



THE BROOKINGS PODCAST ON ECONOMIC ACTIVITY

“What jobs will be most affected by AI?”

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Episode Summary:

Throughout history, human work has been augmented by technology. But the emergence of artificial intelligence tools have led many to ask whether an unprecedented shift in how we work with technology is imminent. In a new study, researchers used modern AI tools to look back at the recent history of technology's impact on work—which jobs were replaced, which were enhanced, and who was likely to benefit—and then used that model to look at the potential impacts of AI going forward. On this episode of the Brookings Podcast on

Economic Activity, two of the study's authors, Dimitris Papanikolaou and Lawrence D. W. Schmidt, join a conversation with Brookings Senior Fellow Molly Kinder to discuss their findings and the policy implications.

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EBERLY: I am Jan Eberly, the James R. and Helen D. Russell Professor of Finance at Northwestern University.

STEINNSON: And I'm Jón Steinsson, Marek Professor of Public Policy and Economics at the University of California Berkeley.

EBERLY: We are the co-editors of the *Brookings Papers on Economic Activity*, a semi-annual academic conference and journal that pairs rigorous research with real-time policy analysis to address the most urgent economic challenges of the day.

STEINNSON: And this is the *Brookings Podcast on Economic Activity*, where we share conversations with leading economists on the research they do and how it will affect economic policy.

EBERLY: Over the past several hundred years, technology has consistently shaped the requirements of human work. Whether it was combine harvesters replacing farm workers or telephone networks replacing switchboard operators, but the recent proliferation of artificial intelligence has raised particular concerns about the number and type of jobs that could be replaced.

In their paper "Automation and labor markets, past, present, and future: Evidence from two centuries of innovation," authors Huben Liu, Dimitris Papanikolaou, Lawrence Schmidt, and Bryan Seegmiller use AI tools to examine the long run evolution of worker technology dynamics.

STEINSSON: It's interesting that when we look backwards, it is clear that changes in technology are what drive the enormous increases in standards of living we have seen over the last few centuries. Yet, when we look forward, there is this constant concern about technology. This is true now, but it has been true ever since the start of the Industrial Revolution. Technology destroys some jobs, but it creates other jobs, and up until now eventually makes everyone better off.

AI is the source of much concern today. Interestingly, this paper uses AI to shed light on the potential effects of AI for jobs. An important piece of what the authors do in this paper is they use natural language processing and large language models to measure the exposure of different tasks that workers perform to technical change over time.

This is an input into estimating how technology affects the demand for different types of workers. It's a very impressive piece of data construction, but I'll let the authors describe what they find using this new dataset.

EBERLY: Today's conversation will be led by Molly Kinder, a senior fellow in Brookings Metro, who will be joined by co-authors Dimitris Papanikolaou, the John L. and Helen Kellogg Professor of Finance at Northwestern, and Larry Schmidt, the Victor J. Menezes Career Development Associate Professor of Finance, at MIT's Sloan School of Management.

With that, let's turn it over to Molly.

[3:02]

KINDER: Thanks, Jan and Jón. It's a pleasure to be here, to have this discussion today. Larry, welcome to Brookings.

SCHMIDT: Thank you. It's great to be here.

KINDER: Great, and thanks Dimitris for joining us as well.

PAPANIKOLAOU: Thank you. I'm excited to be here as well.

KINDER: Well, needless to say, I love this paper, so I'm excited to dive in. I think the audience listening is going to be very interested in your findings because, of course, everyone across the country in the world has been talking about Gen AI, what is it gonna mean for jobs? What is the future of work? And what I loved about your paper was you brought in history. You really did a very rigorous look in the past to help us understand how technology impacts work.

Can you tell our listeners what you learned from looking back in history. What has been the past, say, a hundred years impact of technology in the labor market, and what was surprising in your findings of the past?

[3:58]

PAPANIKOLAOU: So, let's be a little bit clear that it's very hard for us to make statements about the overall labor market. A lot of our focus is gonna be on making relative statements, which is this type of jobs perform differently relative to those types of jobs.

