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[SPEAKER_00]

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[SPEAKER_03]

Hello again, and welcome to the episode five of our The RegInno podcast, where we dive into stories and ideas behind academic papers that shape our understanding of innovation and regional development.

I am Muzammil, PhD researcher at Center for Innovation Research, University of Stavanger, and with me is my co-host, Raj.

Raj, please help me welcome our guest.

[SPEAKER_02]

Thank you so much, Muzammil.

So as our guest today, we have Matěj Bajgar, from Charles University.

You're an assistant professor there and you specialize in innovation economics.

I would like to start with a very simple question.

Why do you work with innovation economics?

Why is it important?

[SPEAKER_01]

Well, so I think, firstly, it's great to be here.

Great on your podcast.

Thank you for having me.

And why do I do innovation economics?

So when you say innovation economics, I remember how like eight years ago, a friend was leaving from the OECD where I was working and said that he's going to academia, work on innovation economics.

And until then, I didn't know that there was such a thing as innovation economics.

I was a trade economist.

And here I am, like eight years ago, doing innovation economics as well.

And yeah, I think it's a really important topic.

Maybe we are aware of what the latest Nobel Prize awards were awarded for.

Actually, this year's and last year's awards were both for innovation economics related to research, in particular this year the Philip Aghion and Hewitt paper about endogenous growth theory and the role of innovation in driving modern economic growth.

And what this model and other models show us is really that in the frontier economies

The only sustained engine of modern economic growth is innovation, is investments in R&D.

And that's what I'm trying to study in my work.

And some of the things I find fascinating about this and what I just talked to my students in Prague,

is if you think about like on one hand we live we are told we live through a technological revolution there's all these discussed new technologies there we have 3D printing and industry 4.0 and smart farming and cloud computing and then

obviously these days it's all about AI and AI very likely is transforming our societies and will be more and more but
Looking at the recent years, it feels like we live through a technology revolution.

But then what I do to my students, I let them ask between two sets of technologies.

So one set of technologies, I say, so either you can have this set of technologies, set A, where what you get is you can have a car.
that you can drive.

It's maybe with an old car, maybe it doesn't have airbags, but it's a car, right?
You have a washing machine, you have piping with running water at home, you have a flush toilet, you have electricity, you can fly with wide-body airplanes, or
And you have a phone, a traditional phone at home.

Or you have a wonderful smartphone.

You have a super fast laptop.

I give you the electricity because I'm generous, because you couldn't use those things otherwise.

You have a microwave oven.

You have internet, but you don't have running water.

You don't have a car.

You don't have a TV.

And what do you choose?

And typically, all but the two biggest smartphone addicts in the room choose for the first set of technologies.

And the thing is that those were technologies which became mainstream for a median American household between the end of World War II and 1980.

And then you look at the things which are new since 19 until now.

And in a way, like how we process information is new.

But many of the inventions with the biggest material impact on our material life in the real world came a long time ago.

And really, the planes look very similar today to what they looked like in 1980.

Cars are still cars.

And so, in some way, we are on the trajectory of a revolution.

In other way, maybe the progress has slowed down.

Maybe ideas are getting harder to find.

Maybe we need different policies to renew the more dramatic transformation to our lives.

So there's a lot of interesting questions about these topics, and I like studying it.

I like teaching it.

[SPEAKER_02]

That's super interesting.

Before my colleague Muzamil dives deep into your research, can I ask you something that you said earlier?

One of your colleagues who moved from the OECD to academia, and you did the same.

Before going to research, how was the move?

Why did you move?

And how is it different doing innovation economics from the OECD versus in academia?

[SPEAKER_01]

So straight after PhD, I got an opportunity to join the OECD as a young professional.

Yeah.

through a young professionals program.

And then I think I was keen on doing something more what I consider than policy oriented rather than pure academic,

research, which maybe I found a little bit lonely during the PhD phase.

So probably the experience is not the same for everyone.

That's what it was for me.

I went to the OECD.

I was very happy there.

But at some point, I more for personal reasons decided to relocate back to my home country in order to just, yeah, I wanted to spend my life in my home country.

And originally written to work for a university-affiliated think tank, and then kind of opportunity opened up to join the Charles University Economic Department, the Institute of Economic Studies is what it's called.

for an academic career, got offered for tenure track assistant professor position, and then kind of things took off, managed to get some grants, get some things published.

