top of Figure 7 reports hourly wages for STEM workers with only bachelor's degrees, and the bottom of the figure reports hourly wages for all STEM workers, including those with graduate degrees. Not surprisingly, the graph shows that when those with graduate degrees are included, hourly wages for STEM workers are somewhat higher. However, the overall trends are the same — hourly wages for STEM workers show very modest growth for more than a decade.

Over the entire period of 2000 to 2012, real hourly wages (adjusted for inflation) grew on average just 0.65 percent annually for those with only a bachelor's degree and 0.71 percent for all STEM workers. Thus, in both cases average hourly wages grew less than 1 percent a year from 2000 to 2012. What growth there has been in hourly wages for STEM workers mostly occurred from 2000 to 2007. There has been almost no hourly wage growth since 2007. Hourly wage growth of less than 1 percent annually for over a decade is certainly not the pattern we would expect to see if workers were in short supply.

Figure 7. Hourly Wages for STEM workers show little growth 2000-2012





Source: Public-use files of the 2000 to 2012 Current Population Surveys. Each year averages 12 months of data. Analysis confined to STEM workers with at least a bachelor's degree age below age 65. Pareto-imputed mean values for top-coded weekly wages are from the "State of Working America", 12th edition, Economic Policy Institute, p. 467. Pareto-imputed means for 2012 were provided by EPI separately. Figures for math tend to be more volatile because of small sample size.

Annual Wages. Hourly wages have the advantage in comparison to annual earnings of controlling for hours worked. On the other hand, annual wages may be seen as providing a more complete picture of trends by reflecting what people are earning on a yearly basis. Figure 8 (next page) reports annual wages from 2000 to 2012 for full-time workers who worked for the entire year based on the ACS. Table A8 in the Appendix reports more detailed annual figures. Figure 8 and Table A8 show the same pattern as hourly wages from the CPS. Real annual wages for STEM workers with only bachelor's degrees grew on average just 0.32 percent per year from 2000 to 2012 and 0.42 percent for all STEM workers. In fact, all the growth was from 2000 to 2007. From 2007 to 2012, real annual wages actually declined slightly for STEM workers overall. Like the hourly data from the CPS, the lack of growth in annual earnings from the ACS strongly indicates that demand for STEM workers is not outstripping the supply of such workers, at least since 2000.

The Petroleum Engineer Exception. Some may wonder whether the ACS data is able to discern wage growth. In Table A8, we report annual earnings growth for petroleum, mining, and geological engineers, who should have benefited enormously from the massive increase in oil and gas production due to fracking in the United States during recent years. (We do not report hourly figures from the CPS because the sample of petroleum engineers is too small in that data source.) Real annual wages for this type of engineer with only an undergraduate degree were $46,000 higher in 2012 than 2000 — 14 times the $3,300 increase for all engineers with only undergraduate degrees. When those with graduate degrees are included, the increase was nearly $51,000 between 2000 and 2012. These findings are entirely consistent with what others have found for this type of engineer.[28]

This is a clear indication that increases in demand can drive up earnings in a STEM occupation. The laws of supply and demand apply to STEM worker wages just as they do to other things in the economy. It is also equally important to note that this finding indicates that Census Bureau data are able to capture an increase in wages. This makes the finding that wages for STEM workers grew modestly in the last decade all the stronger.

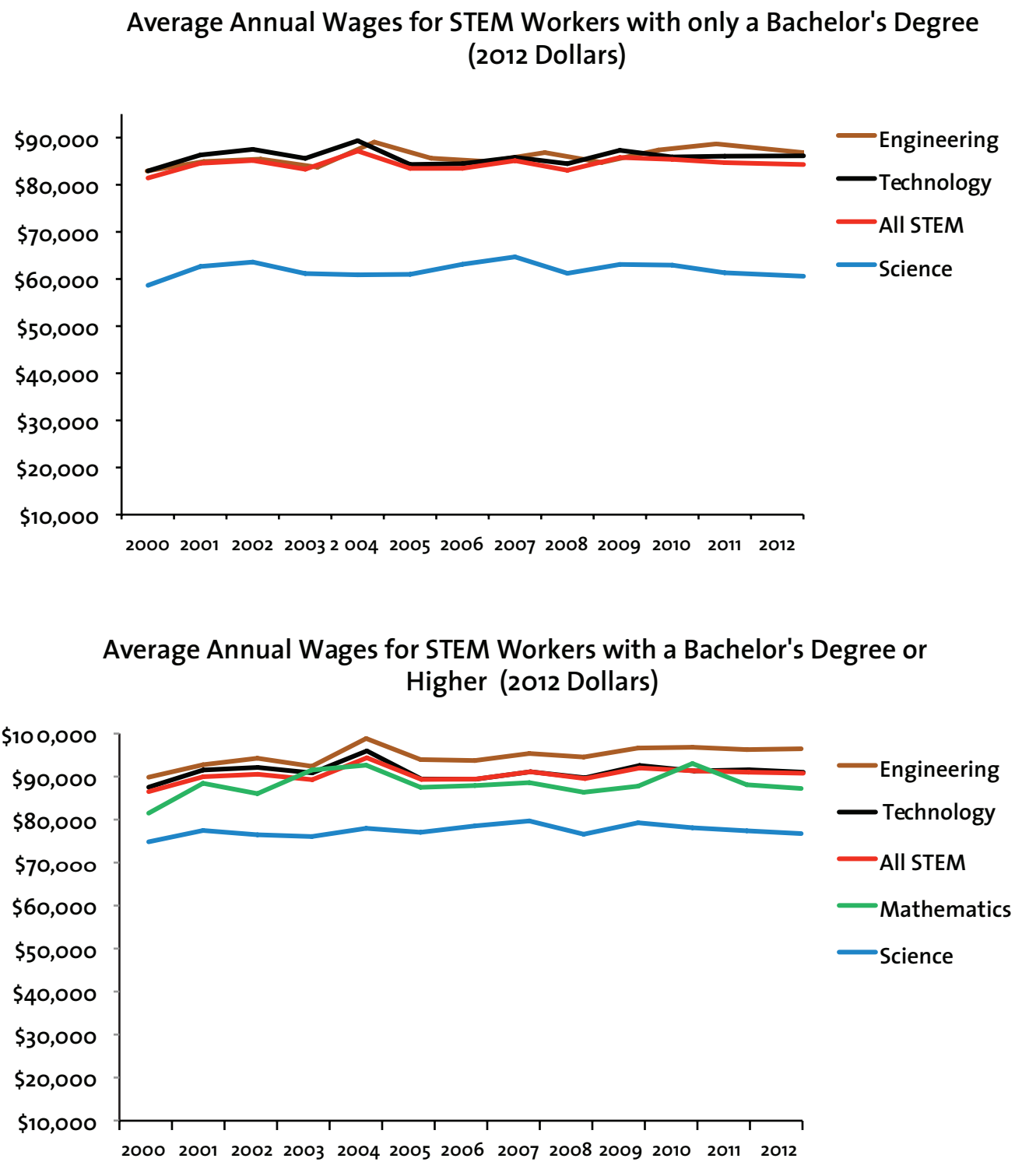
Wage trends show no shortage. Overall, the low hourly and annual wage growth for more than a decade indicates that demand for STEM workers in general is not particularly strong relative to supply. If it were, wages would be rising quickly, as they have for petroleum engineers. But Figures 7 and 8, along with Tables A7 and A8, show that STEM occupations have experienced a prolonged period of very modest wage increases, much less than 1 percent a year on average. In fact, in recent years wage growth has been virtually nonexistent. Like the employment data showing that there are many more STEM graduates than there are STEM jobs, trends in wages and earnings strongly indicate that the supply of workers is adequate to meet the demand.

Even though wage growth has been modest for STEM jobs, the goal of many employers is to keep wages in check by using immigration to increase the supply of workers. Alan Greenspan certainly has made this point. Speaking at a U.S. Treasury conference on U.S. Capital Markets Competitiveness in 2007, Greenspan argued that, "Our skilled wages are higher than anywhere in the world. If we open up a significant window for skilled guest workers, that would suppress the skilled-wage level and end the concentration of income."[29] Greenspan believes that reducing wages for skilled workers, including those in STEM fields, has a number of desirable policy outcomes. Given how active many STEM employers have been in pushing for increases in immigration, they appear to agree with the former Federal Reserve chairman that immigration limits wage growth.