So, I think the overarching theme of our work is we're trying to understand the forces in play of how exactly does technological progress affect the demand for specific jobs. And the answer is not entirely obvious because there's a lot of forces at play and one has to do a little bit of detective work and try to disentangle them both conceptually, but also in the data.

So, for example, imagine you have a technology, and the technology is really good at doing some of the things that I do in my job. Taking the example from Gen AI, you know, I'm using Gen AI as a copy editor these days, so I write some of my work and then I ask Chat GPT to basically check for grammatical mistakes or ways of making the prose a little bit more concise, more clear, et cetera.

Now, this is just a small part of what I do. Part of my job is doing research, part my job is doing teaching, and what Gen AI is able to do is to basically help me, or rather it does one task better than me. So we can think of it as at this very sort of granular level, Gen AI is substituting for Dimitris in performing copy editing jobs.

Fortunately, my job also entails doing a lot of other tasks. So, you might think that yes, on some level it is replacing me. But on some other level, it's also freeing up my time to perform other tasks that I'm now, I have more time to do. So I have, I spend more time thinking about how to structure introduction, or what additional analysis we need to perform.

So even at the job level, the overall effect of a technology on labor demand is a little bit ambiguous, depends on the degree to which these improvements are concentrated only in a specific number of things that I do. Let's say just copy editing versus the technology being able to do most of the things that I do.

So, I think our starting point was this: let's try to create measures of these two objects in the data, and then try to relate it to changes in occupational labor demand. So, labor demand at the job level.

Now, what I just described is a, is just a very partial view. There's also broader forces in play, which is the technology can also change the demand for the products that my firm produces. And also if the firm becomes more efficient, I also start employing more people than me.

So, our goal was to basically tie all these forces together in a coherent framework and have a way of disentangling these forces in the data.

[7:04]

SCHMIDT: And so the one advantage that we saw in coming to this question is that there's actually a wealth of data available about technology, specifically what technology does, that allows us to think about, not just how much technological progress has there been, which is something we've been studying for a long time, but rather to get into the nitty gritty details about which actual tasks that workers do are related to technologies that emerge.

And so this allows us to help quantify the case where maybe you use Chat GPT as a copy editor, it's a subset of your tasks that are exposed versus maybe another type of job, such as someone who works in a call center, where you could think that potentially generative AI could do almost everything that people in the first couple of layers of a call center can do.

And so that's a case where the worker is competing with the technology on basically all aspects of what their job is. And so we can use the text data coming from patents, and one thing that's amazing about patent documents is that they're publicly available and they go back to 1850. And so parts of our study actually make use of this textual information that goes way, way back in time, because one thing that we think is useful is to bring a historical perspective to this question, because many fears have reemerged about technology displacing workers, but this is something that people have been concerned about for a very long period of time.

And so we're able to show that there are indeed situations in which you see technology displacing workers, but there are often other forces that can push in the other direction. So, if you look like the call center worker and technology can basically do everything that you do, this is very bad for the number of workers who are employed in specific occupations.

By contrast, if it's some fraction of the tasks, so the measure we create for this, we call it concentration, because the idea is to basically say, is there a lot of technological progress, but only in a fraction of the tasks that workers do, then they can reallocate their time and potentially become a lot more productive than they were to begin with.

And so, you know, administrative tasks, if they get freed from our plates, you know, potentially that gives us more time to do research and teach students, et cetera. So, we find evidence consistent with both of these effects. So, if you look like the call center worker, it's very bad news for occupational employment.

By contrast, if it looks like technology can help save you time in a subset of the tasks that you perform, this potentially dampens the blow associated with technological progress. And then if there's a lot of technological innovation related to the types of products that your firms are creating, for example, this is a rising tide that lifts all boats. And so we find evidence of spillovers basically, all these firms that are employing the workers taking advantage of the new technology are becoming a lot more productive. And so they make new things and better things.

And so this also helps insulate workers against potential displacement effects.

