Elaine Bennett Research Prize AEA Session Presentations

David Weinstein:
I think many of us first came to know Emi after her job market paper with Jon entitled *Five Facts About Prices: A Reevaluation of Menu Cost Models*. And when I was talking with Serena Ng about how I should structure my introductory remarks, we came to the conclusion that the best way to do so would be to present some new research which we titled *Five Facts About Emi Nakamura: A Reevaluation of Her Contributions*. Now, for those of you who haven't written a *Five Facts* paper, one of the pitfalls is that you have to be careful not to base the paper on facts that everyone knows.

For example, if I simply told you the following *Five Facts* about Emi namely that she's a great researcher, that she's a tremendous colleague, that she's a wonderful teacher, that her career has had a meteoric rise and that she's completely charming; you might say that is a *Five Facts* paper, but we already knew that. So in order to do a true *Five Facts* paper, you need to have some five new and interesting facts about Emi.

So what were the *Five Facts* that we came up with? The first fact is: how many economists are there in Emi's family? And the answer is five. First, of course, there is Emi, a graduate from Princeton at the tender age of 20 in 2001 and then Harvard six years later. Secondly, her husband, Jon Steinsson is also an economist. What some of you may know is that both of her parents who are here today, Alice who's over there is a faculty member at Alberta and Masao is a faculty member at UBC, are also economists. And then her grandfather was Guy Orcutt who was an economist at Yale and also my senior thesis advisor. I got an A.

Fact two is: if you say what research areas does Emi work on, how many of them are there; turns out that there are five. She's made tremendous contributions in work on sticky prices, on monetary policy, on exchange rate pass-through, on fiscal stimulus and rare events and consumption disasters. But in order to get an award such as this, you need to have high impact. So if you define high impact papers as papers that you've written in the last seven years that have more than 100 citations, and you ask how many has Emi written: The answer is five. And that covers not only the work on pricing but the crises, the pass-through, et cetera, that I've talked about earlier. But of course, it's not just a matter of having completed a tremendous body of research that qualifies you for such a prestigious award. You need to have a lot of work in the pipeline and, of course, Emi lists five working papers on her CV.

And finally the last and final fact of the *Five Facts* about Emi consists of the accolades she's won up until this point. If I said how many prestigious awards has she won prior to this one, the answer of course is five: winning Best Thesis Award at Princeton, the President's Award for
Academic Achievement at Princeton, an NSF dissertation fellowship, a Sloan research fellowship, NSF CAREER grant, and most recently listed as one of the 25 most influential young economists at the IMF.

So hopefully what I have succeeded in doing is not only propping up this microphone but convincing you that not only the Five Facts that everyone knew about Emi before were true, but there are many other facts about Emi that make her infinitely deserving of this award. And now without any further ado and with no additional facts to reveal (although Emi may have some facts to reveal) I'd like to turn the floor over to Emi.

Emi Nakamura:

Thank you very much. It's great to be here, particularly in Boston where I went to grad school, so a number of my advisers can be here. And also my parents, who as David mentioned, are also economists and have always been a source of inspiration to me, were also able to attend. So I want to thank the organizers of CSWEP for selecting me for this award, which is really a huge honor.

They asked me to say a few words about my research which, as David mentioned, is somewhat eclectic, maybe more eclectic than most. So I was trying to think about how to structure this. What came to mind for me was a postcard that I got from the Milton Friedman Institute a few years ago which was celebrating the centennial of Milton Friedman's birth. It had a quote from Milton Friedman where he was talking about the importance of what he called positive economics as a complement to normative economics.

When I mentioned this idea to other people, I've heard a lot of jokes about positive economics—as opposed to negative economics.
This is Milton Friedman's definition: Positive scientific knowledge that enables us to predict the consequences of a possible course of action is clearly a prerequisite for the normative judgment whether that course of action is desirable. This idea about positive economics, and the importance of figuring out what kind of a world we live in, has always been a big inspiration to me in research. And I think it serves as sort of an organizing principle for my research. Two of the topics on which I've thought a lot about the importance of positive economics are monetary and fiscal policy.

