COVID Information Commons (CIC) Research Lightning Talk

Transcript of a Presentation by Gerald Marschke (University at Albany), February 2022

Title: Investigating the Impact of COVID-19 on the Future of the U.S. STEM Workforce

Gerald Marschke CIC Database Profile

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Youtube Recording with Slides

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Transcript

Gerald Marschke:

Slide 1

Hi I'm Gerry Marschke, I'm a labor economist at SUNY Albany - an economist from SUNY Albany that specializes in labor [economics]. And what I want to do is talk about some results from my first paper that RAPID has generated. So, we received an NSF grant about a year ago to study the impact of COVID on STEM workers and also to consider policies that might attenuate the effects of COVID-19 effect on STEM workers. So what we've done so far is describe the effect of COVID-19 on STEM workers.

So let me start with some administrative work. I want to read quickly a disclaimer and acknowledge that any opinions, findings and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation and the National Bureau of Economic Research. The findings and conclusions in this paper are those of the authors which should not be construed to represent any official USDA or U.S. Government determination or policy. All results have been reviewed to ensure that no confidential information is disclosed.

As this is funded by the NSF, we'd like to thank the NSF for funding this project and also for CIC, for inviting us to present this material. So this is based on a paper that we just published as an NBER working paper. It is downloadable if you are interested in the full details [https://www.nber.org/papers/w29568], I'm just going to present a subset of the work that we did there. And this is done with Jim Davis who is

now at the USDA, Holden Diethorn and Andrew Wang who are economists at the National Bureau of Economic Research.

Slide 2

Okay, so we are focusing on the STEM workforce. Why is the STEM workforce interesting during a recession or a pandemic like this? The STEM workforce is a key segment in the workforce in that it affects research and development and therefore, affects economic growth. It is a policy focus as much as education and job policy in the U.S. What we are interested in with this paper is understanding the effect of the Great Recession (COVID Recession) on the STEM workforce and comparing its effect to the non STEM workforce. Then what we find, to give you a preview, is that we find that the STEM workforce has done relatively well during the COVID recession. This recession has been terrible for employment generally. The disemployment effect for the COVID recession is about twice as much as it was during the Great Recession a few years ago, although the recovery has been much quicker, the recovery is still not complete, as you are aware. To give you a partial preview of results, it turns out that STEM workers have done fairly well, in comparison they have been hit by the recession but not in the same way as non-STEM workers have been hit. Another focus of this paper is to understand what accounts for the relative resiliency of STEM workers. And you might think that for education that they are in occupations where you can do your work remotely - it is not those things. It turns out that neither education levels, nor ability to work remotely, or concentration in essential industries explains this resilience.

Slide 3

Okay, so there has been a fair amount of work - this work started coming out in the beginning of the recession in May/June. We saw the first papers by economists looking at the disemployment effects of COVID and where it is concentrated. And then, general consensus has been that the job loss has been concentrated amongst workers who are less educated, skilled, and wealthy and those workers tend to be in occupations with more face to face contact and less ability to work remotely. And there is another older and larger literature on the effects of education on employment outcomes during recessions. And that work has generally found, not surprisingly, that better educated workers suffer less employment loss and earnings loss during recessions. And then there has been some work that looks at the effects of particular kinds of education on recession resiliency. And this work has shown that workers, at least college graduates who have graduated with degrees in higher skilled disciplines, have better labor market outcomes just after economic downturns compared to those without graduate degrees who are in quote “softer” disciplines. But there has been very little work done on STEM work

Slide 4

So these plots - I'm going to show you two sets of plots. One regarding the Great Recession and the other one regarding COVID. So this is a employment - these are the effects of the Great Recession on employment and what we're plotting here in the left-hand side is a ratio of COVID employment - employment in each quarter since the beginning of the pandemic relative to what it was during its peak

prior to the recession in this case, and then in the COVID graphs prior to the COVID pandemic. And you can see that - let me tell you what you see - you see that, overall, we get about a 7% decline in employment compared to the peak prior to the Great Recession. A 4% drop for STEM workers and about 7% for non-STEM workers. And I'll talk about the output graphs in a second.

Slide 5

And then this is the, these are the results for COVID. You see that STEM employment fell about 5% relative to its peak prior to COVID. The employment, you can see, is bottoming out in, if you look at the horizontal axis that corresponds to the quarter since the pre-recession peak and the pre-recession peak is about the fourth quarter of 2019. So employment is bottom, bottoming out. Our disemployment is at its apex in about, in the - in the second quarter of 2020, on the first first quarter of the pandemic. And then for non-STEM employment, the employment rate - employment to peak employment ratios about 86% so they - their employment falls by about 14%. And then afterwards, you can see a rapid increase in employment. For non-STEM workers we're still - we're still in a in a deficit situation - the employment is less stable than it was before COVID began for STEM workers we are back to quote “normal.” And then on the right hand side in both slides I have the output. What I'm interested in here is understanding the extent to which firms are hoarding workers and whether that is different for STEMworkers versus non-STEM workers. Hoarding workers is where the employers hold on to workers for when the economy bounces back. So for example if they have training investments that they want to protect. And there's no evidence of hoarding during the Great Recession but for the COVID recession there is evidence of hoarding of STEM workers, not non-STEM workers. Their employment falls by more than, actually, output falls in non-STEM worker intensive industries. But in STEM worker intensive industries STEM employment employment is falling by less than what output is falling by.