Measuring Wage Growth. With the very notable exception of petroleum engineers, STEM workers have generally experienced modest wage growth since 2000. However, some researchers have argued the contrary. Jonathan Rothwell of Brooking has made the case that STEM wages have, in fact, increased significantly. In a report arguing the merit of the H-1B visa program, Rothwell and a colleague report that wage growth for U.S.-born workers has been "high" for some types of STEM workers. But inexplicably their analysis of wages is "not adjusted for inflation". They even make a point of arguing that "nominal wages" (not inflation adjusted) in computer occupations increased from 2000 to 2011 by "2.7 percent each year".[30] But this almost exactly matches the inflation rate over this time period reported by the Bureau of Labor Statistics.[31] Thus, there was no wage growth once inflation is taken into account. Adjusting for inflation is a basic component of almost all economic analysis of this kind. Their decision not to incorporate inflation and then argue that wage growth has been "high" makes little sense.

Elsewhere Rothwell has emphasized the "relative" growth of STEM wages compared to non-STEM occupations to explicitly make the case that that there is STEM shortage.[32] Given the modest level of real wage growth in STEM occupations (as shown

Figure 8. Annual wages for STEM workers show little growth over the last decade (2000-2012).



Source: Public-use files of the 2000 to 2012 American Community Surveys. Analysis confined to STEM workers with at least a bachelor's degree under age 65, working 35 hours or more per week and at least 50 weeks a year. Figures for math tend to be more volatile because of small sample size.

in Figures 7 and 8 and Tables A7 and A8) it is not clear why Rothwell feels that relative wages are a key measure of labor demand.

It is true that STEM workers have done somewhat better than most non-STEM workers. For example, Table A7 shows that real hourly wages for all STEM workers increased 0.7 percent on average each year from 2000 to 2012 and 0.2 percent for all other workers with at least a bachelor's degree. Table A8 shows that annual STEM wage growth averaged just 0.4 percent and non-STEM wages declined slightly. The underlying real wage growth is still less than 1 percent a year whether measured hourly and annually. A more reasonable interpretation of the data would be that wage growth has been weak for STEM and non-STEM occupation alike, rather than emphasize the relative difference. Long-term wage growth of less than 1 percent a year is certainly not evidence of a shortage, even if it is higher than for some other occupations.

Conclusion

The findings in this analysis are consistent with other examinations of the STEM labor market. We find no evidence of a general shortage of STEM workers. In 2012, there were more than twice as many people with STEM degrees (immigrant and native) as there were STEM jobs — 5.3 million STEM jobs vs. 12.1 million with STEM degrees. Only one-third of natives who have a STEM degree and hold a job do so in a STEM occupation. Further, one-third of STEM workers do not have a STEM degree, indicating that the supply of STEM workers in many cases is very flexible. Perhaps most important, real wages for almost all categories of STEM workers have shown only modest growth — both hourly and annual — for more than a decade. None of this is consistent with the idea that STEM workers are in short supply.

The number of immigrants with STEM degrees entering the country each year by itself is already more than all of the annual growth in STEM employment. Census Bureau data shows that over the last decade the number of STEM workers has grown on average by 84,000, while more than 129,000 new immigrants with STEM degrees have been allowed to settle in the country each year. At the same time, the number of natives with STEM degrees is increasing by about 115,000 a year. These figures, coupled with the enormous number of STEM graduates already in the country not working in a STEM job, and the fact that many STEM jobs are done by workers without STEM degrees, calls into question the current level of STEM immigration. The large increases in STEM workers pushed by employers and many in Congress seem entirely divorced from what is actually going on in the U.S. labor market.

When formulating policy, elected representatives need to consider the actual conditions in the U.S. labor market, rather than simply responding to pressure from employers in industries that wish to hire large numbers of foreign STEM graduates. In general, STEM jobs still provide a good income and middle-class lifestyle. By allowing in many more immigrants than the labor market has been able to absorb, Congress is almost certainly holding down wage growth and reducing the incentive for native-born Americans to undertake the challenging course work that is often necessary for STEM careers. While employers may find this situation desirable, it is difficult to argue this is the interest of American people as a whole.

There may be a specific geographic area or a highly specialized field in which demand really is outstripping supply. However, it makes little sense to allow public policy to be driven by very narrow interests. If there is some special need in a highly technical field then perhaps a narrowly focused immigration program is necessary. But overall, the data indicate that the supply of STEM workers vastly exceeds the number of STEM jobs, and there has been only modest wage growth in these professions. This reality should inform and shape public policy moving forward.

End Notes

[1] "Hard Time: College Majors, Unemployment and Earnings", Georgetown University, 2013. Hal Salzman, Daniel Kuehn, and B. Lindsay Lowell, "Guestworkers in the high-skill U.S. labor market: An analysis of supply, employment, and wage trends", Economic Policy Institute, 2013. B. Lindsay Lowell and Hal Salzman, "Into the Eye of the Storm: Assessing the Evidence on Science and Engineering Education, Quality, and Workforce Demand", Urban Institute, 2007. "Assuring the U.S. Department of Defense a Strong Science, Technology, Engineering, and Mathematics (STEM) Workforce", National Research Council, 2012.

[2] "EPI analysis finds no shortage of STEM workers in the United States", Economic Policy Institute, press release, April 24, 2013.

[3] Paul Solman, "The Bogus High-Tech Worker Shortage: How Guest Workers Lower US Wages", PBS Newshour, July 24, 2013.

[4] William P. Butz, Terrence K. Kelly, David M. Adamson, Gabrielle A. Bloom, Donna Fossum, and Mihal E. Gross, "Will the Science and Technology Workforce Meet the Needs of the Federal Government", Rand Corporation, 2004.

[5] Daniel Maurath, "Domestic Prospects Shaded By H1-B Labor Condition Applications", Bright Media Corporation, 2013.

[6] Hal Salzman, "What Shortages? The Real Evidence about the STEM Workforce", *Issues in Science and Technology*, Summer 2013.

[7] Quoted in *Science Insider*, October 2009.

[8] Michael S. Teitelbaum, "The Myth of the Science and Engineering Shortage", *The Atlantic*, March 19, 2014.

[9] Matt Egan, "Silicon Valley Goes to Washington to Take on Immigration Reform", Fox News, March 27, 2014.

[10] The Chamber's immigration website provides a good overview of its views and efforts on immigration. The Business Roundtable's efforts and position on the issue can be found here.

[11] The CBO has estimated the increases that the bill will create in temporary and permanent STEM workers in "S. 744 Border Security, Economic Opportunity, and Immigration Modernization Act".

[12] H.R. 15, with 200 co-sponsors, it is very similar to the S.744 bill that has already passed the Senate. It contains a very large increase in both skilled and unskilled immigration. Also introduced in the House is H.R. 714, which includes 50,000 new visas for STEM workers; H.R.2131, which has 55,000 permanent visas for STEM workers and 90,000 new H-1B visas; and H.R. 1227 referred to as the STAPLE Act, which exempts STEM PhDs from H-1B numerical limitations among other changes designed to increase skilled immigration.

[13] The ACS comes from the University of Minnesota's IPUMS public-use data website. The CPS data come from the Census Bureau's Dataferrett public-use data website.

[14] "STEM: Good Jobs Now and for the Future", U.S. Department of Commerce Economics and Statistics Administration. Issue Brief #03-11, 2011. David Beede, Tiffany Julian, David Langdon, George McKittrick, Beethika Khan, and Mark Doms, "Women in STEM: A Gender Gap to Innovation", U.S. Department of Commerce, 2011. Some government statistics are confined to those over age 16, others are confined to adults, and still others report figures for those 25 and older.

[15] The ACS has consistent occupational codes 2000 to 2004, 2005 to 2009, and 2010 to 2012. Table A1 shows how the codes and categories have changed.

[16] See for example the National Science Foundation's list which can be found here.

[17] Actuaries and architects are two occupations that could more reasonably be considered STEM, but are not considered as such in most research or in this analysis. Architecture is a modestly sized profession, employing about 190,000 people equal to less than 5 percent of STEM occupations defined traditionally. On the other hand, the number of actuaries is small (~25,000) so its inclusion or exclusion would make little difference to this analysis.

[18] It should be noted that if health care really is part of STEM, then there are also many more people with STEM degrees that are not included in this or most other analyses, such as pre-med and nursing. These degrees are not considered STEM degrees because they are focused on practicing medicine, not research and development.

[19] If we include everyone in STEM occupations, including those who have less than a bachelor's degree, the total is 7.8 million.