For those of you who are not macroeconomists in the room, you might be surprised to hear that macroeconomists haven't fully figured out what the effects of monetary and fiscal policy are on
the economy. From reading *The Wall Street Journal*, you might think that we would have had this completely figured out. But the fact is that it's actually really hard and the fundamental difficulty is one of endogeneity.

The challenge is that, for example in the case of monetary policy, the Fed does things for a reason. The whole point of the Fed as an institution is to set interest rates in a way that is reacting to things that are going on in the economy. Every single thing that the Fed does—every decision on interest rates—is poured over by hundreds of economists. As a consequence, there is a huge systematic aspect in what monetary policy does and it doesn't leave a lot of random variation left for us to estimate the effects of monetary policy. And of course the same thing can be said of fiscal policy.

So this is the challenge. And in addition to this, no one has—fortunately or unfortunately—let loose macroeconomists to do randomized trials on the economy to figure out how these things really work. So we're left with using other kinds of methods.

In grad school, I used to sit sequentially through two great courses. The first was Caroline Hoxby's labor economics class. The second was Ariel Pakes' IO class. These are both great classes. Of course they gave quite different perspectives on empirical methods, with Caroline Hoxby's class focusing a lot on non-structural methods and Ariel's class focusing a lot on structural methods. And because of the difficulty of these challenges that we face in macroeconomics, I would say that macroeconomists have tried to use both approaches to answering these kinds of questions.

**Effects of Monetary Policy**

**Structural approaches:**
- If prices were frictionless...
  - Double money supply — Prices will double (instantly)
  - Nothing happens: Like converting from inches to centimeters
- Key input: *price rigidity*
- Can we measure price rigidity?


On the structural side, a big idea in macroeconomics is price rigidity, the idea that prices don't adjust continuously and perfectly to various types of shocks that occur in the economy. The idea
is that price rigidity plays a big role in understanding why monetary policy affects the economy. I've worked a lot on this topic. The basic idea is that if prices were completely frictionless, then if you doubled the amount of money in the economy, prices would also instantly double. And as a consequence, monetary policy would have no impact on the economy. The amount of money would double, prices would double. It would just be like a change in units like going from inches to centimeters. And monetary policy wouldn't have any real effect. The idea of these theories is that, for monetary policy to have a real effect, you have to have it be that there are some frictions in how prices adjust to various kinds of shocks.

And this sounds reasonable because of things that we experience in our everyday lives. All of you have gotten a haircut and you probably have the sense that the price of your haircut isn't changing all the time. So that's the basic idea.

But one of the big innovations in the literature on this topic in the past 10 years has been the availability of really broad base data on prices and in particular, the data that the BLS uses to construct inflation measures. And those data—the availability of these data on prices for the economy as a whole—have allowed us to try to come up with quantitative measures of the extent of price flexibility in the economy, as opposed to just trying to think about our own anecdotes, and our own experiences or focusing on individual industries where we might have better data.

Working on these data, and trying to understand what they implied for how much price flexibility there is in the economy has been a major source of my research with Jon. As you'll see, research with Jon has been a big focus in my research in general.

A big thing that has come out of this data on prices for macroeconomists has been the realization that price dynamics are pretty complicated. These data really forced macroeconomists to confront the fact that the behavior of prices was a lot more complicated than some of the assumptions that we were making in stylized models of how prices adjust.

This is a picture from a paper by Judy Chevalier and co-authors. Judy tells me a funny story about this picture. She said that she was presenting her paper in a macroeconomics seminar and she put up this picture and she got this question from the floor. Someone looked at the picture and they said, "Wait a second. That doesn't look like M1."
In all seriousness, looking at this kind of picture made macroeconomists confront the fact that we had been working with models in which basically the frequency of price change was a pretty good metric for how responsive inflation was to macro-economic shocks. But when you look at a picture like this, you see all these sales. Prices are basically changing all the time. And so the question that came to mind was: does that imply that in fact inflation is also completely responsive—that the aggregate price level is completely responsive to shocks.

But clearly there is a complication, which is that a lot of these price changes are associated with temporary sales. And a lot of these temporary sales actually go back to the original price after the sale. Documenting this fact—the importance of temporary sales in explaining the high frequency of price change we see for a lot products in the economy, and also the characteristics of these sales and how different they look from other price changes—was a big focus of my research with Jon on this BLS data.