And now looking back, it's been really, really kind of exciting last five years over my wildest dreams in terms of how things went.

And now, if I compare it, I did enjoy work at the OECD.

That's where I started working on the science, technology, innovation topics, where I learned what innovation economics is, started some of the projects that I'm even doing now and that maybe we will discuss.

uh but right now i'm really enjoying the the freedom i get in in academia to just pick my topic research it as best i can uh rather than still OECD was more hierarchical i had bosses things have to get approved it was a bit different focus so i'm very very happy about the freedom to explore my interest that i get in academia

[SPEAKER_02]

But then your research also tells us that you're still continuing to collaborate with your colleagues at the OECD.

So that's fantastic.

Do you want to dive deeper into the research?

[SPEAKER_03]

Yeah, let's dive deeply into your research.

So you have been covering 19 OECD countries.

Tell us, what do you know about R&D incentives?

[SPEAKER_01]

So what I think you're alluding to the paper I presented here in Stavanger today, which is a paper indeed with three OECD colleagues, which is coming out in the American Economic Journal, Economic Policy.

And there we look at the effect of R&D tax incentives.

It's motivated by the fact that

While most of research and development is done in companies,

But we know that because of the positive externalities generated by R&D, if left to market forces, firms would underinvest compared to what is socially optimal. And for this reason, governments support firm investment into R&D.

They do it in two ways, mainly.

Two main ways are grants.

There's also procurement loans but kind of funding directly and then there are R&D tax incentives where firms that invest in R&D can then get some of the money back via R&D tax relief.

That's the type of incentive that we are looking at and that actually now in the OECD

accounts for the bigger part of our public business R&D support.

So it's a really important tool through which nine out of ten OECD countries subsidize R&D in private businesses.

And the puzzle we are trying to solve in this paper is that there's a large gap between the estimated effectiveness of these policies in, on one hand, aggregate studies that compare aggregate R&D expenditure across countries in response to R&D tax incentives, and in well-identified firm-level studies that use some natural experiments and policy changes that affect some firms more than others.

to estimate the cause and effect of these policies on firms.

So what happens is that the estimated effects are much, much smaller in the aggregate studies than in the firm-level studies, to give you an idea.

The aggregate studies imply, on average, that one euro of...

R&D tax relief of foregone tax revenue leads to maybe 60 cents of additional R&D. Whereas the firm level studies would imply that one euro of R&D tax relief leads to something more like closer to two euros of R&D, of additional R&D.

[SPEAKER_02]

That's the R&D invested by the company.

[SPEAKER_01]

Yes.

Yes.

Yes.

And...

Yes.

And so the question then is, why is it?

And maybe which one is closer to truth?

What is the true effect?

That's what we try to explore in this paper.

Yeah.

So what we do there is that we take advantage of something called distributed micro-rater analysis, which has been quite an exciting development in the way we can work with

with microdata across countries, which was pioneered by John Haltevanger some 20 years ago, and also some OECD projects played a major role in mainstreaming and promoting this idea.

The basic idea is that

We want to, as much as possible, it's good to work with microdata in this case, with firm-level data, because you have much more variation, much more detail.

You can estimate differences in effects for different firms.

You can get close to estimating causal effects.

We like working with microdata.

But for firms, and for example, in the context of firm expenditure and R&D, The data is collected by statistical offices and is confidential and it's hard to access.

You can sometimes access the data for a particular country.

In some countries even that is quite difficult.

But you cannot take the data and put it on your computer and get it for multiple countries and then run regression on firm-level data for several countries.

That's simply not possible for confidentiality reasons.

So what distributed microdata means is that you run a standardized routine and then you run the code like different people with access to the microdata run the code on the data in their countries.

And then you generate some statistics which are which offer much richer detail than aggregate statistics but are not confidential.

And then those you can use in the analysis and use for the estimation.

That's what we do in this paper.

And what we get in the data in the main sample for 14 OECD countries and try to estimate the effect of the R&D tax incentives.

And we find that the gap between the aggregate studies and the firm level studies is largely explained by two things.

The first thing is we document that, and that's something people were not really aware of, that many firms that actually invest in R&D and would be eligible for benefiting from the R&D tax incentives do not claim the R&D tax relief.

This comes as a surprise to many people.