[20] Persons can select up to two undergraduate majors to report in the ACS. Throughout this report, we consider a person to have a STEM undergraduate degree if at least one of the majors the person lists was in a STEM field.

[21] This includes legal permanent residents, naturalized citizens, temporary workers, and illegal immigrants, but it does not include those born in outlying territories (e.g. Puerto Rico) or those born abroad to American citizen parents.

[22] The Department of Homeland Security estimates an undercount of post-1980 immigrants (foreign-born) in the ACS of almost 1.9 million or 5.8 percent. See Table 2 of "Estimates of the Unauthorized Immigrant Population Residing in the United States: January 2012". We also know that the ACS undercounts STEM arrivals based on administrative data. For example ,the State Department's Bureau of Consular Affairs reports more than 775,000 H1-B visas were issued 2007 to 2012. This does not include other temporary visa categories (e.g. L1, F1) in which a significant share of the applicants have STEM degrees, nor does it include new arrivals issued green cards (permanent immigration) who have STEM degrees.

[23] The ACS is weighted to reflect the population as of July 1 of the year in which it was taken. Thus, the arrival figures for 2012 reflect the number of immigrants who reported in the survey that they have a STEM degree and entered January 2007 to the end of June 2012 and were still in the country in 2012 — a period of 5.5 years. The vast majority of these individuals arrived with an undergraduate STEM degree. We know this because 93 percent of these recent arrivals were over age 21. (The ACS asks questions making it easy to determine age at arrival.) Based on an analysis of the prior individual years of the ACS (2007 to 2011), there are only a tiny number of post-2007 arrivals living in the country in 2012 with STEM degree that did not have the degree when they arrived.

[24] We can measure the growth in native-born STEM graduates using the 2009 ACS forward. As Table 1 shows, there were a total of 8.761 million natives holding STEM degrees in 2012 (working and not working). In 2009, the number was 8.417 million — a growth of roughly 345,000. Thus, annual growth averaged slightly less than 115,000 over the last three years.

[25] Table A6 in the Appendix reports the same figures for individuals with only bachelor's degrees.

[26] In 2012, 59 percent of those with a STEM degree had only a bachelor's degree. Of those in STEM jobs, 69 percent had only a bachelor's degree.

[27] In this analysis, doctors are defined as physicians and surgeons (MDs), podiatrists, dentists, and optometrists. Roughly two-thirds of doctors defined in this way have a STEM undergraduate degree. If we include doctors, then the average annual wage for all STEM degree holders in non-STEM jobs is $100,361. This is a good deal higher than the $90,067 for STEM degree holders in non-STEM jobs when doctors are excluded, as shown in Figure 6.

[28] Leonard Lynn, Hal Salzman, and Daniel Kuehn, "Dynamics of Engineering Labor Markets: Petroleum Engineering and Responsive Supply", conference paper presented at "U.S. Engineering in the Global Economy", sponsored by the Alfred P. Sloan Foundation and the National Bureau of Economic Research, September 26-27, 2011.

[29] Bloomberg News, "Greenspan: Let more skilled immigrants in", March 14, 2007.

[30] Jonathan Rothwell and Neil G. Ruizhttp, "H-1B Visas and the STEM Shortage", Brookings, 2013.

[31] The Bureau of Labor Statistics (BLS) reports individual year inflation rates. It must be remembered that inflation builds

on itself because of the concept of compound interest. The BLS inflation calculator shows that inflation was 30.6% in from 2000 to 2011.

[32] As part of an online debate in March of this year, sponsored by the Information Technology & Innovation Foundation, Jonathan Rothwell presented a PowerPoint entitled "The Shortage of STEM Skills". In the PowerPoint Rothwell reports relative wage growth to make the case that STEM workers are in short supply. The entire debate can be found here. His PowerPoint is here.

Table A1. STEM Occupations in the American Community Survey

2000-2004 ACS OCCSOC Code	2005-2009 ACS OCCSOC Code	2010-2012 ACS OCCSOC Code	Occupation Title
Computer Science	**Computer Science**	**Computer Science**	**Computer Science**
1510XX (see 151121, 151111, 151143, 151199)	1510XX (see 151121, 151111, 151143, 151199)	151121	Computer Scientists & Systems Analyst
		151111	Computer Scientists & Systems Analysts
		151122	Computer & Information Research Scientists
		151131	Information Security Analysts
			Computer Programmers
151021	151021	15113X	Computer Software Engineers
151030 see 15113X)	151030 see 15113X)	151134	Software Developers, Applications & Systems Software
		151150	Web Developers
		151141	Computer Support Specialists
151041	151041	151142	Database Administrators
151061	151061	151143 (includes 1510XX, 151071)	Network & Computer Systems Administrators
151071 (see 151143)	151071 (see 151143)	151199	Computer Network Architects
			Computer Occupations, All Other
151081 (see 151122, 151134, 151150, 151143)	151081 (see 151122, 151134, 151150, 151143)		Network Systems & Data Communications Analysts
113021	113021	113021	Computer & Information Systems Managers
Mathematics	**Mathematics**	**Mathematics**	**Mathematics**
152021			Mathematicians
152031	152031	152031	Operations Research Analysts
152041			Statisticians
1520XX			Misc. Mathematical Scientists & Technicians
	1520XX (includes 152021, 152041, 1520XX)	1520XX (includes 152021, 152041, 1520XX)	Misc. Mathematical sci. occups., w/statisticians
Engineers	**Engineers**	**Engineers**	**Engineers**
171020	171020	171020	Surveyors, Cartographers, & Photogrammetrists
172011	172011	172011	Aerospace Engineers
	1720XX	1720XX	Biomedical & agricultural engineers
172041	172041	172041	Chemical Engineers
172051	172051	172051	Civil Engineers
172061	172061	172061	Computer Hardware Engineers
172070	172070	172070	Electrical & Electronics Engineers
172081	172081	172081	Environmental Engineers
172110	172110	172110	Industrial Engineers, w/Health & Safety
172121	172121	172121	Marine Engineers & Naval Architects
172131	172131	172131	Materials Engineers
172141	172141	172141	Mechanical Engineers
172161			Nuclear Engineers
1721XX	1721XX	1721XX	Petroleum, mining & geological engineers, w/mine safety engineers
172XXX			Engineers, All Other
	1721YY (includes 172161, 172XXX)	1721YY (includes 172161, 172XXX)	Misc. engineeers w/nuclear engineers
173010	173010	173010	Drafters
173020	173020	173020	Engineering Technicians, Except Drafters
173031	173031	173031	Surveying & Mapping Technicians
419031	419031	419031	Sales Engineers
119041	119041	119041	Architectural & Engineering Managers
Science	**Science**	**Science**	**Science**
191010	191010	191010	Agricultural & Food Scientists
191020	191020	191020	Biological Scientists
191030	191030	191030	Conservation Scientists & Foresters
191040	191040		Medical Scientists
		1910XX (includes 191040)	Medical Scientists, & Life Scientists, All Other
192010	192010	192010	Astronomers & Physicists
192021	192021	192021	Atmospheric & Space Scientists
192030	192030	192030	Chemists & Materials Scientists
192040	192040	192040	Environmental Scientists & Geoscientists
192099	192099	192099	Phys. Scientists, All Other
194011	194011	194011	Agricultural & Food Science Technicians
194021	194021	194021	Biological Technicians
194031	194031	194031	Chemical Technicians
194041	194041		Geological & Petroleum Technicians
		1940XX (includes 194041, 194051)	Geological & Petroleum Technicians, & Nuclear Technicians
194051			Nuclear Technicians
1940XX			Other life, Phys., & Soc. science technicians
	1940XX (includes 194051) (see 1940YY)		Misc. life, Phys., & Soc. science techs, w/Soc. science research assistants & nuclear techs
		1940YY (includes 1940XX)	Misc. Life, Phys., & Soc. Science Technicians, w/Soc. Science Research Assistants
119121	119121	119121	Natural Science Managers

Source: Code book from Integrated Public Use Microdata Series (IPUMS) website. IPUMS code book has been corrected for error dealing with occupation 172XXX in years 2000 to 2004.

Table A2. Undergraduate Degrees Considered to Be STEM in the 2012 ACS

Technology Degrees	
Census Code	
2100	Computer & Information Systems
2101	Computer Programming & Data Processing
2102	Computer Science
2105	Information Sciences
2106	Computer Admin. Management & Security
2107	Computer Networking & Telecom.