KINDER: That's great. As I was reading your paper, I thought your distinction between just sort of overall exposure versus the concentration of that technology exposure in a handful of tasks versus all, the example that popped into my head, 'cause you were looking in the past, was in law. A legal secretary who years ago would be doing the typing for the lawyer and the note taking, basically when computers came online and did all of that. And yet for the lawyer, it maybe was parts of a lawyer's job, and that freed up lawyers to be much more productive, and so their job numbers grow and probably their income grew. So, that's the sort of example I had in my head.

And that example leads me to a question for you, which is: you documented a few really interesting historical shifts. One was around gender, the other was around skill level and education. And so, I wanna talk about the pre-Chat GPT era because I think when, you know, we have some changes afoot right now, but looking back, and you did this over several different eras, and I would have to imagine that our listeners are very familiar with the narrative of men losing jobs in production roles. This is very well known. We've sort of had a lot of societal consequences, but that's not the only era that you documented.

So, can you give our listeners a little bit of that historical trend? We've had this long era of men in production roles, really losing some of that work, but there is another period

you identified that I think is really interesting and I'm hoping you can explain what that was and who that impacted.

[11:43]

PAPANIKOLAOU: So, I think one way to interpret our empirical analysis is we're basically saying, look, the shift of technology favored some occupations relative to others. Let's see whether there were systematic differences in these occupations in terms of observables.

So what we found is that the occupations that ended up experiencing increases in labor demand relative to the other occupations- and again, I'm not using the word benefit because one has to be clear here that we're only talking about relative differences, there's very little we can say about the overall level, so I really wanna emphasize that.

But those occupations that benefited, again, in relative terms, were occupations that tended to be attracting high skilled workers. By that, I mean workers that had on average more education relative to other workers; workers that were more likely to be female than other occupations; and also, workers that tended to get paid a higher wage to some extent.

And yes, that that narrative exists. I think what comes out of our analysis is that those trends have been there since essentially the beginning of the century. This is not a recent phenomenon, and it's not even obvious that it has accelerated in any way, but this has been a stylized feature of technological progress throughout the 20th century, and I found that surprising.

I did expect us to find some evidence of disappearing middle class and production workers and some shift towards high skill occupations. But I was somewhat surprised to see that it started earlier, by that I mean, even if you look in the early 1900s, you can see traces of that shift occurring.

KINDER: Yeah, I just wanna say that surprised me as well, Dimitris, that really stood out, 'cause I think a lot of us are familiar with the literature on skill biased technological change, but I think of that as something that starts mid-century and accelerates into the eighties and nineties.

So, I thought that was a really interesting finding of your paper.

[13:50]

PAPANIKOLAOU: I think the other two thing I think that came out is that the resulting shifts look like skill-biased technological change, even though in our framework, technologies always substituting for what workers do.

But yes, observationally, it is equivalent to skill bias change. The way that this is happening is that those occupations are benefiting because even if technology is

substituting for a part of their tasks, at the same time, it's freeing up a lot of time to do other stuff in their jobs and give them more productive.

So, the lawyers is an example of this or a calculator for a scientist where if you're a scientist or you are doing calculations now having a mechanical calculator is great. If all you think you're doing is doing calculations like a computer, which was a job back in the day, then that's probably not great for you.

[14:45]

SCHMIDT: One other thing that did change is that if you look at the tasks that are actually affected by technology, if you go back in time, it's mostly manual tasks. So, it's really, you know, mechanization that we're picking up for the vast majority of what we're doing. And then as you start to go into the more recent era, that's something that actually starts to change, is you see that more and more technology is related to cognitive tasks. And so that is a notable change, I would say.

And then if I recall correctly, early on in the sample, new technologies that are related to cognitive tasks were actually not associated with displacement of workers, but then as we go into the later part of the sample, this the time when it is becoming a big part of a movement in the technological frontier, there we find evidence consistent with the job polarization literature, that basically cognitive tasks that were exposed to these new technologies were actually associated with declines in demand for workers.

