TRANSCRIPT

Key Conversations with Phi Beta Kappa

Economist Paula Stephan on Incentives and Gender Biases

As a college student, Professor Paula Stephan fell in love with economics as a way to understand and influence systems that impacted many people's lives. Years of documenting and analyzing the role of gender in academic performance and the impact of monetary and status incentives on scholars and universities have led her to startling conclusions. In this episode, PBK's Fred Lawrence asks the Georgia State University's to go beyond the research.

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Musical interlude.

Lawrence: Hello, and welcome to Key Conversations with Phi Beta Kappa. I'm Fred Lawrence, Secretary and CEO of The Phi Beta Kappa Society. This podcast features conversations with Phi Beta Kappa Visiting Scholars who spend one academic year with us. They travel to up to eight Phi Beta Kappa-affiliated colleges and universities, partake in the academic life, and present a lecture on a topic in their field. Lectures are always free and open to the public. For a full schedule, and to learn more about the program, visit pbk.org.

Musical interlude.

Lawrence: Joining me today is Paula Stephan, a professor of economics at Georgia State University and a research associate at the National Bureau of Economic Research. Her research focuses on how economics shapes science as practiced at public research universities. Paula, thank you for joining us today.

Stephan: It's a pleasure to be here.

Lawrence: You've done some really provocative research on gender in science, and particularly the gender pairing of the gender of a graduate student and the gender of that graduate student's advisor, and how that affects publication rates. Tell us a little about that.

Stephan: Well, that is the study that I engaged in with three other co-authors. And we had access to an elite university's records over a 10-year period and we were able to match the gender of the student with the gender of their advisor. And we were able to observe what happened to the student in terms of research productivity while they were a graduate student and after they graduated, for three years. And so this is a really rich database from an economist's point of view, it's what we called a pooled database, and it allows us to control for all kinds of things you couldn't control for otherwise. And, as you say, what we were particularly interested in is we knew the gender of the advisor and we knew the gender of the student, and we wanted to see whether productivity depended on that gender matching. But first just fundamentally we wanted to see, controlling for field and other things, whether women wrote fewer articles as graduate students than men did.

Lawrence: What did you find?

Stephan: And we found very strong statistical evidence that the answer to that was yes. Not as great a difference as we observed later in the career, which is about 18 percent, but about 10 percent while they were in graduate school. So then we go to this question that you mentioned and that is: does this depend in any way upon whether the student is a woman working with a woman or working with a man, whether it's a male student working with a female advisor, etc.? And the hypotheses for this are pretty much drawn from both psychology and sociology, talking about the stronger role women play in mentoring and also the role, shall we say perhaps gender bias in the way men and women evaluate the strengths of both men and women.

Lawrence: So what was the hypothesis? What did you think you were going to find before the data came in?

Stephan: Well, I think we've found, we thought that we would find, perhaps the strongest, we really thought the negative result here was going to be women with male advisors, that they were going to be the least productive. And we thought they would stand out particularly. What we found is we definitely found that, but what we found is that the most productive group was men writing with women advisors. And they wrote 10 percent more, and women writing with male professors wrote eight percent less when the benchmark is men writing with men. And we found no statistical difference between women writing with women.

Lawrence: And the difference of eight percent, 10 percent. These are huge differences.

Stephan: They're huge differences. And, I mean, the concept of cumulative advantage or the Matthew Effect, as Robert Martin would say "that to him who has even more will be given." I mean, if you leave graduate school with a much stronger portfolio, it's going to have repercussions on your career for the rest of your life.

Lawrence: Right. These lives are very path-dependent. And the path is being set right from the beginning here.

Stephan: Absolutely.

Lawrence: So let me take you beyond the data, and this is probably the part two you're less comfortable with as an economist, not a social psychologist, but here goes anyway. So what's your theory? What's making this happen?

Stephan: Well, I think, I mean, my reading in that literature, and this is an economist reading this literature, but I really do think that there is strong credibility to the fact that when you evaluate the strength of a student, that we have gender biases and that men overvalue men, but women also seem to overvalue men. And on the other hand, women seem to have a mentoring edge, and men don't seem to be so good at that. But I'm trained as an economist and I also always have to raise the red flag of selection here. So we don't know whether it's also that women, for example, may be very good at choosing what they think are the best students in the group to write with. I mean that's possible.

Lawrence: Although if that were the case, we'd expect they would also choose the best women to write with. So we'd see the same differential effect. Wouldn't we?