Mathematics Degrees	
Census Code	
3700	Mathematics
3701	Applied Mathematics
3702	Statistics & Decision Science
4005	Mathematics & Computer Science

Engineering Degrees	
Census Code	
2400	General Engineering
2401	Aerospace Engineering
2402	Biological Engineering
2403	Architectural Engineering
2404	Biomedical Engineering
2405	Chemical Engineering
2406	Civil Engineering
2407	Computer Engineering
2408	Electrical Engineering
2409	Enging. Mechanics Physics & Science
2410	Environmental Engineering
2411	Geological & Geophysical Engineering
2412	Industrial & Manufacturing Engineering
2413	Materials Enging.& Materials Science
2414	Mechanical Engineering
2415	Metallurgical Engineering
2416	Mining & Mineral Engineering
2417	Naval Architecture & Marine Engineering
2418	Nuclear Engineering
2419	Petroleum Engineering
2499	Miscellaneous Engineering
2500	Enging.Technologies
2501	Enging.& Industrial Management
2502	Electrical Enging.Technology
2503	Industrial Production Technologies
2504	Mechanical Enging.Related Technologies
2599	Miscellaneous Enging.Technologies
3801	Military Technologies

Science Degrees	
Census Code	
1103	Animal Sciences
1104	Food Science
1105	Plant Science & Agronomy
1106	Soil Science
1301	Environmental Science
3600	Biology
3601	Biochemical Sciences
3602	Botany
3603	Molecular Biology
3604	Ecology
3605	Genetics
3606	Microbiology
3607	Pharmacology
3608	Physiology
3609	Zoology
3611	Neuroscience
3699	Miscellaneous Biology
4002	Nutrition Sciences
4003	Neuroscience
4006	Cognitive Science & Biopsychology
5102	Nuclear, Radiology, & Biological Technologies
5000	Physical Sciences
5001	Astronomy & Astrophysics
5002	Atmospheric Sciences & Meteorology
5003	Chemistry
5004	Geology & Earth Science
5005	Geosciences
5006	Oceanography
5007	Physics

Source: Code book from Integrated Public Use Microdata Series (IPUMS) website.

Table A3. Number of Native STEM Workers with Technology Degrees by Detailed Occupation 2012

Occupation	Number	Percent of Natives with Tech. Degree in Occupation
Cmm-Software Developers, Applications & Sys. Software	165,799	27.5
Cmm-Computer Programmers	96,483	16.0
Mgr-Computer & Information Sys. Managers	61,821	10.3
Cmm-Computer Sys. Analysts	52,649	8.7
Cmm-Computer Support Specialists	51,815	8.6
Cmm-Computer Occups, All Other	39,135	6.5
Cmm-Network & Computer Sys. Admins.	29,018	4.8
Cmm-Web Developers	19,944	3.3
Cmm-Computer Network Architects	13,344	2.2
Cmm-Database Admins.	13,331	2.2
Cmm-Information Security Analysts	11,175	1.9
Eng-Misc. Engs., w/ Nuclear Engs.	7,960	1.3
Cmm-Operations Research Analysts	7,030	1.2
Eng-Computer Hardware Engs.	3,804	.6
Eng-Engineering Techs., Except Drafters	3,102	.5
Eng-Civil Engs.	3,050	.5
Cmm-Computer & Information Research Scientists	2,995	.5
Eng-Aerospace Engs.	2,913	.5
Mgr-Architectural & Engineering Managers	2,891	.5
Eng-Electrical & Electronics Engs.	2,888	.5
Sci-Physical Scientists, All Other	2,017	.3
Eng-Industrial Engs., w/ Health & Safety	1,504	.2
Sci-Chemists & Materials Scientists	1,135	.2
Eng-Mechanical Engs.	1,025	.2
Sal-Sales Engs.	894	.1
Cmm-Misc. Mathematical Sci. Occups	842	.1
Eng-Drafters	615	.1
Eng-Biomedical & Agricultural Engs.	602	.1
Sci-Medical Scientists, & Life Scientists, All Other	528	.1
Eng-Surveyors, Cartographers, & Photogrammetrists	398	.1
Eng-Materials Engs.	329	.1
Sci-Chemical Techs.	304	.1
Sci-Misc. Life, Physical, & Soc. Sci. Techs.	282	.0
Sci-Agricultural & Food Scientists	274	.0
Sci-Biological Scientists	225	.0
Eng-Marine Engs. & Naval Architects	191	.0
Sci-Biological Techs.	83	.0
Eng-Chemical Engs.	79	.0
Eng-Petroleum, Mining & Geological Engs., w/ Mining Safety Engs.	66	.0
Sci-Geological & Petroleum Techs., & Nuclear Techs. *	51	.0
Eng-Surveying & Mapping Techs.	46	.0
Total	**602,637**	**100.0**

Source: Public-use files of the 2012 American Community Survey. Analysis confined to native-born STEM workers with a bachelor's degree or higher. Prefix shows occupational category: Sci. stands for science; Eng. stands for engineering; Cmm. stand for computer science (technology) and math; Sal. stands for sales; and Mgr. stands for management.

Table A3 Cont. Number of Native STEM Workers with Math Degrees by Detailed Occupation 2012

Occupation	Number	Percent of Natives with Math Degree in Occupation
Cmm-Software Developers, Applications & Sys. Software	27,104	22.0
Cmm-Computer Programmers	17,785	14.4
Mgr-Computer & Information Sys. Managers	12,940	10.5
Cmm-Computer Sys. Analysts	12,619	10.2
Cmm-Misc. Mathematical Sci. Occups	7,732	6.3
Cmm-Computer Occups, All Other	5,210	4.2
Eng-Misc. Engs., w/ Nuclear Engs.	3,719	3.0
Cmm-Computer Support Specialists	3,626	2.9
Cmm-Operations Research Analysts	2,849	2.3
Sci-Physical Scientists, All Other	2,778	2.3
Cmm-Network & Computer Sys. Admins.	2,742	2.2
Cmm-Web Developers	2,620	2.1
Eng-Aerospace Engs.	2,044	1.7
Cmm-Database Admins.	1,982	1.6
Eng-Civil Engs.	1,550	1.3
Cmm-Computer Network Architects	1,462	1.2
Sci-Medical Scientists, & Life Scientists, All Other	1,254	1.0
Mgr-Architectural & Engineering Managers	1,225	1.0
Eng-Industrial Engs., w/ Health & Safety	1,146	.9
Eng-Electrical & Electronics Engs.	938	.8
Sci-Misc. Life, Physical, & Soc. Sci. Techs	872	.7
Eng-Engineering Techs., Except Drafters	814	.7
Sci-Environmental Scientists & Geoscientists	787	.6
Sci-Biological Scientists	676	.5
Eng-Mechanical Engs.	671	.5
Sci-Chemists & Materials Scientists	600	.5
Eng-Computer Hardware Engs.	563	.5
Mgr-Natural Sci.s Managers	555	.5
Eng-Drafters	519	.4
Sci-Astronomers & Physicists	506	.4
Cmm-Computer & Information Research Scientists	501	.4
Eng-Surveyors, Cartographers, & Photogrammetrists	443	.4
Sci-Atmospheric & Space Scientists	434	.4
Cmm-Information Security Analysts	409	.3
Sal-Sales Engs.	302	.2
Eng-Biomedical & Agricultural Engs.	221	.2
Eng-Petroleum, Mining & Geological Engs., w/ Mining Safety Engs.	202	.2
Eng-Materials Engs.	151	.1
Eng-Chemical Engs.	145	.1
Eng-Environmental Engs.	144	.1
Sci-Agricultural & Food Scientists	112	.1
Eng-Surveying & Mapping Techs.	96	.1
Sci-Chemical Techs.	60	.0
Eng-Marine Engs. & Naval Architects	52	.0
Total	123,160	**100.0**

Source: Public-use files of the 2012 American Community Survey. Analysis confined to native-born STEM workers with a bachelor's degree or higher. Prefix shows occupational category: Sci. stands for science; Eng. stands for engineering; Cmm. stand for computer science (technology) and math; Sal. stands for sales; and Mgr. stands for management.