Another thing that I found quite interesting, is that you can use a little bit of the variation across different groups of workers, and the one thing that you can see very easily is age. And so we can look at different cohorts of workers and sometimes we have this idea that maybe technological change can be sort of benign. And the reason why is just that new workers who haven't yet decided what they wanna do with their lives will just avoid occupations that are declining, so then it can be a very easy adjustment potentially in a world that looks like that.

That's not what the data looked like at all. In fact, entering cohorts are just as likely to rise or shrink in response to these as cohorts of older workers, and in fact, it's actually the employment of the oldest cohorts of workers that's most exposed to new technological change. And what turns out to be driving that is that these concentration effects that we talk about, this idea that you could reallocate across tasks, those have the most predictive power for what happens to workers among the youngest cohorts of workers.

So, if you think about the folks who have the strongest incentive to invest in new skills, things like that. They're the ones who seem like they're benefiting the most from these potential reallocation opportunities. And that actually echoes a finding that we have from other work where we've looked at certain types of technological change, and we found there that it was actually older, high skilled workers who are potentially displaced more as a result of technological change relative to others.

KINDER: Well, Larry, you picked up my – two questions from now, I'm gonna go into age, but I wanna back up one before I get there, these are all the findings I found most interesting in your paper, so thank you for surfacing them for our listeners.

I wanna quickly go back to what Larry was talking about with this cognitive era with the computers and ICTs, and that's really the first time your paper starts picking up it isn't just physical manual work that's being displaced. And you had great examples in your paper articulating these technological innovations that actually I hadn't even been thinking about for some time. I mean, it's really worth reading your specific examples, many decades of how some of these innovations disrupted the need for physical work.

Then I think it was around the 1960s, 1980s, where you start seeing some of the cognitive work, and I wanna just ask a clarifying question: again, this is me nerding out just a little bit more than maybe our listeners wants, but when I looked in detail at your tables in the back, it seems to me that the cognitive displacement you find is consistent with the job polarization literature that showed that it was, yes, it was cognitive, but it was probably the more routine cognitive work. So, it's more the legal secretary and the clerical roles that women were doing, especially in the 1980s. So, in the paper I'm writing for Brookings, I go in depth at documenting, especially since 1980, huge declines in secretaries and these kinds of roles.

So really, I wanna just make sure that my understanding, 'cause I'm gonna get to a, a question later, is that where we're seeing the displacement of cognitive work of jobs is really in that kind of routine clerical work. It seems to me your data in terms of both education and wage shows that the increase has been in the higher paid, higher education cognitive work that I would call professional and managerial. And I just wanna clarify whether that's the right interpretation of your paper.

This is all the Pre-chat GBT era is this correct?

[19:12]

PAPANIKOLAOU: Yeah, that's correct. That's my sense as well.

KINDER: So, part of the reason why I asked this question is going into the findings around age. So, I've thought a lot about the reality that women have seemed to be more resilient than men to technological change over the past several decades. Women have shifted. Yes, there's been jobs that have declined, like these clerical roles. But women overall have moved a lot into the higher paying service-based and professional jobs. And I think something the paper doesn't really get at is in that same period that you pick up some of the declines in those routine cognitive tasks, women were going to college in huge numbers and preparing themselves for those higher paying jobs.

So, I'm wondering if part of the strategy – it might not have been explicit. I don't think women were going to college in huge numbers in the eighties and nineties 'cause they were afraid of technology taking over clerical jobs. I think they were just, some of the discrimination sort of fell and women were seeking opportunity. It turns out those better paying opportunities we're less exposed to the technology.

So, part of my question to you is this finding around young people pivoting in some ways, being able to be resilient, to go away from the jobs that are technologically exposed, could part of that mechanism have been this push into higher education and seeking out some of those better opportunities? And I ask this because I think today might look different.

[20:40]

SCHMIDT: It does seem like there's these two forces that are potentially offsetting each other that are consistent with our results.

So, on the one hand, it's right that these sort of routine cognitive types of jobs or clerical work is an area that gets hammered. We see that in our decompositions and that's consistent with the predictions of our model. It's also the case that the opportunities that involved more education and also interpersonal tasks, which is a category that we've consistently seen – basically, technology is never related to interpersonal tasks, and when it is, it's basically not correlated with what happens to, to labor demand going forward.