Stephan: Well, I think you're right. But, of course, if you have this bias about how you value best, it may not show up.

Lawrence: So you're stacking biases on top of biases and getting this result.

Stephan: Absolutely. But I do think that raises a real cautionary flag to any director of a graduate program.

Lawrence: Has this been out long enough to start to see some effect? Has there been discussion in the field about how these things are being handled?

Stephan: There's some discussion. I should say there's a lot of work done at the undergraduate level looking at these kind of gender matches. But it hasn't been out long enough really to see any big impact.

Lawrence: Another area you've worked in that has a lot of currency today, question of foreign-born scientists is part of the whole question of immigration. What role have foreign-born scientists played in American science? And how do you see that all going forward today?

Stephan: Well, foreign-born scientists are disproportionately productive in the US. Historically, they have been, and we see that edge even today. There are a number of reasons for that. And one could obviously be back to our friend selection here.

Lawrence: Right, right, right.

Stephan: You know, that they are better when, we admit better students and the faculty that we hire who were foreign-educated or foreign-born have an edge. So there's definitely that at work, and I believe that's a component. But there's also work I've done with a couple of Italian coauthors in which we looked at the foreign-born through a server in 16 countries. We continually see this edge. And we, as economists, try to control for the selection and we still find the edge. And one of the possible reasons is if we look at faculty, particularly, and we're talking about faculty who are hired and go into a particular research situation,

there's a reason for their being hired. And that reason could be that they bring unusual skills or they have something that matches very well with the resources that are there. And to the extent that that kind of matching really contributes to productivity, I definitely think that's part of the story.

Lawrence: And do we think that the current climate with respect to immigration is going to have an effect on all this?

Stephan: I think it's sending a big chill. And if you look at the Council of Graduate Schools report, we say that at least at the master's level, the number of international students who applied and were admitted last year declined. It held on the Ph.D. level. But I think we really have to be concerned about this. And there was a National Academy committee report I was on that looked at this right after 9-11 that raised similar concerns.

Lawrence: I always found our challenge was deciding how many international students we wanted to bring to our school because the quality of the students we got was extraordinary and really improved the overall applicant pool, and ultimately the student body.

Stephan: Absolutely.

Lawrence: So you work at the intersection of science and economics, but you were almost a history major, weren't you?

Stephan: That's true. I was almost a history major at Grinnell College. And I took a couple of courses in economics. And I got hooked on the idea that one could perhaps make more of a difference in the world with economics than one could with history. And it was, I have to say, in the 1960s when the war on poverty was something we all talked a lot about, and I became very engaged in the topic then.

Lawrence: Tell me how economics appealed to you in that regard.

Stephan: Well, I've always been intrigued by the fact that if you want to, if you want to have change, you have to think about incentives, and you have to think about costs, and you have to think about how we can change some of those parameters. And I just found the whole idea that one could perhaps have a real effect on policy through knowing these kinds of skills very appealing to me.

Lawrence: So let's talk a little bit about incentives and cost. You've said that economics is ultimately about incentives and costs. So how do we incentivize science in this society?

Stephan: Well, science is a system in which there are strong incentives to be highly productive, particularly at research universities. People's promotion comes based on their publications, based on the impact factor of the journal in which they published, based upon how much external funding they brought in. So those are all incentives to behave in a certain kind of way. And we certainly see incentives encouraging where people submit manuscripts for publication. We see incentives in the way universities behave. I could give many examples, but we'll stop right there.

Lawrence: Well, let's talk a little bit about where people submit their articles. And, actually, you've written a little bit about how international scholars' incentive structure affects where they submit. Can you tell us a little about that?

Stephan: Yeah, this was an interesting study I did with two Italian colleagues, and we were very interested in the fact that a number of countries in the last 15 to 20 years have adopted strategies to try to encourage their scientists to publish in leading-edge top journals. And we took a number of countries and divided these into countries that gave a cash bonus for publishing in a top journal, countries that the bonus or the money really went to the university, countries where you could get promoted on an early timeframe for publishing in a top journal, and then countries that had no change in policy. And the journal *Science* kindly gave us all of their submission data for 10 years, and we coded it by the country of the submitting author. And we found, benchmarking it to 2000, that where the greatest growth in submissions came from, was countries that were giving cash bonuses. And it was a significant increase.