Table A3 Cont. Number of Native STEM Workers with Engineering Degrees by Detailed Occupation 2012

Occupation	Number	Percent of Natives with Eng. Degree in Occupation
Eng-Misc. Engs., w/ Nuclear Engs.	215,511	17.2
Eng-Civil Engs.	173,420	13.8
Cmm-Software Developers, Applications & Sys. Software	114,153	9.1
Eng-Mechanical Engs.	109,801	8.7
Eng-Electrical & Electronics Engs.	94,576	7.5
Mgr-Architectural & Engineering Managers	78,523	6.3
Eng-Aerospace Engs.	73,369	5.8
Eng-Industrial Engs., w/ Health & Safety	62,211	5.0
Mgr-Computer & Information Sys. Managers	37,434	3.0
Eng-Chemical Engs.	32,283	2.6
Cmm-Computer Programmers	28,603	2.3
Cmm-Computer Sys. Analysts	19,121	1.5
Eng-Petroleum, Mining & Geological Engs., w/ Mining Safety Engs.	19,008	1.5
Cmm-Computer Support Specialists	17,028	1.4
Eng-Engineering Techs., Except Drafters	15,381	1.2
Eng-Materials Engs.	15,380	1.2
Eng-Environmental Engs.	14,258	1.1
Cmm-Computer Occups, All Other	14,192	1.1
Sci-Physical Scientists, All Other	12,435	1.0
Eng-Drafters	11,700	.9
Eng-Computer Hardware Engs.	9,795	.8
Sal-Sales Engs.	9,119	.7
Cmm-Network & Computer Sys. Admins.	8,673	.7
Eng-Biomedical & Agricultural Engs.	8,542	.7
Cmm-Computer Network Architects	7,362	.6
Cmm-Operations Research Analysts	6,200	.5
Eng-Marine Engs. & Naval Architects	5,839	.5
Eng-Surveyors, Cartographers, & Photogrammetrists	5,508	.4
Cmm-Database Admins.	5,355	.4
Cmm-Web Developers	5,255	.4
Sci-Environmental Scientists & Geoscientists	4,870	.4
Sci-Misc. Life, Physical, & Soc. Sci. Techs.	3,727	.3
Sci-Medical Scientists, & Life Scientists, All Other	2,849	.2
Cmm-Information Security Analysts	2,299	.2
Sci-Chemists & Materials Scientists	2,160	.2
Sci-Chemical Techs.	1,767	.1
Sci-Astronomers & Physicists	1,354	.1
Mgr-Natural Sci.s Managers	1,092	.1
Eng-Surveying & Mapping Techs.	1,074	.1
Sci-Agricultural & Food Scientists	923	.1
Cmm-Misc. Mathematical Sci. Occups	895	.1
Cmm-Computer & Information Research Scientists	755	.1
Sci-Atmospheric & Space Scientists	545	.0
Sci-Biological Techs.	427	.0
Sci-Biological Scientists	415	.0
Sci-Conservation Scientists & Foresters	408	.0
Sci-Agricultural & Food Sci. Techs.	171	.0
Sci-Geological & Petroleum Techs., & Nuclear Techs.	140	.0
Total	**1,255,906**	**100.0**

Source: Public-use files of the 2012 American Community Survey. Analysis confined to native-born STEM workers with a bachelor's degree or higher. Prefix shows occupational category: Sci. stands for science; Eng. stands for engineering; Cmm. stand for computer science (technology) and math; Sal. stands for sales; and Mgr. stands for management.

Table A3 Cont. Number of Native STEM Workers with Science Degrees by Detailed Occupation 2012

Occupation	Number	Percent of Natives with Sci. Degree in Occupation
Sci-Physical Scientists, All Other	64,034	12.6
Sci-Chemists & Materials Scientists	45,347	8.9
Sci-Biological Scientists	43,790	8.6
Sci-Environmental Scientists & Geoscientists	41,015	8.1
Sci-Medical Scientists, & Life Scientists, All Other	38,281	7.5
Sci-Misc. Life, Physical, & Soc. Sci. Techs, w/ Soc. Sci.	29,676	5.8
Cmm-Software Developers, Applications & Sys. Software	29,074	5.7
Sci-Chemical Techs.	18,073	3.6
Eng-Misc. Engs., w/ Nuclear Engs.	17,256	3.4
Mgr-Computer & Information Sys. Managers	14,407	2.8
Cmm-Computer Sys. Analysts	14,341	2.8
Cmm-Computer Programmers	13,339	2.6
Sci-Agricultural & Food Scientists	11,247	2.2
Cmm-Computer Support Specialists	11,087	2.2
Eng-Engineering Techs., Except Drafters	8,316	1.6
Eng-Industrial Engs., w/ Health & Safety	8,164	1.6
Mgr-Architectural & Engineering Managers	6,143	1.2
Cmm-Operations Research Analysts	6,026	1.2
Eng-Civil Engs.	6,014	1.2
Cmm-Computer Occups, All Other	5,666	1.1
Mgr-Natural Sci.s Managers	5,372	1.1
Sci-Conservation Scientists & Foresters	4,773	.9
Sci-Astronomers & Physicists	4,563	.9
Eng-Aerospace Engs.	4,545	.9
Cmm-Network & Computer Sys. Admins.	4,486	.9
Eng-Environmental Engs.	4,387	.9
Sci-Atmospheric & Space Scientists	4,172	.8
Sci-Biological Techs.	4,120	.8
Cmm-Web Developers	4,014	.8
Eng-Mechanical Engs.	3,867	.8
Eng-Electrical & Electronics Engs.	3,766	.7
Eng-Surveyors, Cartographers, & Photogrammetrists	3,641	.7
Cmm-Database Admins.	3,421	.7
Sci-Agricultural & Food Sci. Techs.	2,998	.6
Cmm-Misc. Mathematical Sci. Occups	2,675	.5
Cmm-Computer Network Architects	1,973	.4
Eng-Petroleum, Mining & Geological Engs., w/ Mining Safety Engs.	1,973	.4
Eng-Chemical Engs.	1,925	.4
Eng-Biomedical & Agricultural Engs.	1,663	.3
Eng-Materials Engs.	1,657	.3
Sci-Geological & Petroleum Techs., & Nuclear Techs.	1,595	.3
Eng-Drafters	1,473	.3
Cmm-Information Security Analysts	1,072	.2
Eng-Computer Hardware Engs.	1,028	.2
Cmm-Computer & Information Research Scientists	837	.2
Eng-Marine Engs. & Naval Architects	624	.1
Sal-Sales Engs.	478	.1
Eng-Surveying & Mapping Techs.	418	.1
Total	**508,812**	**100.0**

Source: Public-use files of the 2012 American Community Survey. Analysis confined to native-born STEM workers with a bachelor's degree or higher. Prefix shows occupational category: Sci. stands for science; Eng. stands for engineering; Cmm. stand for computer science (technology) and math; Sal. stands for sales; and Mgr. stands for management.

Table A4. Number and Share of Immigrants and Natives in STEM Occupations, 2000 to 2012 (thousands)

Natives	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Technology	1,518	1,598	1,543	1,551	1,538	1,573	1,635	1,673	1,729	1,771	1,722	1,816	1,912
Math	75	84	72	60	79	84	85	90	91	96	100	123	111
Engineering	1,217	1,262	1,245	1,262	1,291	1,290	1,300	1,333	1,359	1,282	1,286	1,275	1,310
Science	499	498	510	504	503	493	506	481	529	521	517	528	532
All STEM	3,310	3,442	3,370	3,378	3,412	3,440	3,527	3,578	3,708	3,669	3,624	3,742	3,864
Immigrants													
Technology	485	542	515	529	560	592	647	643	682	696	715	768	813
Math	15	18	13	14	12	17	19	18	20	24	22	23	23
Engineering	328	326	324	340	330	352	361	357	383	366	372	357	387
Science	143	177	166	181	187	172	196	167	192	197	217	218	202
All STEM	971	1,062	1,017	1,064	1,090	1,133	1,222	1,185	1,278	1,283	1,326	1,365	1,424
Immigrant and Native													
Technology	2,003	2,140	2,058	2,080	2,098	2,165	2,282	2,316	2,411	2,467	2,436	2,584	2,724
Math	90	102	85	74	92	101	103	108	112	119	122	146	133
Engineering	1,544	1,588	1,568	1,602	1,621	1,642	1,661	1,690	1,743	1,648	1,658	1,632	1,697
Science	642	675	676	685	691	665	702	648	721	718	734	746	733
All STEM	4,281	4,504	4,388	4,442	4,501	4,573	4,749	4,762	4,986	4,952	4,950	5,107	5,288
Immigrant Share by Occupation													
Technology	24.2%	25.3%	25.0%	25.4%	26.7%	27.4%	28.4%	27.8%	28.3%	28.2%	29.3%	29.7%	29.8%
Math	16.5%	17.2%	15.0%	18.5%	13.4%	16.5%	17.9%	16.4%	18.3%	19.8%	18.2%	15.7%	16.9%
Engineering	21.2%	20.5%	20.6%	21.2%	20.3%	21.4%	21.7%	21.1%	22.0%	22.2%	22.4%	21.9%	22.8%
Science	22.3%	26.2%	24.5%	26.4%	27.1%	25.9%	27.9%	25.8%	26.7%	27.5%	29.6%	29.2%	27.5%
All STEM	22.7%	23.6%	23.2%	23.9%	24.2%	24.8%	25.7%	24.9%	25.6%	25.9%	26.8%	26.7%	26.9%

Source: Public-use files of the 2000 to 2012 American Community Survey. Analysis confined to those with a bachelor's degree or higher.