And so, I think both of those forces definitely help to offset so that, on net, if you look at occupations that women tended have higher shares, and actually the demand for those occupations tended to increase.

Again, that's for our in-sample analysis that we do.

[21:35]

PAPANIKOLAOU: It's important to make one distinction, I think, which I think will set the discussion for what follows as well, which is: our paper is not really about what happens to individual workers; our paper is really what's happening to jobs.

So, I think we have to be very clear or very careful in drawing a distinction between the number of jobs in a particular occupation and what's happening to the incumbent workers in that occupation. So, for example, yeah, you might think that if the labor demand for administrative assistants goes down, some people are gonna lose their job. I think that makes sense. What is a bit less obvious though, is if technology just changes the nature of a job, that is going back to my earlier example where now technology can do some of my tasks, which allows me time to focus on the other tasks, what may happen also is that technology also just changes as of tasks that I can potentially do.

And here there might be differences across workers in their ability to do these new tasks. So, and this actually echoes some of the findings in our other work, where we had these technologies that at the job level that led to more job creation. So, let's say they increased the demand for a specific job, but if you were looking at what's happening to incumbent workers in those jobs, those workers were not experiencing increases in earnings.

Much of that increase occurred to new entrants in that occupation. And again, that's not something that we fully have a great grasp yet because again, there are data limitations, but I do think that understanding the process through which workers move across jobs and what are the frictions also what's happening when the jobs are changing, I think it's sort of first order. If you think about what is the human cost, so to speak, of changes in technology.

[23:31]

SCHMIDT: One simple framework that is consistent with a lot of the results that we see is that if you look at non-routine related technological changes, so it's the good part of the job polarization literature, the place where we saw big increases in demand for workers.

If you look at the incumbents who are most affected, it looks like it's the folks who have the most accumulated skills and expertise prior to those new technologies emerging. And so, on the one hand, this is gonna be great for some workers in those jobs. The nature of those jobs will be changing consistent with the evidence that we document throughout this paper.

But the people who were in those jobs before, especially the best educated, the most experienced, like older workers, and the highest paid workers are the ones who actually experience very large earnings declines. And it's sort of a messy process as well where lots of people are okay, but there's a subset of workers who really experience big declines going forward.

And so yes, we definitely think it's interesting to draw that distinction between the jobs which evolve in response to technology, but also it's not necessarily the same people in those jobs going forward.

KINDER: This is so fascinating because you're teeing up all these findings and now we're entering what feels like a new world of technology. Like Gen AI, there's lots of ways this might look very different from the past.

So, tell me if I've synthesized this correctly: my read of your pre-Chat GPT pre-Gen AI findings over a hundred years is the experiences in the labor market is jobs have moved more female, more educated, and less manual. If that's the correct assumption. It's polarized, we've lost jobs in the middle. We have seen some rise in very low paid jobs, but we've seen a lot of a move toward female, higher paid, higher wage, higher educated work, less manual.

Now enters Chat GPT, which I've worked in this space of technology and work for enough years, that predate Chat GPT. A lot of our assumptions of technology have been upended. Still don't really know, it's early days. A paper I just put out a few weeks ago with Yale shows, we're not even really seeing a labor market impact yet of Gen AI, but a lot of the fundamentals of this technology feel quite different. And your paper picks that up.

So, walk us through what is different potentially about this technology in terms of where you see the job impacts that you model out, how is this different from what the last hundred years or so looks like?

[25:59]

SCHMIDT: One of the most important differences between this technology and ones in the past is that while it's true that some technologies were related to cognitive tasks, the set of tasks to which AI seems to be related is completely different.

So, we have a previous paper which thinks about adoption of AI where we also use textual information from online resumes to look at which types of workers we're exposed to that technology. And you see, in contrast to everything else, it's basically the higher paid you are, the more education you have, the more non-routine tasks you're doing, the more likely it is that you are actually exposed to this technology.

