GENERAL DISCUSSION

AMIT SERU: Let me just quickly summarize the issues, and then we can open up the discussion. I think essentially there is a debate on measurement. Over what horizon should we be measuring r-star? Long run? Short run? If we agree r-star is relevant, which model do we think r-star is relevant in? Because that then means we've got to worry about measuring demand shocks versus supply shocks, because they could have different implications for how we will think about r-star. And finally, if we agree r-star is important, what should the Fed do? What's the right level? Is 2 percent the right number? Three percent? Zero? We should debate that. And potentially, what should it target? The long-run interest rate, the nominal interest rate, or the inflation rate?

MICHAEL DOTSEY: This question is for Volker. I think there are lots of interesting questions regarding why we might care about long-run interest rates or twenty-year moving averages of real rates. But in the monetary policy context, I just don't see it. You're using these New Keynesian models to look at stuff, but if I remember my textbook New Keynesian models, what we respond to is some output level relative to its flexible-price benchmark, and some real interest rate relative to its flexible benchmark. Those are high-frequency things that have nothing to do with twenty-year averages of real rates. In fact, Carl Walsh has demonstrated that if you respond to these long-run statistical type of trends instead of the theoretical constructs, you can make tremendous mistakes. It's a mistake to do that. So I was wondering why you chose to do monetary policy rather than some other type of policy?

VOLKER WIELAND: First of all, you mentioned New Keynesian models. These models include a construct that is the short-run natural rate, that is, the flexible-price interest rate or output level. Ed

Nelson was one of the first to compute them but they were extremely variable, which is precisely why we've had trouble getting policy makers to even focus on them. Based on a particular model, you can think of this highly variable natural short rate as a policy prescription. If the price level were fully flexible, this is where the economy would be. However, it depends on all the shocks in the model, all the parameters in the model. It's highly model and shock dependent. If we all agreed on what's the right model, and if that model actually delivered good real-world policy outcomes, then we'd be in an ideal world. But we're not in that world. So I don't share your view that this is the agreement in the field, that that's the way to do it. I also don't think that's how policy makers have acted, because typically we've had a hard time getting them interested in such model-based short-run natural rates.

The long-run equilibrium rate concept, as I've showed, is a pretty standard one. It was already in the 1993 Taylor rule, for example. What the New Keynesian models can add is model-based estimates of this long-run equilibrium. More important, the models can tell you something about what factors are driving the potential deviations of the average interest rate from the long-run equilibrium. For example, is such a deviation driven by monetary policy or by something else? So I think that's where they can be helpful. In terms of policy recommendations, I would certainly argue against a policy that is driven entirely by an unobservable short-run natural rate, which requires a model to estimate it and then that model to be right, because if the economy is closer to a different model, then policy would be totally off track.

MICHAEL DOTSEY: I agree with what you've just said, but I totally disagree with your solution. Methodologically, we have this problem about uncertainty of parameters, uncertainty of models. We have tool kits to think about that. I mean, John Williams

has done a tremendous amount of work in this area looking at robust rules. And often he says, "Well, if these level things are really tough to measure, go to some first-difference rule," which he finds works well in a number of contexts. So his answer is to just throw the damn things out.

VOLKER WIELAND: Yes, that is what I mentioned, right? This is one of the options. I said, "Why not focus on strategies where you don't need an equilibrium rate such as a first-difference rule?" Actually, I've looked at that jointly with John Williams and with John Taylor in different papers. You can see from our research that a first-difference rule does pretty well under many circumstances in the models we've studied. In terms of tool kit, we've been putting up a database of models, where you can compare the performance of rules across models. This provides a strong case for simple rules. And a difference rule may be one of the rules that should be given much weight. However, when you try to figure out past policy mistakes, then the difference rules are not very helpful, because every quarter, they re-normalize to the most recent level of the interest rate. So whether policy has been off for a while is very hard to assess with those.

And if you have the view that monetary policy may not have been optimal before the financial crisis, then the Taylor rule, which actually gave a signal before the crisis that interest rates were unusually low, is one that shouldn't be ignored.

