

Tim Phillips [00:00:00]:

Today on VoxTalks Economics, the consequences of the war on Ukraine, on Ukraine's science. Welcome to VoxTalks Economics from the Centre for Economic Policy Research. My name is Tim Phillips. Every week we bring you the best new research in economics. So remember, subscribe. Follow us on Instagram as well. You'll find us at VoxTalks Economics.

Tim Phillips [00:00:32]:

The scientists are affected by war like everyone else. Their work is disrupted, they're placed in danger, they may become refugees or even casualties. So what has been the impact of the Russian invasion of Ukraine on Ukraine's scientists? Ina Ganguli of UMass Amherst is one of the authors of a CEPR discussion paper that has estimated the impact of war on science and scientists in Ukraine, and she joins me now. Ina. Welcome to VoxTalks Economics.

Ina Ganguli [00:01:09]:

Thank you for having me.

Tim Phillips [00:01:11]:

In normal times, before this war started, was Ukraine good at science?

Ina Ganguli [00:01:17]:

So Ukraine has a strong history of great science, and a lot of that comes from the Soviet Union and its history there. But we know that in the 90s, after the end of the collapse of the Soviet Union, it was affected a lot, just like in other Soviet republics, a lot of scientists left, there was a huge economic crisis, there wasn't funding for science, and so that impacted science in Ukraine. Now, that being said, yeah, Ukraine has, before the war, even now, a lot of scientists who were working in Ukraine doing really kind of top research, a lot of international collaborations. So, you know, I think if you look at kind of total publications, I think it's 42nd. So it's not necessarily kind of like one of the top producers of papers, but again, it's still really a good place for good science.

Tim Phillips [00:02:06]:

And for previous conflicts, especially World War I and World War II. What effects do we know that war has on science and the scientists who are producing it?

Ina Ganguli [00:02:18]:

Yes, we know quite a bit from these wars. You mentioned World War I, World War II, and other

conflicts. And there's great work by people like Fabian Waldinger, Petra Moser and other economists that show that wars have significant impacts. And so we know from work by Fabian and others that during World War II, for example, in Germany, you had universities that were bombed. As you can imagine, there's this physical destruction. But one thing that also happens during wars is there's a lot of movement of people. And so you have scientists who are leaving. During World War II, you had a lot of Jewish scientists who were forced to leave Germany. And so something that we know from that experience is that German universities were really impacted by the loss of these scientists. And I think what's interesting from that work is that we see that actually losing the people or the human capital can actually matter more in the long run than the physical destruction because you can rebuild the universities with resources dedicated to that. But it's hard to actually have the people return. Wars can also spur innovation, and the experiences that scientists have during wars can actually impact what they're going to do. So there's examples during World War II that there was increased innovation in sectors that were invested in during the war. There's also examples of people like Charles Townes who won the Nobel Prize in physics, who worked with radar and later developed maser and laser that led to the Nobel Prize. So again, these experiences can impact scientists a lot.

Tim Phillips [00:03:53]:

And in this work, are you focusing on the scientists who have been affected already or on their research output, the science they're producing?

Ina Ganguli [00:04:05]:

I think both, those are linked. Right. So we know that, as I just was saying, experiences that scientists have, and especially things like mobility or if there's a disruption to their work that they're doing, then that impacts the research. So it's really both of these things and they're linked. So we're interested in the scientists themselves, their experiences, where they are, and then how that impacts the knowledge they're producing.

[Voiceover] [00:04:37]:

The Russian war on Ukraine has put thousands of people out of work and the damage to schools and universities interrupted education for many of its students. How can other countries help? In February 2023, we asked Tito Boeri this question in the episode called Rebuilding Ukraine's Labor Market.

Tim Phillips [00:05:06]:

So my first question is, is the productivity of Ukrainian scientists lower since this war started?

Ina Ganguli [00:05:14]:

That's what we're finding. So it looks like it has declined. And one thing to keep in mind is that publications take a while to get out. And so at this point, we compare publications for Ukrainian scientists in 2021, so before the war started, compared to 2022. And so there just within a year, we already see a decline of about 10%. But again, it's likely that that's not really showing the true impacts because it's going to take a while for us to really see how the war is going to then affect that pipeline.

Tim Phillips [00:05:48]:

Yes, it's remarkable that anyone can do any work at all in this situation. As you say, papers do take a couple of years to write very often. So is this going to continue to fall, do you think?

Ina Ganguli [00:06:02]:

If the war goes on, then I think that's probably going to happen. Now, I will say that it's been amazing to see the international community that has stepped up and created fellowships and other ways for Ukrainian scientists to continue to do their research, so through collaboration or kind of going to other countries. And so hopefully that's going to help. But yeah, we're already seeing 10% just in one year, so I imagine that we'll kind of continue to see that decline.

Tim Phillips [00:06:33]:

You've also estimated emigration by scientists? Emigration numbers are particularly hard to count in any situation. In a wartime situation for one particular group, it must be extremely difficult. How did you do this?

Ina Ganguli [00:06:52]:

Exactly as you said, it's challenging in any situation. And so what we do is we do what in this literature that people who look at migration of scientists typically do, which is you take papers that were published by the scientists and we can look at the paper's affiliation for the scientists before. So this was anyone who was publishing in Ukraine. And our samples actually were looking at the scientists who are kind of in the top institutions and publishing. And the reason we do that is because we want to kind of think about who are the people who are kind of producing that knowledge or they started out with the good science. If we want to focus on that group, we know they're already publishing. We look at who changed their institution after the war started. We already see that it's about 5.4 based on our calculations have left Ukraine. Now, there are a whole bunch of issues there is that estimate going to be high or low? And so there's a lot of caveats there. Now there's other estimates that are from surveys and we essentially find that ours is a bit lower than the survey estimates. Like who answers the survey is going to matter. So for example, if scientists who migrate are more likely to answer the survey, then we're going to have an overestimate. Our estimates about 5.4% have left Ukraine. The Ministry of Science education estimates about 10%. And then the surveys tend to show higher shares. 18 or 20%.

