Yes, We Have a Need for More STEM, Part 2

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This is part two of a two-part piece. Part one can be found here *[1].* [1]

There Is a Shortage, Even If It Doesn't Show Up in Wage Inflation

Finally, Eisenbrey argues that, even if we can't get enough foreign STEM talent, it doesn't matter because we don't need it. We have plenty of domestic talent: "If anything, we have too many high-tech workers: more than 9 million people have degrees in a science, technology, engineering or math field, but only about 3 million have a job in one. That's largely because pay levels don't reward their skills.

"Salaries in computer- and math-related fields for workers with a college degree rose only 4.5 percent between 2000 and 2011. If these skills are so valuable and in such short supply, salaries should at least keep pace with the tech companies' profits, which have exploded." This is in fact a central argument made by opponents of STEM immigration. But in a global STEM labor market, it's fundamentally flawed. There are several reasons for this.

First, we don't have enough STEM talent, particularly in the STEM occupations most related to U.S. competitiveness, engineering and computer science. Most of the growth of U.S. STEM degrees has been in biological, agricultural and environmental sciences. In contrast, growth in engineering and the physical sciences was minimal. Moreover, from 2000 to 2007, non-STEM bachelor's degrees grew 24 percent, compared to just 16 percent for STEM bachelor's degrees.

We see the same pattern for master's degrees. STEM master's degrees awarded increased by about 2 percent per year from 1993 to 2007, which is about half of the annual growth rate in the number of total master's (4 percent). And while Ph.D. level production increased somewhat faster, number of doctoral degrees awarded increased by about 2.5 percent per year from 1993 to 2007, which is lower than the 3 percent annual growth rate in the number of non-STEM Ph.Ds.

Moreover, there has been a steady growth in STEM jobs. Data from the Census Bureau's American Community Survey show that the number of scientist and engineering-employed workers increased at a rate of about 2.2 percent per year from 2000 to 2007, compared to the 1.4 percent annual growth rate for the overall workforce over this period. Moreover, the STEM workforce has grown more than 50 percent faster than the number of STEM degree recipients.

Moreover, the Bureau of Labor Statistics projects the number of STEM jobs to grow over the next decade faster than other jobs. If the United States is ever to turn its economy around, including eliminating the massive trade deficit, we will have to do it largely through science- and technology-based industries. If we were to eliminate the trade deficit by expanding exports, many of these exports would likely be in technology-based sectors. We would need to employ large numbers of additional STEM workers.

But at the heart of the "we don't need more STEM immigration" argument is the wage argument. According to this view, American students are not enrolling in STEM because wages are not high enough. But this ignores that STEM wages are the third highest of any occupational group, after law and medicine.

But they argue that if there is a shortage, STEM wages should have grown faster. Indeed, since 1983, wage growth for STEM occupations has tracked that, for all occupations as a whole, increasing by about 3.4 percent on average annually. In neoclassical economics, the prima facie evidence of any kind of shortage, labor or otherwise, is increasing prices and expanding supply. Absent price and responding supply increases, there simply cannot be a shortage in these models. But the conventional neoclassical models are inadequate when analyzing STEM labor markets on both the supply and the demand side.

On the demand side, it is true that for many occupations where workers are predominately employed in non-traded industries (e.g., like trucking and nursing), shortages often lead to faster than average wage increases as employers bid up wages to attract a scarce supply of workers. And because the skill acquisition is relatively straightforward (and often can be accomplished in a matter of months, rather than years), higher wages pull in more workers. But for occupations with workers predominately employed in internationally traded industries (e.g., computers and software, chemicals, pharmaceuticals), demand and supply factors are at least partially influenced by global, as opposed to domestic, market conditions. In these occupations, shortages in workers may not lead to higher wages, for the globally competitive conditions in the industry may limit companies from paying higher wages, especially if many of their competitors are in low-wage nations.

In the cases of shortages, firms may simply see positions unfilled with no above-average wage increases, or they may fill those positions overseas. The problem with the neoclassical model is that it assumes that average wage increases mean no shortage, when it could just as easily be a reflection of a shortage that is addressed in a global marketplace. And we see this differential in the wage increases for different professions. In professions, such as law and medicine in which licensing and the location-specific nature of work reduce vulnerability to foreign competition, wages increased faster than for STEM jobs, which are more exposed to international competition.

Moreover, it is likely that if more STEM graduates were available that the expansion of the STEM workforce would have been even larger; technology companies that possibly expanded offshore due to shortages of STEM talent might have expanded instead in the United States. And the evidence is clear that foreign STEM workers end up leading to even more STEM jobs in the United States. One reason is because they innovate and start new companies. Considering that the number of patents granted to U.S. residents has remained constant since 2005, U.S. innovation would be declining without the influx of foreign workers.

Moreover, at least seven studies have examined the role of immigrants in launching new companies and all conclude that immigrants are key actors in this process, creating 15 to 26 percent of new companies in the technology sector. Because new companies with 20 or more employees account for nearly all new net job creation, one can argue that the influx of foreign-born STEM workers is helping to boost jobs for U.S.-born STEM workers.

On the supply side, the argument is that if we want more STEM workers, we should just raise salaries by a few percent and all is well. But this ignores the fact that STEM is not like other occupations like sales or even medicine. For someone to be a scientist or engineer, they need to have a particular personality orientation and really like STEM. How else would they make it through the hard work of getting a degree?

Moreover, the fact that we see more interest in high school students in the arts than in STEM is not because they think they can make a fortune in the arts. For example, as ITIF reports in its report “Refueling the U.S. Innovation Economy: Fresh Approaches to STEM Education [2],” enrollment in the music-theory, advanced-placement (AP) test high school students test grew by 362 percent between 1997 and 2009, while enrollment in the computer science AB AP test grew by just 12 percent. Even Latin Virgil and French literature AP test enrollment grew faster than computer science. In 2008, more than three times as many students took the art history AP test as did the computer science AB test. I guess it’s those high wages for artists that are drawing them to it, instead of computer science, with its wages twice as high as the average U.S. wage [3].

At the end of the day, Eisenbrey’s arguments against high-skill immigration are grounded more in attempts to redistribute a shrinking economic pie away from companies and toward workers, rather than growing it so all Americans can benefit.

Americans can't afford fighting over the slices of the pie, we need to be coming together to grow the pie, and efforts like I-squared are key ingredients in that recipe.

To read part one of this two-part series, please click here. [1]What's your take? Please feel free to comment below! This blog was originally posted on The Innovation Files [4], which is sponsored by the Information Technology and Innovation Foundation (ITIF). ITIF [5] is a think tank focused on innovation, e-transformation and economic competitiveness. We are non-profit and non-partisan.

Dr. Robert D. Atkinson has conducted research projects on technology and innovation, is a valued adviser to state and national policy makers, and a popular speaker on innovation policy nationally and internationally. He is the author of "Innovation Economics: The Race for Global Advantage" (Yale, forthcoming) and "The Past and Future of America's Economy: Long Waves of Innovation That Power Cycles of Growth" (Edward Elgar, 2005).

Links:
[1] http://www.chem.info/Community/Blogs/CHEM-Blog/Regulatory-News-Yes-We-Have-a-Need-for-More-STEM-Part-1/
[2] http://www.itif.org/publications/refueling-us-innovation-economy-fresh-approaches-stem-education
[3] http://www2.itif.org/2012-jobs-it.pdf
[4] http://www.innovationfiles.org/yes-virginia-we-do-have-need-for-more-stem-workers/
[5] http://www.itif.org/