Lawrence: Would you advocate universities to take that approach? If you were advising the provost in your university, would this be a good strategy for the university?

Stephan: Well, I think it's a strategy that has a number of perverse incentives attached to it that we could go into. And it turned, but we have to put these incentives in perspective. So for example, in China, many of these incentives for publishing in *Science* or *Nature* are worth eight to 15 times the salary for that year. Very, very large.

Lawrence: But that's for having an article accepted for publication, not just submitting.

Stephan: Absolutely. And so what we found is that you've got this huge increase in submissions without an increase in acceptances.

Lawrence: Scientific lottery tickets.

Stephan: Scientific lottery. Although I have to say, and I was very critical of it at the time, if we went back and did the study, we see that the number of articles published by Chinese authors I believe has grown significantly in *Science*. Now of course there are many factors doing that, but part of it may well be that this really encouraged these scientists to reach out and look for international co-authors who had something to offer in this equation.

Lawrence: We've been talking about individual's incentives, but universities have incentives as well, don't they?

Stephan: Absolutely.

Lawrence: So how have we incentivized universities? And to what extent has that been productive? And to what extent would you say these are actually counterproductive incentives?

Stephan: Universities have incredibly strong incentives to build their reputation. I mean, reputation matters everything. You were president of a university.

Lawrence: We took our reputation very seriously, you bet.

Stephan: You take your reputation very seriously. And one of the things that reputation is based on is the amount of external funding that's coming into the university. Another thing is the number of members of the National Academy that are on your campus, that are members of your faculty, number of PhDs bestowed. So universities pay a great deal of attention to those things. And they go to a great deal of work to attract faculty that will be highly productive and will bring in these grants, but will also help to pay for the very expensive research space that universities have put up to attract these scientists. Indeed, I like to say that in many ways universities have become high-end shopping malls,

Lawrence: Right.

Stephan: That they're in the business of building state-of-the-art research facilities or mall space, and they then turn around and they rent this out to faculty in the forms of indirect recovery and buy out on salary. And in the, in the most extreme case, they "rented" to scientists who are on soft-money positions. So they've also exported all the risk onto the scientist.

Lawrence: Has this always been true with American research universities or is this a relatively recent phenomenon?

Stephan: Well, I think it's important to remember that universities got very little research money until after World War II. And after World War II, and as somebody at NIH said, at the end of World, that science emerged from World War II spelled with a capital S. I mean, science had really delivered at the end of World War II. And of course we all probably are familiar with the idea that Vannevar Bush wrote *[Science:] The Endless Frontier* and argued very cleverly, lobbied Roosevelt to ask him to write the report. Of course he was already ready to do that. And--

Lawrence: Some think that report was already in draft at the time he got the commission.

Stephan: Yes. I think that's possible. I think that's very possible. And so, you know, this report is the basis for the great expansion of NIH and for the creation of NSF.

Lawrence: Just assume for a moment that there weren't a political problem. What would be the solution? If you could design a better system.

Stephan: Well, I have to say this isn't something I've spent a lot of time thinking about because it seems so, um...

Lawrence: Speculative.

Stephan: So incredibly speculative. Alright. But I think there are a number of these costs that the federal government should just directly support. And that should be able to be written kind of above the line. And I also think we need more just basic block funding to universities in that respect.

Lawrence: Now, I'm going to guess that one of the reasons that you would want block funding is it would allow universities to have much more speculative research, much more risk-taking research. I know you've written quite a bit about the challenges of universities pursuing risk strategies. I've always told my team, if all your ideas are good ideas, you don't have enough ideas. But is that in fact a strategy that universities can afford to pursue today or have we created incentives against risk taking research?

Stephan: Well, I think the way our system funds research has strong incentives aren't in it to discourage risk taking. So, I mean, the basic model is that a faculty member is hired and given a startup package and given a lab and vital team members, the principal investigator. But that startup package and that, those funds, is only going to cover that faculty member for two to three years, and the faculty member is going to have to bring in at research universities outside funding to stay in business basically. And you have to do it fairly quickly in your career. And if you don't, your chances for tenure are not that good. And so this puts tremendous pressure on the system to write proposals that are extremely fundable. And we do have evidence that funding organizations are pretty risk averse also. So if you put incentives from the point of view of faculty that you need something that's going to be pretty sure a sure bet. And you marry that with reviewers that are somewhat risk averse, you really foster risk aversion I think.