Tim Phillips [00:08:18]:

Yes, because we often hear that knowledge workers are mobile. I would have thought it would be higher than five or 10%. Why is it not higher?

Ina Ganguli [00:08:29]:

So there's a few reasons for this, one obviously the 5% is based on publishing. It's a war and we know that there's been a decrease in publication, so migrants may not have published yet with another affiliation. The second thing that I think is really important to keep in mind is that there's martial law in Ukraine. So men between 18 and 60 actually can't leave the country. A large share of the scientists actually can't leave. Again, we would expect then that the share leaving is not that high.

Tim Phillips [00:09:02]:

Now that's the number for elite scientists. Science is also built up by many other junior researchers. Were you able to track what's happened to them?

Ina Ganguli [00:09:15]:

Yeah, so for our data, we can't really say. I think in the surveys, again, it's also difficult to say because it can go either way. Men through 60 can't leave. So then you might get older men who are leaving. We do know from surveys that women with children tend to be the ones who leave. So again, that might be more junior scientists, women researchers.

Tim Phillips [00:09:38]:

Also you have looked at the universities themselves in Ukraine. Ukraine has many good, well established universities. How affected have they been by this war?

Ina Ganguli [00:09:50]:

Yeah, I think this was one of the more striking estimates that we found. So we took the top hundred universities in Ukraine and we went through and we looked at media reports of which had some destruction. And so we find that about 22%, 22 of the top hundred have some physical destruction. And again, there's going to be a variation in kind of how much destruction there have been some universities. So in Kharkiv, which is, you know, in the eastern part of the country, there was a lot of damage to the main university there. Others have had less but still some damage. But I think 22% is quite striking.

Tim Phillips [00:10:29]:

Yes. One of the great joys of seeing scientific research is how collaborative it is these days, often across international boundaries. Has the pattern or the amount of collaboration changed?

Ina Ganguli [00:10:45]:

Yeah, so this is also quite striking. One thing that we're seeing is that given again the history and the close ties between Russia and Ukraine, there was a lot of collaboration among scientists. And so we can already see that there is really a significant drop in collaborations with Russia. As you can imagine, about 40%. I had expected that there might be a little bit more of an increase with kind of Western Europe and the United States. And so far, we're not seeing it in the data, the publications. But I imagine, going forward, given that there have been a lot of these programs to foster international collaboration and support for Ukrainian scientists, that this may change. And this is something, again, we've seen from prior episodes. So from World War I, we've seen that wars do change collaboration, diffusion of knowledge. Given that there's a lot of changes in who's interacting.

Tim Phillips [00:11:45]:

Based on these prior episodes and also the facts that you've managed to uncover about how science has been disrupted in Ukraine. When the war ends, and we hope this will be soon, can science in Ukraine recover?

Ina Ganguli [00:12:01]:

Yes. So that's the hope is that it can recover. And I think what we know from prior episodes suggests that there's going to have to be a lot of funds that are going to be invested in Ukraine. So hopefully that will happen. And so then the destruction to universities, infrastructure, right. A lot of equipment has been destroyed, other damage to the country. Hopefully that can be rebuilt. Now the question whether scientists will come back, that's always a big question. And so I think that's where the community, international community and funders are trying to get resources devoted to bringing scientists back to Ukraine and allowing them to really continue their collaborations.

Tim Phillips [00:12:42]:

Do we know the best way that the institutions, the universities within Ukraine can respond so that they can recover?

Ina Ganguli [00:12:51]:

The universities in Ukraine have been amazing, and they've had to create bomb shelters so students can continue to take their classes when there's air raids going on. Also remote

learning. So there were a lot of situations where universities had to go to remote classes. And so I think that flexibility is going to again, continue to be important.

Tim Phillips [00:13:14]:

As you pointed out, the elite scientists, some of them have migrated. They will be in demand from universities elsewhere in Europe, in North America. Should those universities be looking on this as an opportunity to recruit those Ukrainian scientists?

Ina Ganguli [00:13:35]:

That's a controversial question. It's probably good for everyone right now to create those connections and for example, to have stays by Ukrainian scientists abroad. I think the question is, in the long run, thinking about how can Ukraine recover, I think the engagement of those Ukrainian scientists in Ukraine is going to be critical. So I think, again, an eye towards what happens in the future to make sure that there are ways for people to continue to be involved in Ukraine. And there's a big literature on how immigration of scientists can be good for their country back home, like a bridge or a way for knowledge to diffuse and for resources and collaboration, so you know, I think it's not necessarily bad for Ukraine to have these scientists go abroad, but if everyone leaves, then that's not going to be great.

Tim Phillips [00:14:26]:

Well, the best possible outcome will be a quick finish to this conflict. Meanwhile, it is encouraging to hear that Ukrainian researchers, scientists are managing to carry on with their work, whether they're within Ukraine's borders or outside it. Ina, thank you very much for talking to me about it.

Ina Ganguli [00:14:45]:

Thank you, Tim.

Tim Phillips [00:14:55]:

The paper is called War and Science in Ukraine. And the authors are Ina Ganguli and Fabian Waldinger It is discussion paper 18247 at CEPR.

[Voiceover] [00:15:12]:

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[Voiceover] [00:15:29]:

Next week on VoxTalks Economics, how the inflation reduction act upset South Korea's politicians and how the U.S. fixed the mess.