Table A5. Occupational Categories for Natives with Technology Degrees Not Working in STEM Occupations, 2012

Occupation	Frequency	Percent
Management	128,914	25.3
Office and Administrative Support	70,047	13.8
Sales and Related	57,832	11.4
Education and training	40,150	7.9
Post Secondary (college) Teachers	14,683	2.9
High School Teachers	2,889	.6
Business Operations	39,314	7.7
Installation, Maintenance, and Repair	27,306	5.4
Arts, Design, Entertainment, Sports, and Media	22,583	4.4
Financial Specialists	23,076	4.5
Production	16,521	3.2
Transportation and Material Moving.	13,168	2.6
Healthcare Practitioners and Technical	10,906	2.1
Doctors*	2,345	.4
Laboratory Technologists & Technicians	1,160	.2
Protective Service	10,436	2.0
Personal Care and Service	7,708	1.5
Legal	7,531	1.5
Community and Social Services	6,973	1.4
Construction	6,689	1.3
Food Preparation and Serving	5,888	1.2
Military	4,522	.9
Building and Grounds Cleaning and Maintenance	3,084	.6
Healthcare support	2,917	.6
Architects	1,953	.4
Life, Physical, and Social Science	1,159	.2
Extraction, Farming and Fishing (combined)	669	.1
Actuaries	72	.0
Total	**509,418**	**100.0**

Source: Public-use files of the 2012 American Community Survey. Analysis confined to native-born STEM workers with a bachelor's degree or higher.
*Physicians, surgeons, podiatrists, dentists, and optometrists.

Table A5 Cont. Occupational Categories for Natives with Math Degrees Not Working in STEM Occupations, 2012

Occupation	Frequency	Percent
Education and training	130,777	30.7
Post Secondary (college) Teachers	48,942	11.5
High School Teachers	27,654	6.5
Management	73,152	17.2
Office and Administrative Support	33,394	7.8
Sales and Related	30,218	7.1
Financial Specialists	28,477	6.7
Business Operations	25,274	5.9
Healthcare Practitioners and Technical	22,627	5.3
Doctors*	14,069	3.3
Laboratory Technologists & Technicians	741	.2
Actuaries	10,731	2.5
Legal	10,727	2.5
Arts, Design, Entertainment, Sports, and Media	8,600	2.0
Production	7,716	1.8
Community and Social Services	6,994	1.6
Transportation and Material Moving.	6,220	1.5
Personal Care and Service	4,995	1.2
Food Preparation and Serving	4,712	1.1
Military	3,800	.9
Protective Service	3,429	.8
Installation, Maintenance, and Repair	3,342	.8
Construction	3,320	.8
Building and Grounds Cleaning & Maintenance	3,007	.7
Life, Physical, and Social Science	1,619	.4
Architects	1,329	.3
Healthcare support	895	.2
Extraction, Farming and Fishing (combined)	495	.1
Total	**425,850**	**100.0**

Source: Public-use files of the 2012 American Community Survey. Analysis confined to native-born STEM workers with a bachelor's degree or higher.
*Physicians, surgeons, podiatrists, dentists, and optometrists.

Table A5 Cont. Occupational Categories for Natives with Engineering Degrees Not Working in STEM Occupations, 2012

Occupation	Frequency	Percent
Management	537,297	35.5
Sales and Related	172,125	11.4
Business Operations	104,401	6.9
Education and training	102,965	6.8
Post Secondary (college) Teachers	49,762	3.3
High School Teachers	12,884	.9
Office and Administrative Support	89,896	5.9
Production	74,568	4.9
Arts, Design, Entertainment, Sports, and Media	46,886	3.1
Construction	50,732	3.3
Healthcare Practitioners and Technical	50,658	3.3
Doctors*	27,645	1.8
Laboratory Technologists & Technicians	1,941	.1
Installation, Maintenance, and Repair	49,279	3.3
Transportation and Material Moving.	47,449	3.1
Financial Specialists	41,858	2.8
Legal	37,898	2.5
Protective Service	21,290	1.4
Military	18,102	1.2
Community and Social Services	14,987	1.0
Food Preparation and Serving	13,725	.9
Building and Grounds Cleaning & Maintenance	13,314	.9
Personal Care and Service	10,277	.7
Architects	5,842	.4
Extraction, Farming and Fishing (combined)	5,184	.3
Healthcare support	2,835	.2
Life, Physical, and Social Science	2,759	.2
Actuaries	663	.0
Total	**1,514,990**	**100.0**

Source: Public-use files of the 2012 American Community Survey. Analysis confined to native-born STEM workers with a bachelor's degree or higher.
*Physicians, surgeons, podiatrists, dentists, and optometrists.

Table A5 Cont. Occupational Categories for Natives with Science Degrees Not Working in STEM Occupations, 2012

Occupation	Frequency	Percent
Healthcare Practitioners and Technical	879,709	33.4
Doctors*	484,160	18.4
Laboratory Technologists & Technicians	59,581	2.3
Management	387,375	14.7
Education and training	358,221	13.6
Post Secondary (college) Teachers	167,506	6.4
High School Teachers	46,122	1.8
Sales and Related	189,200	7.2
Office and Administrative Support	163,210	6.2
Business Operations	111,922	4.3
Legal	57,014	2.2
Production	54,015	2.1
Arts, Design, Entertainment, Sports, and Media	46,385	1.8
Personal Care and Service	48,083	1.8
Financial Specialists	46,260	1.8
Healthcare support	43,601	1.7
Food Preparation and Serving	37,561	1.4
Community and Social Services	37,311	1.4
Transportation and Material Moving	34,625	1.3
Protective Service	31,229	1.2
Building and Grounds Cleaning & Maintenance	25,741	1.0
Construction	24,725	.9
Installation, Maintenance, and Repair	15,947	.6
Extraction, Farming and Fishing (combined)	12,661	.5
Life, Physical, and Social Science	11,903	.5
Military	7,714	.3
Architects	5,082	.2
Actuaries	513	.0
Total	**2,630,007**	**100.0**

Source: Public-use files of the 2012 American Community Survey. Analysis confined to native-born STEM workers with a bachelor's degree or higher.
*Physicians, surgeons, podiatrists, dentists, and optometrists.

Table A6. Employment by Occupation and Degree for Natives and Immigrants with only a Bachelor's Degree, 2012 (thousands)

Natives

	Occupations								
Degree	Technology	Math	Engineering	Science	Any STEM Job	Non-STEM Job	Total Working Who Have STEM Degree	Unemployed	Not in Labor Force <65 Years of Age
Technology	464	6	24	3	497	385	882	39	86
Math	55	3	8	3	69	216	285	13	54
Engineering	179	3	670	13	866	965	1,831	76	169
Science	64	3	44	164	275	1,188	1,463	75	312
STEM Degree	761	15	747	183	1,706	2,754	4,461	203	621
Non-STEM Degree	677	45	179	94	995	20,120	n/a	n/a	n/a

Immigrants

	Occupations								
Degree	Technology	Math	Engineering	Science	Any STEM Job	Non-STEM Job	Total Working Who Have STEM Degree	Unemployed	Not in Labor Force <65 Years of Age
Technology	138	3	10	2	152	126	278	16	53
Math	11	1	2	0	14	49	63	6	17
Engineering	151	1	136	6	295	394	688	34	115
Science	13	0	6	20	39	188	227	16	78
STEM Degree	313	5	153	28	500	757	1,256	72	263
Non-STEM Degree	91	3	24	12	130	2,778	n/a	n/a	n/a

Natives and Immigrants

	Occupations								
Degree	Technology	Math	Engineering	Science	Any STEM Job	Non-STEM Job	Total Working Who Have STEM Degree	Unemployed	Not in Labor Force <65 Years of Age
Technology	602	8	34	5	649	511	1,160	55	139
Math	66	4	10	3	83	265	348	18	72
Engineering	330	5	806	20	1,160	1,359	2,519	111	284
Science	77	4	50	183	313	1,377	1,690	91	390
STEM Degree	1,074	20	900	211	2,206	3,511	5,717	275	885
Non-STEM Degree	768	48	203	106	1,125	22,898	n/a	n/a	n/a

Source: Public-use files of the 2012 American Community Survey. Analysis confined to those with only a bachelor's degree.