Also, previous studies assume that all of this tax relief, which is lying on the table, is taken up by the companies.

But the reality is that companies make a benefit-cost analysis, essentially weighting the benefits of receiving this relief with costs, which are some administrative costs.

You have to claim it, you have to document the project.

And then maybe you risk that you attract attention of tax authorities who will then audit you and see whether what you're doing is really R&D and maybe you withdraw the tax incentives.

So there's also some costs.

And especially firms that do less R&D or are smaller might decide it's not worth it for them and not claim the R&D tax relief.

And actually not taking this into account leads to underestimating the effectiveness of the tax incentive.

And so that's one thing we show there.

The other thing we show there is that there's big differences between the effects of the R&D tax incentives on different types of funds.

In particular, and this is, I think, a really important thing for thinking about innovation policies, a lot of research suggests that innovation policies such as R&D tax incentives, but also R&D subsidies, R&D loans, etc.

are more effective for firms which are more likely to be financially constrained. In particular, smaller firms, importantly younger firms, startups, they don't yet necessarily have big reliable profits that they can rely on, they're growing fast.

They don't have the track record.

It's harder to access financing.

And this particular problem for innovation, because financing innovation is hard. Because if you want to finance a machine for manufacturing things, then you can use it as a collateral.

If you are unable to pay back the loan, you can sell the machine and the bank recovers some of the money.

If you pay somebody for several years,

Thank you.

research a salary to research something and then nothing comes out of the project maybe, you can't take it back, the wages, and give it to the bank.

So financing innovation is hard and especially for younger firms, for smaller firms.

So that's where the support is effective.

That's what we find indeed that R&D tax incentives are much more effective for smaller and less R&D intensive firms and they are not very effective for large R&D intensive businesses.

But the large R&D intensive businesses are relatively few, but they account for a big part of the aggregate R&D and aggregate R&D tax relief.

So what this means is that for the small, less R&D-intensive firms, we recover the estimates that some of the recent well-identified and well-published papers find.

But we show that because a lot of the R&D tax relief goes to the large R&D-intensive firms where it's not very effective,

the aggregate effects are much smaller than what the firm-level studies would suggest.

[SPEAKER_02]

If I'm to understand it correctly, is that the large R&D-intensive firms are few in number,

They yet attract the largest amount of R&D tax incentives, but still the effect of those incentives are least for these firms.

[SPEAKER_01]

Yes, that's perfect.

Right?

[SPEAKER_02]

That's a big irony.

If you were to design an R&D policy from scratch, what would be the key things you would be mindful about?

[SPEAKER_01]

So the direct implication of what we just discussed is that you want more of the support to go to the smaller less R&D firms.

The most direct way to do it is

to impose a ceiling or a threshold on the eligible R&D expenditure.

So the ceiling means that you get the incentive for R&D expenditure up to a certain ceiling.

R&D expenditure above that ceiling is no longer subsidized.

This is how it works in Norway.

The effect is that most firms are below the ceiling and they are the smallest R&D firms so they get the subsidies and as a result for them it is very effective and so there's the effect.

Then of course the large R&D firms also get some support, but only up to the ceiling, which might compare to their total R&D expenditure might be very little.

And because the distribution of the R&D expenditure is so massively skewed to a few large firms, this dramatically reduces the aggregate cost of the policy. while still kind of giving the full support to the firms where the effect is biggest.

There was also recently a reform in the Czech Republic where I was involved in some of the discussions with policymakers about how to design it.

And there as well, kind of following the Norwegian lead, the R&D was made more generous, but only for firms below certain ceiling.

Or we could say a threshold.

So below the threshold, you have a greater rate and above the threshold, only some benefit.

And again, in this case, it reduced using the ceiling, reduced the cost of the reform by 80%.

while still 90% of R&D performing firms being eligible for this more generous incentive.

Only the few very large and very expensive R&D performers are above the ceiling, and it doesn't concern them.

[SPEAKER_02]

But how does this fare with your first point, which is that a lot of firms which are even though eligible to apply, they don't apply anyway.

So when you introduce a ceiling, how can we guarantee that more and more firms will apply?