Lawrence: So why are the reviewers risk averse?

Stephan: That perhaps is something we should talk to sociologists and psychologists about. But there certainly is strong evidence that reviewers are pretty risk averse. And I think it's partly, um, it's not all on for psychologists and sociologists. Once again it's about incentives. And I think reviewers identify very much with the organization they're reviewing for, so they really want that organization to be successful, and they're very, very worried about the organization looking like it's frivolously spending its resources. And so you can hear, and I've been on a number of reviews and I've been a member of council of NIGMS at NIH. I mean people often are concerned about what it will look like to the public. Are we taking excessive amounts of risk?

Lawrence: Is there a difference between public organizations like the National Institutes of Health, National Science Foundation, NIH and NSF, and private foundations, private organizations that fund?

Stephan: That's a great question. I think, I mean the most work has been done comparing what the Howard Hughes Medical Institute, HHMI, does for funding and their funding model versus the NIH-type funding model. And the two parameters that really stick out there, or stand out, are that HHMI now funds people for a period of seven years. And if you have that long a window, when NIH used to fund people for three to four years, if you have the seven year window and something goes south in your research, you have time to recover. But if you've got to have results in three to four years so you can get renewed, so you can go on this again, the cycle again, it does encourage risk aversion I think. And the other thing is that HHMI has funded what we think of as people rather than projects, so they kind of look at the whole person and their research output and it's not so project oriented. And once you make things project oriented, reviewers just are obsessed with preliminary results.

Lawrence: So with all of these funds flowing into a university for research and the incentive to create indirect cost funds that fund other parts of the university, does this create any dislocation within the university overall across from the sciences to the social sciences and across to the humanities and the arts?

Stephan: I think very much so. I mean the incentives for a university are all there to invest very, very heavily, particularly in the biomedical sciences, and nowhere would did we see this more than when the NIH budget doubled. The NIH budget doubled between 1998 and 2003. And NIH kept saying, this is a one-time doubling. Don't count on this.

Lawrence: I know how we all responded to that.

Stephan: But universities thought, hm, this is an opportunity to really expand. And almost every university with a medical school and other universities really went on a major building binge to create better research facilities, new research facilities, upgrade their facilities. By NSF data, we see this huge increase in research space for the biomedical sciences during this time, and we don't see that kind of increase on others.

Now, you know, and I know that this doubling didn't continue. And there were a lot of universities caught having borrowed to build these buildings, having, in some sense, mortgaged their future, I think. And you can find a certain amount of research space in mothballs in the US. Now, economists like to talk about incidence and this certainly has incidence in the university and one suspects that it's not the biomedical sciences that are paying for this. One suspects it's other parts of the university that are.

Lawrence: You have had visiting faculty positions all over the world, in Italy, and the Max Planck Institute in Germany, and Belgium. And now you're a Visiting Scholar for Phi Beta Kappa here in the United States. What attracted you to become a Visiting Scholar?

Stephan: Well, I see it as just a wonderful opportunity to spend time with students and I should say also with faculty on campuses that I would never go to before, that I've never been to before and probably would not go to without this Visiting Scholar program.

Lawrence: Now, you've already done a couple of these visits. You want to tell us a couple of stories about some of those visits?

Stephan: I've already done two of these. I just came back from the University of South Dakota and I found student engagement with some of these questions, the questions they asked, their interest in these, to be extremely rewarding. And perhaps particularly rewarding of the casual lunches one has with students where people talk about career possibilities, how you make decisions and things like that. And that's an environment that I haven't really been part of and I really appreciate that. I'm going to Cornell College in Iowa next week, and yesterday I got an invitation to come to a faculty member's house for dinner with 15 students the day I arrive. And that's just a real opportunity to spend time talking with students.

Lawrence: Those are the kinds of things those students will remember more than anything. Long after they've forgotten their multivariable calculus, I suspect they'll remember when they had dinner with you.

Stephan: That's true, but it's also the kind of thing I'll remember from being a Phi Beta Kappa Visiting Scholar.

Lawrence: Thanks for being with us today.

Stephan: Thank you.

Musical interlude.

Lawrence: Thanks for listening. This podcast is produced by Lantigua Williams & Co. Hadley White is the PBK producer on the show. Our theme song is "Back to Back" by Yan Perchuk. To learn more about the Phi Beta Kappa Visiting Scholar Program, please visit pbk.org. I'm Fred Lawrence. Until next time.

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