Slide 6

Okay, so now what I want to do is I want to look at a set of workers who I captured just before the pandemic begins. This is a representative set of workers, some of them will be STEM workers and some of them will be non-STEM workers. And the STEM workers in my sample, this is the current population survey sample from the Bureau of Labor Statistics, it's monthly data on the set of workers who are first captured just before COVID hits. What I’m interested in doing is seeing to what extent, you know, it's demographics, to what extent it's the industries that workers are in, and to what extent it's occupational characteristics, and so on, that explains the fact that STEM workers enjoy a 9% employment advantage compared to non-STEM workers. That is, their employment falls by 9% less than non-STEM workers. So I'm going to look at things like demographic characteristics and educational characteristics and some job characteristics which I want to describe quickly now. So this slide shows you the differences between STEM and non-STEM workers in terms of educational attainment demographics, firm size, the size of the employer that employs the worker and the educational requirements of the job as opposed to educational attainment. So one thing I'll point out is that STEM workers are half as likely as non-STEM workers to be female Black or Hispanic. And they're much more likely, about three times more likely, the non-STEM workers, to be Asian. Their educational levels are very different, college, the STEM, STEM workers about 70% of STEM workers have a college degree or better than a college degree, and about only 30% of non-STEM workers have a college degree or better than that. And they also tend to be in

different industries. So here's the distribution of STEM and non-STEM workers across industries. And you can see that STEM workers that's the - the red, the red -those are the red rectangles. You can see they're concentrated in professional scientific and technical services. And they're also seen in manufacturing. And non-STEM workers, you see a lot of them in retail and a lot of them in accommodation and food service industries that were hit very hard by the pandemic, so that's going to be part of the story.

Slide 7

Now it turns out - so as I said there's a literature which shows that you know the remote work capacity of the occupation is important in explaining variation in the disemployment of COVID. And if you look at workers who are STEM versus workers who are non-STEM you see a big difference between remote work capacity of STEM workers and non-STEM workers. So non-STEM workers are more likely to be in jobs that require physical activities and close personal proximity to co-workers and customers and so forth. And as a consequence, their remote ability is much less than the remote ability, if I could use that word for STEM workers. And they tend to be, interestingly, the STEM workers tend to be in industries that have not been deemed politically as essential. So that works against STEM workers in favor of non-STEM workers, but remote ability works in favor of STEM workers. And then if you look at the types of tasks that workers are engaged in so there's a large literature in Economics that shows that workers in jobs where the tasks are routine and non-cognitive tend to do worse in recessions and recoveries. And it turns out that STEM workers are not in those kinds of jobs, they're typically jobs that require tasks that are cognitive and non-routine.

Slide 8

And then the last thing I want to show you before I show you the decomposition is that, as you might imagine, if you're a STEM worker, STEM knowledge use is important in your employment in your everyday work. And here's the distribution of the importantness of different kinds of STEM knowledge in in executing tasks on the job for STEM workers and non-STEM workers. And you can see that although there's some overlap, and that's interesting, a lot of non-STEM workers actually are using STEM knowledge of one kind or another on the job, STEM workers tend to be using more STEM knowledge on the job than non-STEM workers.

Slide 9

Okay, now what we're interested in here finally is a decomposition of this difference the 9% point employment advantage of STEM workers compared to non-STEM workers during COVID. We're interested in seeing if we can't explain that in terms of the characteristics of the worker and the characteristics of the job. And so in the interest of time I won't go through this figure, I'm just going to summarize it in the next slide.

Slide 10

So I'm looking at bullet points 2 and 3. If I divide up the sample between college educated and non-college educated workers I get different results. So for college educated STEM workers, and that's the bulk of the STEM workers or the STEM workforce, it turns out that, and maybe this isn't surprising,

but STEM knowledge use on the job explains about half of the advantage. So if you are in a job that requires extensive use of STEM knowledge, you are in a sense protected. And what's interesting about that result is that it's also true for non-STEM workers. So a lot of non-STEM workers, about 70 million non-STEM workers are, in fact, in jobs that require some STEM knowledge use, those workers are protected too from the - from the recession, in terms of their employment. And then for non-college educated workers, it's a whole host of things that matter. Non-routine cognitive tasks, composition of jobs matters for whether they're hit by the COVID recession hard or not. Demographics are important and which industry you're in is also important. And then the last thing I want to say is that we're looking at STEM workers, some STEM workers do R&D many don't, all R&D workers, almost all R&D workers are STEM workers. Those are important workers because they say they have a disproportionate effect on economic growth rates and productivity increases in industry. And it turns out that R&D expenditures and R&D employment and patenting didn't take much of a hit during COVID. In fact, although they fell, those three variables fell in the first two quarters of the pandemic, they didn't fall as much as even this STEM employment did. Thank you.