So it's a very different group of workers who's exposed now relative to the past, and it's also, whereas previous technologies may have been more related to the routine cognitive tasks, there are a number of non-routine cognitive tasks that it seems like AI really excels at, especially generative AI.

And so, it's a different set of tasks, which is one important distinction.

KINDER: And Dimitris, I'm curious, when you model out, you look into the future, you project looking at exposure, you had a few different methodologies you used.

What's the implication of what Larry said to where jobs could be going?

[27:16]

PAPANIKOLAOU: Right. So let's be very clear that this is the part of the paper that is the most speculative, and everyone has a strong view about AI, and I don't think we have enough information to comfortably say what AI will or will not be able to do five years from now.

So, we structured that paper as a series of what ifs. So we said, what if AI can substitute for a lot of the cognitive tasks? And more so, if this task don't require a lot of prior experience. And then if that's your view of what AI is gonna look like in five years, then we expect to see that the jobs that are gonna experience the largest decline in labor demand relative to other jobs are gonna be exactly the jobs that benefited over the last century. That is jobs that had a higher share of female workers, more educated workers, and used to produce high wages.

So, in that sense, a reasonable guess is that AI is gonna reverse some of the labor market trends over the last hundred years. Now, is it gonna fully reverse them? Is it gonna partially reverse them? I think a lot of it depends on how productive ultimately the technology is, how widely it's adopted. And also what else it can do.

And again, these are all relative statements. I think thinking about the overall impact of AI and productivity is an interesting question, but it was a little bit too hard to tackle in this paper 'cause one needs to make a lot of additional assumptions.

KINDER: I really love this part of your paper. A question for you: the way you just framed the methodology of your assumption that cognitive tasks that don't require a lot of experience are the most substitutable. That seems to be the opposite trend that you found in your previous period where it was the most experienced and most knowledgeable that might potentially experience the biggest earnings falls.

How do you think about that early career versus later, the most experienced versus less? Should I read from this that you're projecting that Gen AI is able to do the sort of early career, the less experienced cognitive tasks, but not the much more complex, more experience. How would that potentially impact the labor market?

[29:35]

PAPANIKOLAOU: Just to clarify, in our previous work, we never really said that technology's gonna replace cognitive tasks that required a lot of experience. If anything, we're thinking more about a distinction of what constitutes our routine cognitive tasks. That's something that you can describe. It's simple instructions versus something that's somewhat more complicated.

Here we're thinking, okay, maybe I, what I do is do some of these more complicated cognitive tasks that, however, don't require a lot of experience. Another way to think about it is part of some tasks, there's a lot of data that's available to them, and then we can train AI models, and this may be the tasks that don't require a lot of human intuition or know-how that's hard to qualify and write down

KINDER: Like judgment.

[30:20]

PAPANIKOLAOU: Yeah, a lot of judgment, things that, think that some intuition that develops after years of doing a particular job. Like airline pilot, I imagine it's not a task that AI is gonna be able to do unless we can generate lots and lots of data and simulations of work of pilots, a specific scenario, and somehow be able to extract all the knowledge from pilots and store it into an AI

KINDER: In fact, I'm writing a paper right now for Brookings about the risks for sort of less experienced workers for Gen AI in particular. I'm reflecting on something Larry said. Maybe it wasn't the jobs. I think I heard you Larry suggest that it was some of the individuals who had a lot of experience who experienced the biggest earning falls.

I'm curious if what Dimitris just said, and some of the data that we just saw coming out of Stanford, the canaries in the coal mine paper, suggesting there may be an effect of AI on just the youngest workers. Is there potentially something in here that feels a little different in that sense in terms of how gen AI. Should we be thinking actually, maybe

this might be something that's really gonna upend the younger workers versus the more experienced who have the judgment, who have that kind of tacit knowledge that AI doesn't have? I'm curious if you have thoughts on that.