[SPEAKER_01]

so uh chances are that the firms that don't so they don't apply are below the ceiling anyways yes right uh the what we what we what we also find is that uh the uptake is correlated uh with basically the value of detection for the firm so larger more r d intensive

uh firms are more likely to to use the r d extensive so certainly the the really big players uh big firms which are on the intensive their r d budgets and hence also the text relief they are eligible for is very big so for them it definitely pays off to to

to undergo the administrative costs, maybe hire some advisors, consultants to help them with the paperwork and claim the tax credits.

It's the firms that are smaller, that do less R&D, where they are doing kind of this benefit-cost analysis I was describing, and they will be under the ceiling. So that's exactly the idea here that

Basically, by saving money that you would pay to these large firms with little effect, you can make it more generous and hence more interesting to also take up for the smaller firms.

[SPEAKER_02]

I see.

Perfect.

[SPEAKER_01]

So I think that would be one implication.

[SPEAKER_02]

Yeah.

[SPEAKER_01]

Another one concerns firms that are not turning profit or don't have sufficient taxable profit to benefit from the incentives.

In most countries these days, there is a feature called refundability or cashback, where if you are loss-making, you get the value of the tax incentive paid by the government.

It's not the case everywhere.

In my country, in the Czech Republic, this is not the case.

So again, if you are a startup, you might not be profitable.

It would be really beneficial for you.

You would have a really big effect of the tax incentive.

but you can't benefit, you can't receive it because you don't turn profit yet.

You can carry it forward to the subsequent years, but by then maybe you don't exist anymore or you don't need it.

It's not the same thing as just getting it paid out now.

So I think that second feature definitely should be at play, at least for SMEs.

Well, and the third thing I think is about being mindful how the tax incentives are administered.

it's easy to say make the administrative burden not too high, but then the devil is in the details.

And I don't have the, I think it's hard to generalize.

These things are administered very differently in different countries.

But one point that I find interesting that we also find in our kind of exploring the uptake is that the uptake tends to be higher in countries where the incentives are

partially or fully administered by an innovation authority, which might be the innovation ministry or some innovation agency, as opposed to purely administered by tax authorities.

And I think it makes perfect sense from kind of institutional cultural standpoint where the

tax authorities, their raison d'etre is to collect taxes and prevent tax evasion.

And so they might be kind of biased on

In the trade-off, there are definitely... The thing with tax incentive is that determining what is R&D versus some sort of innovative, creative work that is not really R&D, it's not easy to tell.

And so there will always be some judgment, some expertise to tell this.

So one thing is that tax authorities might not have the expertise to tell what is R&D.

But also, like, in this, that necessarily it's trade-off between...

trying to really minimize tax evasion and false claims for the incentive versus the opposite mistakes where true R&D you don't recognize.

And the tax authorities might be bound to err on the side of being too strict in what they allow to be subsidized.

Whereas in working in conjunction with innovation authorities, they have more of

the expertise in the area.

In the Czech case, for example, the innovation authorities have the reviewers who also evaluate direct subsidies for R&D and so they kind of are used to evaluating R&D projects and at the same time there's more of a for them really what they are trying to promote is that this issue that the policy issues that innovation is increased that R&D expenditures increase so I think it provides a better balance than just leaving it with tax authorities alone.

[SPEAKER_02]

So basically introducing a ceiling for large firms where tax incentives are least effective and redirecting sort of the incentives for small companies to uptake it and make it less administrative hassle and just encourage them to apply more. Super interesting.

[SPEAKER_03]

Yeah, we at Center for Innovation Research, we have a lot of geographers who'd like to actually see what insights you have for geography. For example, could you actually elaborate your research in terms of geography? Is there, for example, an urban bias in R&D tax incentives? And what cross-regional or cross-country differences you have observed?

[SPEAKER_01]

So in terms of... I'm not a geographer.

And I...

So my insight here and also my work so far is not too regional kind of focus.

So my insight here will be limited.

But I will say a few things.

I think in general with like looking at business R&D it is inevitably I would say certainly in the Czech context and it's strongly concentrated in cities in particular a few big cities that's like a center of fact is like a small minority of all firms do invest in R&D or perform R&D at all

And these tend to be larger firms and they often are firms in cities, often firms close to major universities.

And there's, I think, so partly, I think it's kind of a factor of life and there's so much policy can do with it.

Of course, you can like support or establish universities outside. capital.

So in that sense, yes.

But once these universities are set up in the shorter term, there's so much you can do about it.