JOHN COCHRANE: I want to address this "who cares?" issue. Who cares about the long-run real rate of interest? If this were a conference about government debt sustainability or the present value of social security, we would care a lot, directly, about the long-run real rate of interest. But it's not. It's a monetary policy conference. So why do we care?

I think Janet Yellen made one answer really clear in the speech she gave here in January. If the long-run real rate of interest is not 2 percent but 1 percent, she says, then when we tack on our

2 percent inflation target, that means the current sequence of interest rate rises will go up to 3 percent, not 4 percent. And if r-star is zero, then we're going to top out at 2 percent. So it's about the long-run glide path of nominal interest rates. It's not really about short-run policy; it's about our long-run nominal interest rate targets and Fed communication about where interest rates will end up.

But the question I'd like to ask is, Who wrote that procedure in stone? Why do we take some guess at the real rate, add a 2 percent inflation target, and that's where interest rates have to go?

We mentioned headroom. The number one thing that comes up is that we need to get nominal rates up so we have room to lower them when the next recession comes. As opposed to, say, Milton Friedman, who might say, based on his optimal quantity of money essay, the right nominal interest rate target is zero. Well, now we say not zero, because then the Fed doesn't have any headroom to lower interest rates.

But both of those considerations—either just zero, for the optimal quantity of money, or headroom to lower in the next recession—just say the *nominal* interest rate target ought to be whatever it is. If you need 4 percent headroom at r-star 3 percent, you need 4 percent headroom at an r-star of 0 percent. So just ignore r-star. R-star is irrelevant if you're thinking about headroom arguments or optimal quantity money arguments.

The procedure Ms. Yellen described, which everyone seems to take for granted, must mean that we really think the inflation target itself matters, that pi-star has a definite life, that we really need to start with 2 percent inflation, then add our r-star, and *that* tells us where nominal interest rates go.

But why 2 percent inflation? Who wrote that in stone, anyway? I mean, the Federal Reserve Act says "price stability." It doesn't say 2 percent inflation forever. Why not a price-level target? Why not zero? Why not negative? Perhaps there is something

about sticky prices and 2 percent being the optimal amount to unstick them, but I'm just making that up.

The differences comment is interesting in this context. Why bother with any of this? Let's just talk about how the Fed adjusts interest rates in response to events and not talk about a long-run target. But I think the Fed wants to "anchor expectations" more than that.

MARTIN EICHENBAUM: This may be the last time today that I agree with John. But I want to point out that Irving Fisher is still alive. The nominal interest rate is still equal to the real interest rate plus the inflation rate. It's clear that the real interest rate—whether you call it r-star or something else—has fallen. So unless we raise the inflation target, the normal nominal interest rate will go down.

Two points on Lee's discussion. The first concerns his view that wage rigidities are becoming less important. That view is premised on his enormous confidence about the rationality of union-led workers. I suggest that he talk to union officials at Alitalia, where workers just voted themselves out of a job rather than take a wage cut. I'm not sure we understand why wages aren't the flexible objects that we put in real business cycle models. But that doesn't mean they aren't nominal wage rigidities.

Second, Lee argued that monetary policy isn't particularly important. I have no problem with the view that total factor productivity growth is immensely important. But when the next big recession or financial crisis comes, it just won't do for the Fed to say, "Dodd-Frank put us out of business. And we can't cut interest rates. But that's okay. TFP growth in the long run is important."

LEE OHANIAN: The key is understanding why we're in an economy that has such a high equity premium. That's what really jumps out from the data. Returns to private capital are very high. The low rates that people refer to are relevant only for a very small set of securities, primarily government bonds. Understanding

how to make useful policies requires understanding why the equity premium is currently so high. Virtually all of the discussion about r-star seems to me to completely omit this important issue. We need to understand the very high equity premium and why investment remains so low despite very high returns to private capital. We do not yet understand these important issues.

In terms of wage stability and Marty's comment about the Italians, I am not sure that the Italian workers are representative of the behavior of US workers. Italy's economic performance has been remarkably different than ours; Italian economic performance is among the worst among the advanced countries. Their per capita GDP is actually lower today than it was twenty years ago. In the United States, there is now incredible competitive pressure on wages.