[31:35]

SCHMIDT: I think one thing that is potentially very different about generative AI versus previous technologies is that knowing whether the thing works or not is a subtle and confusing process. So whereas typically you could think we go into a situation where there's just a new way of doing things and no one knows how to do it, which is why the incumbent workers aren't necessarily, I was the best at doing it the old way. That doesn't mean I'm good at doing it the new way. That's the sort of logic that's consistent with what we found in the earlier paper.

One thing that's interesting about large language models is that they're pretty good at tracking that sort of tacit knowledge and expertise that collectively we've accumulated on the internet and so on, but they're occasionally way off. And we see that when we play with AI in just experimenting whether it can do various things that we do in our day-to-day as academics. I have these conversations with my colleagues all the time.

So, it might well be that this is one of those cases where knowing whether the thing is right is incredibly valuable. And so that is one way in which, it could first of all be that the set of tasks that LLMs can do quickly, like that we can offload to, are the sorts of things that you might have given to an intern before because you weren't sure whether they were gonna do it right. But ideally, they would save you time.

Well, now you can have an AI intern that can do it in a fraction of a second with potentially even higher quality. So that is something that does feel potentially different. On the other hand, it's a completely different way of operating, and so we'll see. My guess is that it's gonna be a little bit of both depending on the context.

[33:15]

PAPANIKOLAOU: Let me add a few words to that as well. So, yes, there's this fear that AI can do a lot of the things that entry level workers do. I'm still not convinced they can fully do it without a process of verification. I mean, copy editing a paper, something where I can immediately verify what it's done.

But anytime I ask something more complicated, I think there's a 50/ 50 chance that it just BSes me and tells me something I want to hear and gives me an answer that appears correct and superficially seems right, but once you dig a little bit deeper, it, you just, you realize it's taken a lot of shortcuts and just potentially just tries to make me happy.

So that's one. And the second thing is, it's not entirely obvious why do firms have these entry level jobs? So obviously there's a set of tasks that may not require a lot of experience, and yes, AI can do that, but I think these entry level jobs also serve as a way for firms to grow more experienced workers.

So, for example, like in investment banking, you know, the firms hire a lot of these entry level workers and there's a process where they select the better workers for the top. Now, unless you tell me that it's really easy for these firms to figure out who are the workers that are gonna be the better mid-level managers down the line, it's gonna be very clear to, yeah, if you have no entry level workers, eventually gonna have no mid-level managers, right? How are these people gonna get trained?

Now that said, we might reach another type of equilibrium where just education gets reorganized, which is instead of workers going for three years to, I don't know, Goldman Sachs or some other like consulting firm and learn how to do things, maybe they go back to like a business school or they have a part-time job and part-time education.

So it's possible that new forms will emerge. So, I'm not as pessimistic about the future of young people as, as just reading that Atlantic article.

KINDER: Great. Well, Dimitris, hold that thought because I have some further research coming out and I'll call you to get your feedback.

We are out of time. Last just 30 seconds. Is there one really important takeaway you would want a policymaker to pay attention to in your paper? Just as we wrap this up.

[35:35]

PAPANIKOLAOU: I think adaptability is important and to the extent that technology renders some skills obsolete, I think it's important to have a way for workers to acquire new skills that are useful in the marketplace.

KINDER: Great. Larry, anything from you?

[35:54]

SCHMIDT: I think a lesson from many of the papers we have, which kind of dovetails with what Dimitris said, is just that technological change always reallocates a lot of what we need from workers in the labor market. And so, we need to plan for that reallocation and think about the ways that we can do that in a productive way.

KINDER: Great. Well, Larry, Dimitris, this was such a great conversation. I encourage our listeners to go out and read the full paper and your additional papers as well. Thanks for joining us, and thanks for sharing your terrific research with us.

PAPANIKOLAOU: Thank you, Molly. It was a pleasure.

SCHMIDT: Thanks, Molly.

[music]

STEINNSON: Once again, I'm Jón Steinsson.

EBERLY: And I'm Jan Eberly.

STEINNSON: And this has been the *Brookings Podcast on Economic Activity*. Thanks to our guests for this great conversation and be sure to subscribe to get notifications about new releases of this podcast.

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