Now, you might be thinking: coming up with a really detailed model of how prices adjust and using that to build up to a full model of how monetary policy affects inflation—you might be thinking that's a pretty challenging endeavor. Maybe you macroeconomists should just try to do something simpler, just look directly in some way at how inflation responds to monetary shocks.

In fact, this is an ongoing conversation I have with Liran Einav who's an IO economist at Stanford. He's always saying to me, "Emi, why do you want to get into all this nitty-gritty detail of how prices behave? Why don't you just try to do something simple and direct and just look at how inflation responds to monetary shocks?" And of course you could ask the same thing about merger analysis on prices in IO or something like this. But the answer that I try to give to him is, first of all, it's useful for policy analysis. And second of all, it's really hard to come up with exogenous variation in monetary policy that we can use to directly estimate the effects of
monetary policy on inflation.

Nevertheless, given the challenges involved in trying to figure these things out, macroeconomists including myself have tried to use all available methods to do this. So let me tell you about another paper that I’ve written with Jon where we try to use a more nonstructural approach to estimate the effects of monetary policy.

Here, what we do is we try to use the fact that, while there's a lot of systematic variation in how the Fed is responding to developments in the economy, if you look specifically at what happens to interest rates in the 30 minutes around when the FOMC makes announcements, you can make the assumption that the movements that occur only within these 30 minutes are really monetary shocks as opposed to being responses to macro-economic events.

And so you can use this kind of a discontinuity-based identification approach to find estimates of monetary shocks that are not endogenous to developments in the economy. We use this approach to identify monetary shocks. And then, of course, we're looking for some variable that we can regress on the shock that also varies at a high frequency. And so the variable we look at is the real interest rate.

The intuition is that in a model where monetary policy has no impact, like a Real Business Cycle model, then monetary policy affects nominal interest rates, but all of the impact comes through inflation. So there's no impact on real interest rates. But actually, what we find in this paper is that the monetary policy shocks actually have pretty large and pretty long-lasting impact on not only the nominal interest rate but the real interest rate. So we actually find quite a bit of evidence for monetary non-neutrality. And to explain that kind of evidence, you need a framework which has price rigidity. So in that sense, it's related to the research that I described
before where we're thinking about structural models for these kinds of effects.

Now I've been talking mostly about price rigidity as an input into understanding how monetary policy shocks affect the economy. But one thing I want to emphasize is that the role of price rigidity is really much more pervasive. It doesn't just matter for how monetary policy affects the economy. It matters much more generally for how demand shocks affect the economy.

In general, you can think about an increase in demand that comes from some source: say, it's government fiscal stimulus or monetary policy or something else. One thing that could happen is that prices could rise and that can crowd out demand from other sources in the economy. And as a consequence, aggregate demand actually doesn't rise. But if prices don't adjust flexibly, if there's some price rigidity; then the prices don't rise so rapidly and this crowd-out doesn't occur. And then you actually get this big increase in aggregate demand and the effects are very different than a situation where the prices adjust in this instantaneous and complete way.

So it means that the assumption that you make about the responsiveness of prices really matters for how we think about how all sorts of things affect the macro economy: for example, the effect of fiscal stimulus on the economy, the role that things like animal spirits—like optimistic expectations about the future—the role that those things have in causing business cycles. Or the role of de-leveraging shocks of the kind that Mian and Sufi, for example, have thought about in generating the recent recession. In all of these cases, when prices adjust more rapidly and more completely to these kinds of demand shocks, then the effect is much smaller than in a model where the prices adjust in a sluggish and incomplete way.
Another topic on which I've thought a lot about the importance of positive macroeconomics is on the topic of fiscal stimulus. Here is yet another really challenging problem where macroeconomists still haven't come to a definitive conclusion. And again, the basic problem is endogeneity. You could imagine just running a simple regression of output on government spending in the recent recession. But it probably wouldn't work that well. You might come to the conclusion that government spending actually caused a recession. But that conclusion might not be justified because in fact the government spending was really motivated by wanting to attack the recession. Again, this is a place where people have used a lot of different types of approaches to deal with this challenge.