ANDREW LEVIN: So just a few thoughts. The intersection I saw between Volker and Lee is that there used to be a lot of confidence in models and economic forecasts, so the idea of inflation forecast targeting seemed like a natural approach for setting the course of monetary policy. But it seems that one thing we've learned over the last ten years, and certainly Volker has multiple papers about this, is the extent to which the forecasts have been persistently wrong, with little or no ability to understand why they're going wrong so that the forecast errors can be avoided in the following year. The alternative approach is to follow what John Taylor has been advocating for many years, which is the use of simple policy benchmarks.

One potential benchmark for assessing r-star would be to use the average of professional forecasters' longer-term projections of real interest rates. After all, those forecasters are using lots of different kinds of models. Some of them talk to Stock and Watson. Some of them may talk to Lee. That might be a reasonable benchmark. If you wanted to use the Taylor rule, or a variant of the Taylor rule that's in levels, using an estimate of r-star based

on the consensus of professional forecasters seems reasonable to me.

An alternative would be to switch to a difference rule, like Volker has mentioned. How does a difference rule work? Well, it's like getting in a shower in the morning. You have no idea what the appropriate setting of hot and cold is. So you start twisting the knobs, and if it's too hot, you start dialing back the hot and dialing up the cold a bit. That's a difference rule. The difference rule says, if inflation's a little bit too high, above the target, that means our interest rate is probably too low. So let's dial up. But here we are in 2017. Inflation is pretty close to the Fed's 2 percent target. GDP growth is roughly 2 percent, not much different from its potential. So, as of today, a difference rule might imply that this is pretty comfortable, without any need to adjust the dial much. I can't see how any difference rule would call for moving the federal funds rate all the way up to 3 or 4 percent. I'm curious what each of you have to say about that.

VOLKER WIELAND: First, regarding what John said, he highlighted the concern about the headroom for easing, which has been very important in policy practice, both before and after the crisis. For example, the Fed used the argument to explain why it kept interest rates low in the years before the financial crisis. The idea was that we can't lower interest rates below zero, and if there is deflation, real interest rates will rise, and that will drag the economy farther down. According to this view, there should be an asymmetric response. Interest rates should stay lower for longer. And a higher inflation objective would provide more headroom. That's a valid argument. I've contributed to research developing this argument. Except that the experience of the financial crisis shows there are also opposite risks. Keeping interest rates too low for too long may create financial instability. Negative effects on bank profitability are another concern that people have worked on. Accordingly, interest rate policy is not quite as

effective when rates are kept lower and lower. Hence, I think there is something to say for symmetry in terms of policy responses.

Andy explained again the difference rule, I think very intuitively. So that's one way to go. I think that's one benchmark I would use. You know there is a legislative process in the United States where the idea is to let the Fed pick a rule. I think it would be major progress if the Fed would say, "Under such and such a scenario, the difference rule is the one we focus on." Then, maybe the Taylor rule would be another one to be compared—it's even in the legislation. This would help motivate a discussion about when and why the Fed deviates from the particular rule it picked. The Fed could deviate from it for particular reasons, but it would then explain the differences. I wouldn't want to argue that much about which rule the Fed should pick, because I think the format itself would be a big step forward. At the moment, we're still far from that.

LEE OHANIAN: There's an interesting and important tension in inflation forecasts versus inflation outcomes. You've got monetary policy makers and monetary policy being made in conjunction with private markets and nominal spending, and this has produced a remarkably stable record of inflation. And at the same time, we have people forecasting inflation who are way, way off in terms of accuracy, and who are systematically making the same forecast errors time and again. So at some level, it's like when we're making monetary policy and we see how the private markets are working; we're generating perfectly stable, low inflation, but when we predict inflation, we make these large mistakes. It is hard to rationalize those two points of view, though I think it would be interesting and important to figure out why policy makers are able to produce stable inflation but aren't able to forecast what they ultimately accomplish.