But I think an interesting question to me that I explore in some other projects, which are more looking at direct subsidies for research and development, is this like, imagine you're an evaluator or you're an agency dispersing the subsidies. It might be national subsidies, it might be subsidies financed by the European Union.

And you have to make a decision, do you rather give the subsidy to a firm from one of these

one of the biggest cities where already there is a lot of R&D.

These firms will look better on paper, they will be more productive, more export-oriented, maybe they will already have a stronger record in R&D. Or do you try to allocate more subsidies to to more disadvantaged regions in the Czech cases, often the regions kind of along the border closer or farther away from Prague. And so what I tried to do in an ongoing project is to estimate the effect of the subsidies when you give them to basically split the regions into those with higher GDP per capita and lower kind of into two halves. And you might think that they're straight up, you want to support the ones in the further away regions, but the effectiveness might be smaller there. But actually what I found that the effects, if anything, of the subsidies are greater in the more peripheral regions. And I think that's again in line with what I was saying earlier, that a lot of the evidence point out to to subsidies having greater effects where the credit constraints are more binding, where firms have fewer alternatives. And this is lately, it's a theme that repeats in different parts of my work. I also do some work about the impact of scientific grants to researchers like me or you. And there also across several studies, we actually find that that the impact of getting a grant on publications that you produce in the subsequent years is stronger for more junior researchers where again you could argue that more junior researchers such as like think an assistant professor somebody who's not doesn't have yet the new tenure they are more finance constrained. They don't have 10 other grants lined up. Whereas for a senior professor, if you don't get this grant, you might get something else. Or you have more power to allocate funding from your institutional funds within the university. But for the startup researchers, there's bigger effect of the funding. So this is a theme that I see a lot. And I think what happens often is that for the authority giving out the subsidies, let's go back to the firms, it's safer to maybe subsidize firms which which have more track record, they are profitable, they are kind of better, maybe they even have a better proposal. I think there might be a trade-off that even if you do purely based on quality, and we can also think about, of course, there's literature about like, being you know kind of drastic innovation like supporting risky financing risky projects versus kind of like lower risk lower reward projects but even abstracting from this It's, yeah, it's, even if you give the grants based on a pure kind of quality of the proposal, then that might not be the most efficient, but because maybe the firms that have the best proposals, okay, that's the best proposals, but they have alternatives, maybe they don't need it as much. There might be other firms like that are more financing on the street where it will really make most, most effective or the additionality of this grant will be greatest. And I think there's space to allocate the funding more on those grounds.

[SPEAKER_02]

This is super interesting because just like redistributing firms from larger, relatively lower returns to smaller, relatively higher returns, it's also shifting probably funds from urban cores to more peripheral regions, which is a part of my research.

So I'm really interested in that.

I will ask you for more research on that.

But should we go towards the end?

Do you have any pressing questions?

No, we could just go to the keyword.

Yes.

So in this podcast series, we're doing a series where for each guest, we ask them to leave a keyword for the next speaker.

And the next speaker is supposed to reflect on that keyword based on their research perspective and also give a keyword for the next speaker.

So the keyword that you got is connectivity.

So a few sentences on that from your perspective.

[SPEAKER_01]

Okay, I guess that's not the connectivity that my predecessor had on mine, but immediately what it brings to my mind is my latest research project, which is still kind of in early stages, which I will be presenting internally next week for the first time.

which is about spillovers from R&D.

And there we study how benefits of R&D spread through connectivity between firms, where here the connections are supplier and buyer relationships.

So we have information on Japanese firms and we know which firms are major buyers or suppliers of other firms.

Then we see if as a result of R&D disincentive reform exogenously, your suppliers or your buyers increase their investment into R&D, does it help you to become more productive, do better as a company?

[SPEAKER_02]

So spillover not in a geographic sense, but on a network sense.

Yes, indeed.

Super interesting.

Fantastic.

And your keyword for the next guest?

[SPEAKER_01]

Industrial policy.

[SPEAKER_03]

industrial policy okay yeah thank you very much it was a really interesting and enriching conversation related to R&D R&D subsidies thank you very much for joining us today till next time we'll be continuously uncovering stories and ideas behind academic research shaping our understanding of innovation and regional development thank you thank you so much Matej thank you for having me

[SPEAKER_00]

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