Table A7. Hourly Wages for Workers in STEM Occupations 2000 to 2012 (in 2012 dollars)

Bachelor's Only	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average Wage Growth 2000-2012
Technology (Computer Science)	35.18	36.46	35.88	36.39	35.68	35.34	36.30	37.68	37.30	36.89	38.36	37.23	38.05	0.7%
Computer and information systems managers	n/a	n/a	n/a	44.57	41.96	39.69	40.62	43.61	45.47	45.70	44.39	41.30	43.75	-0.2% **
Computer scientists and systems analysts	35.75	37.34	36.71	35.37	34.30	33.51	36.98	36.67	36.45	37.22	38.03	39.11	36.19	0.1%
Computer programmers	34.53	35.77	34.94	34.69	34.22	34.16	35.06	37.51	34.70	37.53	35.07	35.97	36.85	0.6%
Mathematics*	42.70	29.92	23.55	33.76	33.52	38.43	36.08	35.28	32.94	30.11	34.95	36.33	38.55	-0.8%
Engineering	34.87	36.15	35.97	36.85	36.38	35.70	36.32	37.65	36.27	37.28	37.89	36.95	37.58	0.6%
Civil engineers	32.98	35.47	34.47	37.03	33.09	33.07	36.22	37.75	35.41	37.55	35.21	36.91	36.91	1.0%
Electrical and electronic engineers	37.83	38.66	39.22	39.49	38.79	38.71	39.29	39.44	36.70	39.12	42.73	39.83	38.88	0.2%
Mechanical engineers	35.69	34.83	37.87	37.61	32.78	35.54	33.25	37.19	39.28	40.32	35.93	36.69	36.34	0.2%
Science	27.05	26.36	27.69	28.00	26.93	27.04	29.14	28.47	26.86	31.61	28.53	28.98	29.23	0.7%
Chemists and materials scientists	27.51	27.42	31.82	30.85	30.39	28.68	29.94	34.09	31.23	38.47	34.60	32.05	31.63	1.2%
Biological Scientists	23.49	22.21	25.47	24.78	19.19	25.72	26.00	28.34	27.35	31.05	25.90	28.32	26.11	0.9%
Environmental Scientists	n/a	n/a	n/a	32.33	24.29	35.21	34.33	29.46	29.90	37.00	30.21	35.63	33.14	0.2% **
Physical Scientists	33.41	29.09	34.55	27.71	25.64	32.19	32.77	28.25	28.47	44.55	26.75	31.90	33.86	0.1%
All STEM	34.27	35.23	34.96	35.52	34.88	34.53	35.47	36.64	35.81	36.32	37.08	36.21	36.93	0.6%
Other	27.72	28.32	28.53	28.30	27.86	28.14	28.13	28.15	28.12	27.69	28.27	27.38	27.58	0.0%
Bachelor's and Higher														
Technology (Computer Science)	36.92	37.76	38.04	37.69	37.32	37.59	38.39	39.08	38.87	39.23	40.57	39.43	40.35	0.8%
Computer and information systems managers	n/a	n/a	n/a	45.73	43.35	41.91	43.08	45.45	46.44	46.56	46.40	43.62	45.00	-0.1% **
Computer scientists and systems analysts	37.67	38.77	38.84	36.75	34.96	36.09	38.95	38.26	37.67	39.04	39.55	39.76	38.21	0.1%
Computer programmers	35.73	36.24	36.87	35.13	35.54	35.32	35.77	37.67	36.54	39.03	35.60	37.46	39.30	0.8%
Mathematics*	41.14	38.70	34.43	34.62	35.52	41.28	36.20	39.15	34.82	35.40	37.85	38.42	39.80	-0.3%
Engineering	37.14	37.77	37.76	38.39	38.23	38.12	39.06	39.35	39.12	40.22	40.72	38.98	40.34	0.7%
Civil engineers	35.38	35.36	36.21	38.34	34.64	36.06	38.89	39.33	39.13	40.97	37.85	37.79	37.91	0.6%
Electrical and electronic engineers	40.12	40.35	41.01	41.67	39.42	40.12	42.62	41.82	41.47	44.02	45.07	42.16	42.04	0.4%
Mechanical engineers	37.82	37.01	38.69	38.06	36.19	37.29	35.88	39.33	40.78	39.98	36.26	37.69	37.80	0.0%
Science	31.60	31.21	31.99	31.19	31.32	32.92	33.24	33.64	33.02	34.85	32.89	33.15	33.73	0.6%
Chemists and materials scientists	31.98	33.78	35.84	31.33	29.82	37.11	36.09	35.13	35.03	36.80	40.38	38.15	34.24	0.6%
Biological Scientists	26.69	27.37	31.14	28.69	28.29	28.02	28.44	29.19	32.64	30.98	27.81	28.49	31.95	1.6%
Environmental Scientists	n/a	n/a	n/a	33.75	28.12	39.31	37.47	35.71	33.96	36.28	35.78	40.41	38.45	1.2% **
Physical Scientists	36.42	35.39	36.70	37.56	42.24	38.41	39.24	41.41	38.63	37.71	32.27	37.44	38.00	0.4%
All STEM	36.32	36.83	37.03	36.89	36.68	37.08	37.74	38.38	38.09	38.83	39.44	38.34	39.40	0.7%
Other	30.17	31.21	31.12	30.91	30.54	30.76	30.79	30.77	30.83	30.84	31.31	30.41	30.75	0.2%

Source: Public-use files of the 2000 to 2012 Current Population Survey.. Each year averages 12 months of data. Analysis confined to STEM workers with at least a bachelor's degree age 64 and under. Pareto-imputed mean values for top-coded weekly wages are from the "State of Working America", 12th edition, Economic Policy Institute, p. 467. Values for 2012 were provided by EPI separately.

* Figures for math tend to be more volatile because of its small sample size.

** * Annual increase is from 2003 to 2012.

Table A8. Annual Earnings for Workers in STEM Occupations 2000 to 2012 (in 2012 dollars)

