

General Discussion: Modeling Inflation After the Crisis

Chair: Susan M. Collins

Mr. Berner: Just following up on Frank Smet's comments, I wonder if Jim and Mark have considered the possibility of a regime shift. As we approach price stability and monetary policy turned away from what some have described as opportunistic disinflation and became more symmetric around the inflation target, did they take that into account in thinking about the response in the Phillips curve and inflation expectations?

Mr. Weber: This question is also for Frank. I suppose this is about hourly wages, Frank. What we've seen, for example, in Germany is that there has been a whole new deal between the unions and the employers in the last crisis. The Backus-Driffill kind of evidence showed if you have wages negotiated at an industry level, this results in the worst outcome you can have in a country.

Germany has moved wage negotiations now more to the firm level. What has happened in the crisis is that there has been a huge reduction in hours worked, so while hourly wages stayed roughly the same, the overall wage bill has reduced. In good times, employees used working-time accounts to build up overtime accounts. In bad times, they ran them down first and only then reduced working time.

To sum up, there is a lot of evidence of rigidity in hourly wages, but overall there has been much more wage flexible than hourly wages alone suggest, even in the euro area.

Mr. Levy: Just a simple point regarding 2004: At the time, there was spreading concern about deflation particularly—even earlier than that when the Federal Reserve mentioned it as a possibility—nominal GDP growth was accelerating well above potential growth, and the dollar was falling. That seems to be the missing link.

It seems wage and price-setting behavior is certainly affected by nominal spending in the economy. When you have nominal spending in the economy accelerating and above productive capacity that may well be your missing link. In fact, that is one of the crucial variables to be looking at now. Nominal spending, which had been growing quite rapidly through the first quarter of this year, has since decelerated. I would say that is a crucial variable to be looking at.

Mr. Geanakoplos: This is a very naive question, but when people talk casually about inflation in the next 10 years, the government debt, the fact there are so many homeowners underwater, and the incentives for the government to cause an inflation to rescue us from our problems seem to loom large. I'm wondering whether there was some kind of analysis you did by looking at other countries in similar situations in the past or America in the past that enabled you to rule that out in your equations or whether you think it will show up in output and therefore you'll get it eventually anyway? I just didn't understand how that kind of thinking played into the regressions.

Ms. Reaser: Jim and Mark, I read your paper and then read Larry Christiano's paper over the past week. I was struck by the very different images of the inflation picture: your paper, of course, emphasizing the role of the unemployment gap and the recession in reducing inflation and then Larry's paper indicating lower inflation in periods of stock market booms. I wondered if you might comment on that very different image. I can certainly see the impact of productivity causing positive shocks in lowering inflation during stock market booms, but I'd be interested in your comments.

Mr. Christiano: It seems to me in thinking about the inflation outlook at this particular time that there is an important potential nonlinearity. I don't know how to solve this problem. My guess is, if two people know how to do it, it is you. The nonlinearity is something we see in our models, which is when the interest rate hits zero, a shock that might not have a big effect normally on inflation could have a huge negative impact on inflation.

A lot of people are talking about this zero-bound stuff and the fear of deflation. I don't know how you get that into your forecast. One of the problems is, of course, we don't have any history, at least in the postwar period, with this kind of thing. Maybe the Great Depression gives you information about this. But now we are getting into some pretty unusual time series stuff.

The other information we have about it is the models that fit the data well have in them this nonlinearity and this scary thing that a small shock at a time like now could really produce a big deflation. But I don't know how exactly you would integrate that, although a lot of people are worried about that.

Mr. Blinder: Just a short question about the interesting u-gap specification that was used. The word NAIRU (non-accelerating inflation rate of unemployment) has been used a lot. But, as you look at what is in the equation, isn't it more of a hysteresis specification? Because it says that, if the unemployment rate should happen to be x for 12 consecutive quarters, then x becomes the NAIRU?

Mr. Fischer: I am not sure if the paper answers this question, but the title of the conference is "Macroeconomic Challenges: The Decade Ahead." I've been trying to figure out what the paper says about whether we are in a new moderation, whether we are in a new moderate moderation, whether we are going to be lower than ever, or whether the fact there is a model that seems to work for recessions pretty well says that nothing much has actually changed in inflation dynamics.