One of the things that has been quite exciting for me in this literature in the past five years, particularly since the American Recovery and Reinvestment Act, and since interest rates hit the zero lower bound, has been the increasing use of creative identification strategies using panel data. People have used all kinds of different approaches like using windfalls to state level pension plans as a shock to government spending in particular states, or using Mafia crackdowns in Italy as a way of identifying government spending shocks in particular regions, or using census population recounts. So there has been a lot of innovation in terms of creative new identification strategies.
The paper that Jon and I wrote early on in this literature used the fact that when the U.S. goes into an aggregate military buildup, it falls very disproportionately on different states.

Here is a graph showing military spending as a fraction of state GDP on average (that's the dark line in the middle) and then for California and for Illinois. You can see that, for example, in the Carter-Reagan military buildup, there was a big increase in government spending for the country as a whole on average. But the effect falls much more on California—basically because they build airplanes, than it does on Illinois where basically nothing happens.

What we do is to ask whether this translates into a bigger increase in output in California versus Illinois and use that as a way of getting a sense of the size of the fiscal multiplier.

So here is what we find. This is a scatter plot with on the X axis would be the increase in government spending in the state and on the Y axis would be the change in state level output. And you can see that we find this positive relationship. The slope of this line is basically giving us our estimate of what we call the relative multiplier. It's stating that when government spending increases by $1 in State A versus State B, by how much does output increase in State A versus State B? And we find that the number that we get is about 1.5, which is basically consistent with the idea that aggregate demand shocks can have a big impact on output, so consistent with the kind of model I've been talking about where there's a sluggish adjustment in prices and the effect of this aggregate demand doesn't just get crowded out by increases in prices.

Now, there is an issue of interpretation here because here we're measuring this relative multiplier: what happens when government spending increases in State A versus State B. And it's not totally clear that you can translate that into an aggregate multiplier, where you're asking what happens if government spending increases in the country as a whole.
Because there are general equilibrium effects that might push back at the national level that might not arise if you're comparing one state versus another state. And this is an issue that arises in general in these kinds of identification approaches that are using relative variation, comparing one state versus another.

So while there's a lot more data that we can get out of using these relative identification strategies, there are these new challenges of interpretation. Mian and Sufi's analysis, for example, of de-leveraging shocks in one state versus another and how you build up from that to an aggregate level estimate of how much this stuff matters; there are challenges in doing that.

What we show in our paper on fiscal stimulus is that the relative multiplier that we estimate using this kind of relative approach, what it corresponds to is essentially the multiplier that you would get at an aggregate level if monetary policy was relatively unresponsive. The intuition is that if you're comparing California versus Illinois, then the Fed can't raise interest rates in California versus Illinois. So in that sense, the monetary policy is unresponsive. In contrast, in the country as a whole, when you have increases in government spending; you might expect that the Fed would respond.

So let me conclude by saying that I think that despite all of the challenges that we face in macroeconomics with regard to identification and the fact that we can't run experiments and so on, I think we are making some progress in terms of amassing more and more facts that allow us to try to think about distinguishing among different models of the world.
I think that sometimes people draw an analogy between macroeconomics and meteorology. The reason is I think twofold. One is that both fields deal with a lot of general equilibrium effects and the other is that both fields have a lot of difficulty making long run predictions. But I think that there is also something that you can learn from this analogy in terms of the potential upside of our research, which is that if you look at meteorology in the olden days when we didn't know anything about science or how the weather worked, then people spent a lot of time praying to the rain gods and doing all sorts of crazy things with the hope that they might be able to improve the weather. But then as our understanding of science and meteorology improved over time, there was a lot less praying to the rain gods and people spent more time watching the weather channel.

And I think that there's something similar that one can say about the potential upside in terms of macro-economic research. On these topics that I've talked about of monetary and fiscal policy, because—I think—of some of the challenges we face in figuring out exactly what the answers are to these questions, there are a lot of crazy politicians who say a lot of crazy things about these topics of how monetary policy or fiscal policy affect the economy. But I think one can hope that over time, as we amass better understanding of how these things work, that there will be less and less scope for the rain gods to have an effect on things and more and more scope for facts as opposed to ideology to influence the debate.

Thank you very much.