Bachelor's Only	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average Wage Growth 2000-2012
Technology (Computer Science)	$82,896	$86,320	$87,527	$85,595	$89,385	$84,277	$84,446	$85,816	$84,450	$87,323	$85,892	$86,064	$85,896	0.3%
Computer and information systems managers	$101,544	$111,175	$108,153	$104,452	$115,206	$102,573	$104,881	$105,296	$106,436	$110,947	$108,768	$106,805	$107,539	0.5%
Computer Scientists and Systems Analyst	$82,215	$81,603	$86,020	$83,581	$86,880	$80,039	$81,283	$83,885	$80,508	$84,269	$82,847	$81,196	$80,929	-0.1%
Computer Programmers	$82,382	$82,803	$83,258	$82,343	$84,302	$80,039	$78,912	$81,383	$79,949	$83,373	$81,027	$83,692	$81,249	-0.1%
Math*	$73,252	$80,323	$76,082	$73,712	$85,620	$81,239	$75,173	$78,562	$77,705	$77,457	$79,626	$75,823	$79,023	0.7%
Engineering	$85,538	$87,392	$87,866	$86,282	$91,203	$88,041	$87,392	$89,148	$87,212	$89,652	$90,827	$89,327	$88,790	0.3%
Civil Engineers	$75,668	$83,794	$82,948	$80,977	$84,539	$85,537	$83,114	$88,373	$85,646	$85,823	$86,560	$87,376	$86,035	1.1%
Electrical and Electronics Engineers	$95,444	$91,219	$91,667	$93,237	$96,277	$93,169	$92,920	$94,073	$92,955	$91,673	$92,286	$93,961	$94,479	-0.1%
Mechanical Engineers	$78,791	$83,527	$87,913	$83,157	$87,912	$84,315	$84,565	$82,296	$81,953	$82,973	$83,581	$82,634	$83,180	0.5%
Petroleum engineer	$86,448	$117,656	$110,405	$109,739	$128,310	$109,921	$131,612	$139,300	$130,375	$118,040	$129,117	$123,195	$132,618	4.5%
Science	$58,617	$62,673	$63,618	$61,148	$60,881	$60,979	$63,142	$64,733	$61,200	$63,106	$62,959	$61,318	$60,799	0.3%
Chemists and Materials Scientists	$63,200	$67,937	$70,161	$67,212	$66,651	$69,004	$67,151	$67,998	$65,177	$64,879	$67,055	$62,734	$64,376	0.2%
Biological Scientists	$48,492	$56,969	$58,742	$56,429	$53,724	$55,350	$60,819	$57,416	$54,782	$56,683	$58,027	$54,755	$57,436	1.5%
Environmental Scientists	$63,682	$65,331	$71,856	$69,549	$63,314	$65,252	$72,539	$75,813	$73,007	$76,730	$78,041	$84,283	$70,429	0.9%
Physical Scientists	$59,173	$61,826	$60,565	$58,890	$62,870	$63,188	$63,478	$70,228	$64,850	$63,097	$63,871	$57,524	$66,760	1.1%
All STEM	$81,388	$84,566	$85,161	$83,280	$87,195	$83,459	$83,473	$85,120	$83,049	$85,803	$85,410	$84,700	$84,489	0.3%
Other	$69,380	$70,710	$71,127	$69,784	$70,677	$70,988	$70,184	$71,123	$67,956	$69,889	$68,422	$67,377	$66,631	-0.3%
Bachelor's and Higher														
Technology (Computer Science)	$87,485	$91,516	$92,119	$90,831	$96,000	$89,399	$89,368	$91,101	$89,691	$92,581	$91,293	$91,578	$90,997	0.3%
Computer and information systems managers	$110,730	$116,875	$113,412	$112,342	$126,408	$108,367	$111,700	$112,091	$111,910	$116,961	$112,513	$111,099	$112,739	0.2%
Computer Scientists and Systems Analyst	$84,585	$88,324	$89,236	$89,151	$94,461	$86,556	$86,083	$89,124	$85,951	$89,192	$87,013	$87,218	$86,182	0.2%
Computer Programmers	$85,611	$85,003	$86,927	$84,575	$87,292	$83,154	$82,474	$83,887	$82,892	$86,737	$84,990	$85,594	$84,346	-0.1%
Math*	$81,441	$88,437	$86,016	$91,546	$92,682	$87,493	$87,902	$88,593	$86,337	$87,762	$93,067	$88,093	$87,221	0.6%
Engineering	$89,802	$92,726	$94,253	$92,362	$98,886	$93,942	$93,715	$95,366	$94,534	$96,649	$96,832	$96,280	$96,474	0.6%
Civil Engineers	$82,530	$86,517	$87,226	$85,828	$88,679	$89,302	$88,435	$91,864	$91,394	$90,478	$90,921	$90,329	$90,888	0.8%
Electrical and Electronics Engineers	$97,584	$97,371	$100,844	$98,969	$106,439	$98,898	$98,835	$99,231	$102,061	$98,575	$98,489	$100,756	$103,057	0.5%
Mechanical Engineers	$83,626	$86,764	$89,769	$87,754	$93,059	$87,901	$87,491	$86,243	$86,166	$88,353	$86,467	$87,760	$86,583	0.3%
Petroleum engineer	$84,370	$122,583	$109,900	$109,843	$130,285	$111,487	$133,325	$132,278	$131,263	$134,799	$137,502	$130,989	$135,222	5.0%
Science	$74,782	$77,461	$76,444	$76,030	$77,972	$77,032	$78,541	$79,719	$76,575	$79,285	$78,104	$77,384	$76,728	0.2%
Chemists and Materials Scientists	$77,416	$78,874	$82,579	$75,939	$79,822	$81,652	$79,769	$80,139	$78,204	$79,329	$78,867	$73,738	$75,063	-0.3%
Biological Scientists	$58,086	$64,183	$63,506	$64,946	$65,415	$63,607	$65,543	$65,457	$63,168	$69,052	$63,270	$62,706	$65,681	1.1%
Environmental Scientists	$70,009	$73,087	$76,388	$77,987	$79,415	$77,678	$86,281	$86,755	$84,579	$86,701	$88,105	$94,480	$83,533	1.6%
Physical Scientists	$80,576	$82,209	$84,478	$79,073	$85,460	$85,854	$87,825	$90,509	$84,022	$83,003	$80,789	$80,777	$80,458	0.0%
All STEM	$86,449	$89,953	$90,528	$89,260	$94,402	$89,318	$89,407	$91,117	$89,518	$92,002	$91,332	$91,012	$90,778	0.4%
Other	$78,989	$79,810	$80,899	$79,945	$79,231	$81,396	$80,430	$81,780	$78,842	$81,155	$79,123	$77,847	$77,113	-0.2%

Source: Public-use files of the 2000-2012 American Community Surveys. Analysis confined to STEM workers with at least a bachelor's degree age 64 and under, working 35 hours or more per week and at least 50 weeks a year.
*Figures for math tend to be more volatile because of its small sample size.

Table A9. Number and Share of STEM Occupations Comprised of Natives

Occupation	Number U.S.-Born	Native Share of Occupation
Sci-Conservation Scientists & Foresters	19,688	98.5%
Eng-Surveying & Mapping Techs.	5,278	91.8%
Eng-Surveyors, Cartographers, & Photogrammetrists	25,385	91.3%
Sci-Geological & Petroleum Techs, & Nuclear Techs	4,748	91.0%
Sci-Environmental Scientists & Geoscientists	61,975	90.2%
Sci-Atmospheric & Space Scientists	7,614	89.4%
Sci-Agricultural & Food Scientists	19,338	88.5%
Cmm-Operations Research Analysts	81,935	87.1%
Sal-Sales Engineers	18,081	86.4%
Cmm-Web Developers	104,567	85.1%
Eng-Materials Engineers	19,961	83.4%
Sci-Chemical Techs.	24,951	83.4%
Sci-Biological Scientists	59,346	82.8%
Eng-Marine Engineers & Naval Architects	7,963	82.7%
Cmm-Information Security Analysts	31,539	81.7%
Eng-Civil Engineers	207,816	81.6%
Eng-Environmental Engineers	22,511	81.4%
Sci-Agricultural & Food Sci. Techs.	6,822	80.8%
Sci-Misc. Life, Physical, & Soc. Sci. Techs	56,855	80.8%
Eng-Aerospace Engineers	92,763	80.7%
Eng-Chemical Engineers	37,707	80.5%
Cmm-Computer Support Specialists	182,352	80.3%
Eng-Drafters	34,460	80.2%
Mgr-Architectural & Engineering Managers	100,706	79.8%
Eng-Mechanical Engineers	127,220	79.6%
Cmm-Network & Computer Systems Admin.	89,643	79.6%
Eng-Petroleum, Mining & Geo. Engs	25,537	79.4%
Eng-Industrial Engineers, w/ Health & Safety	100,396	79.3%
Mgr-Natural Sci.s Managers	12,849	78.5%
Mgr-Computer & Information Systems Managers	295,410	77.6%
Sci-Biological Techs.	8,040	77.5%
Cmm-Computer & Information Research Scientists	8,200	76.2%
Sci-Chemists & Materials Scientists	57,570	75.4%
Eng-Biomedical & Agricultural Engineers	13,104	75.1%
Eng-Engineering Techs., Except Drafters	53,356	74.8%
Cmm-Computer Occups, All Other	137,791	74.4%
Eng-Misc. Engineers, w/ Nuclear Engineers	280,882	74.0%
Cmm-Misc. Mathematical Sci. Occups	28,842	73.5%
Cmm-Computer Network Architects	40,381	73.3%
Cmm-Computer Programmers	237,035	73.0%
Sci-Astronomers & Physicists	8,005	72.8%
Cmm-Computer Systems Analysts	258,284	72.7%
Cmm-Database Administrators	54,609	70.8%
Eng-Electrical & Electronics Engineers	115,346	68.9%
Sci-Physical Scientists, All Other	116,105	61.9%
Cmm-Software Developers, Applications & Sys. Software	471,909	56.6%
Sci-Medical Scientists, & Life Scientists, All Other	67,666	53.3%
Eng-Computer Hardware Engineers	21,648	52.3%
All STEM Occupations	**3,864,189**	**73.1%**

Source: Public-use files of the 2012 American Community Survey. Analysis confined to STEM workers with a bachelor's degree or higher. Prefix shows occupational category: Sci. stands for science; Eng. stands for engineering; Cmm. stands for computer science (technology) and math; and Mgr. stands for management.