Mr. Orphanides: I read this paper as a very nice way to resurrect old-fashioned, unstable acceleration in Phillips curves by pointing out that if you replace those fixed coefficient lags with something that reflects the evolution of inflation expectations better—and this

is the trend time-varying component that we have—you can get a more stable-looking sort of Phillips curve than before. I read this as highlighting the importance of thinking hard about inflation expectations and how well-anchored we are for predicting inflation and for thinking about the policy implications.

There is one element of the paper that did not complement the discussion that I wanted to highlight because it worried me a little bit. There is a section in which there is some evidence suggesting that perhaps shorter-run expectations, as reflected in surveys, are less important. That is not proven in the paper. In thinking about inflation for 2011, for example, inflation expectations are important. The weakness in the paper in uncovering this has to do with the fact, as it is stated, that the equations are trying to predict the core PCE (personal consumption expenditures) inflation, but the surveys that are being used to do this are not about core PCE inflation, as is measured right now. They are about other concepts of inflation that do not line up with the inflation the paper is really measuring.

As the paper does point out—but unfortunately it is a considerable weakness for this point—it does not do real-time analysis very well. Under the control of Charlie Plosser and Jim Bullard, I would like to point out this is a major weakness that I don't think should be considered acceptable in econometrics these days because at the Philadelphia Fed and at the St. Louis Fed they have put considerable resources in having all of the necessary real-time data that one can use to do this experience right—very accessible and very easy to use. Indeed, you could use the real-time available data to find out whether shorter inflation expectations in the surveys are important. Some evidence that they are unaware of suggests that indeed they are.

Final comment. On the 2004 episode, you do again run into this revision issue. In 2003 and 2004 were two years in which the first published core PCE data, and a matter of fact, data published a year or even two years later were much, much lower than the data you are using that are published seven or eight years after the fact.

Your comment about the FOMC sub-projections or other commentary at the time showing inflation projections and expecta-

tions being very low—those were very good forecasts off the first-announced core PCE numbers that were subsequently published in 2004 and 2005. Those do not line up with the data you are using right now. The plea here is, under the control of Charlie Plosser and Jim Bullard, do this a little bit better.

Mr. Sinai: This is a question about deflation risk in the context of your model and, if possible, a missing variable. You forecast, at least on today's data, that core inflation grew 1½ percent year over year. So, if you subtract a half-point from that, which you have here, that would be 1 percent at the second quarter of next year, and there is a large margin of error.

In your model, I don't see a unit labor cost for productivity variable, and we have had some cyclically different behavior of unit labor costs and productivity growth in the last three post-recession episodes. So, if that ended up, if you are willing to admit that into your framework, and you found stronger productivity growth or falling unit labor costs, or very low unit labor costs, what might that do to that 1 percent? Or, to put it another way, what would that do an assessment of deflation risk next year? Would you have an observation you could make on that?

Mr. Watson: Let me start, and then Jim can finish. Let me take a second to give you my take on the paper, which I hope will answer at least some of the questions. Jim and I have written several papers on trying to forecast inflation and discovered it's very hard. So we've sort of successfully failed to do it regularly.

The interesting thing about this particular exercise is Chart 2. Chart 2 says what we all know—during recessions, inflation falls. The question, then, was first asking is that thing we all know—during recessions inflation falls—does it fall in a way that is systematic and reasonably stable?

The answer seems to be yes. This picture is stunning in that respect. Frank's work from his picture he brought from Europe is also stunning, and Jean Boivin at the Bank of Canada sent us something just as we were getting on the plane, showing for Canada a picture that looks very much like this. So, our sense that during recessions,

when there is a lot of slack, inflation falls seems to be right, and that is consistent with what I thought I knew.

So then the question is, Can we capitalize that, and can we think about forecasting inflation during recessions? So, we know inflation falls during recessions. Is there enough stability here to forecast inflation during recessions? And that is an interesting question because sometimes we are in recession. Ten years from now we may well be in a recession again, to answer Stan's question, and hence that will be an interesting question.

That bit of the exercise turned out to be a bit more challenging than just looking at what we've been calling spider plots, summaries of all these recessions, because then you have to worry very much about instabilities in the inflation process, anchoring of expectations, and changes of pass-through of shocks to expectations. We were pleased that a relatively simple model—part of which we had constructed earlier in which we had time variation in the amount of anchoring—allowed us to forecast inflation reasonably accurately during recessions. I say “reasonably accurately”—more accurately than not being able to forecast it at all. That was my take on this.

As Jim says, “The fit seemed to be reasonably good.” Interestingly, what this says during the current episode in spite of the fact there is much more anchoring now than we've seen in the past—over the next year this kind of model predicts a decrease in inflation of about 50 basis points instead of an increase. That is a striking result.

There are some things that are different about this. Trend inflation is lower. There are perhaps some nonlinearities here that we tried to examine, but the problem with examining nonlinearities in places where you haven't been is you can't say much about it in looking at data. You can probably say things about it in looking at models. But, if models haven't been forced to look at data around those points as well, I am not sure I would trust the model. There is more uncertainty in this particular episode than in typical episodes because we are in this region of the data we haven't seen before. Those were my key points. I think I am going to stop and turn it over to Jim. Maybe he has some more to say.

Mr. Stock: Let me say one very quick thing on the remark that Frank was talking about in terms of downward wage rigidity. Sure, there are a lot of indications there is downward wage rigidity for specific individuals and specific jobs. Probably a more relevant thing in terms of thinking about price indexes is thinking about overall employment costs facing firms. Given the amount of turnover and the ability to replace at lower wages, there is probably a lot more downward flexibility in wage bills.

Let me turn to the broader topics and address some of the comments from the floor. In terms of the methodology, the history of this literature, and I use the word “tortured,” and it really is, where people throw in one variable like productivity or exchange rates or oil prices or this version of them. It works great until they publish it and it doesn’t work. Maybe the trick is to never publish your work. Our goal is really to step back from this and say, “Look, is there a basic overall fact here?”

And there is. There is a basic overall fact. So, then we propose this particular way where we think about this in a different way, using this unemployment gap measure. It is a funny thing because, as Alan points out, it builds in some hysteresis in a way that maybe usual NAIRUs don’t. Maybe that is a good thing. Maybe it’s not a good thing. I don’t know.

For the trend term, there are a lot of discussions of expectations and expectations anchoring it. There is no question as we think about what the real challenges going forward for the next couple of years—the question is, How much we are going to be able to rely on the anchored expectations? We have an expectations mechanism built in, but it is a reduced-form mechanism, so it doesn’t involve some exogenous determination that overall market participants are going to anchor their expectations at 2 percent. If we forced that trend term to be 2 percent, we would have reversion back to that trend after this period.

If that is what the Fuhrer-Olivei simulations find, and that if you just insist expectations are 2 percent—and that’s what we saw in Frank’s—it will go back to 2 percent in all of these models, both

data-based models and theory models. That is in some sense a model that can't be resolved by empirical evidence.

One comment related to that: The empirical evidence underlying the new Keynesian Phillips curve, which is really the framework in which we all think about the expectations as mattering, is also questionable. There is a serious study by Kleibergen and Mavroeidis published in the *Journal of Business and Economic Statistics* in 2009 where they take a careful look at how well-identified those parameters are and whether the models are rejected. There is a lot of faith involved in those models.

Let me make a final comment. Because the whole morning has been having academics chiding policymakers, it is delightful to have policymakers chiding academics about their econometric details. There is a nice paper on 2004 real time by Roberto Billi in the third quarter 2009 Kansas City Fed's *Economic Review*. As you go back to read the FOMC minutes, you are correct there is a big data revision, so the inflation they are looking at the time maybe doesn't line up with the citations we had in the Dokko and others' paper. But there were also quite a bit of unexpected increases in inflation. One of the reasons they attributed it to, as was pointed out by Mickey Levy, was the increase in exchange rates. The problem is that when you actually run those regressions and you look at oil pass-throughs and exchange rate pass-throughs and commodity pass-throughs into core, it doesn't quite seem to add up to the level of increases in inflation and core that was observed either in real time or looking at the final revised data.

Ms. Collins: This morning we have certainly identified and discussed a number of the macroeconomic challenges that face us now and the decade going forward. While we have not by any stretch of the imagination resolved the policy debates that emanate from them, it is striking each of the papers has highlighted some really important and provocative empirical regularities that are starting to emerge and that do come out of the data and that will occupy our discussion, continued research and better understanding of these issues in the months to come.