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Transcript of Presentation, "Optimal Monetary Policy for the Masses"

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This transcript has been lightly edited for clarity.

James Bullard: I thought what I'd do today is talk about this research I've been doing over the last year or so, "Optimal Monetary Policy for the Masses." This is kind of a mixed audience, but I'm just going to walk through it; this version actually has no equations at all. Today we're actually posting this paper on the webpage. I have given it at various places around the world actually in the last year, but now you can actually read a paper, which you weren't able to do before.

So I hope you'll hang with me here, but this is kind of a tour of some of the things that are going on in monetary policy research really focused on inequality, because it's become a major issue in the U.S. economy and there's a lot of feedback toward monetary policymakers, you know, asking, "How do your policies affect inequality?" And when we talk about inequality, we don't mean just income inequality, but also financial wealth inequality and consumption inequality. So the model I'm going to outline here gets them all. It's going to get them all exactly right. No. [laughter] It's going to get them partly right.

I guess the broad questions are things like "does monetary policy affect inequality or not?" And you get a lot of conflicting talk around the economy on this. A typical thing would have been that QE helps rich people by sending the stock market higher—that was a typical thing that was said. Lower interest rates help poorer people is a typical thing that was said over the last decade. And I think if anything comes out of this, it gives you a model to have some perspective on these issues. So that's probably the best thing I could say about this. So can monetary policy be conducted in a way that benefits all households, even in a world of substantial heterogeneity? There's going to be tons and tons of heterogeneity in this model.

Just to keep you from having to read these papers, I'm giving you one set of summaries of them, but they're very complicated papers. [The paper by] Kaplan, Moll and Violante is in the *AER* last year. It's getting a lot of play in the research world. This is a very complicated economy. They've got lots of people in this economy. They've got shocks hitting all these different people. They do get the Gini coefficients right—the Gini coefficient is a measure of inequality—on all these different dimensions.

And their basic conclusion is that monetary policy would work very differently in that world versus the way we typically describe it. The way we typically describe it in traditional central banking is we go into a recession, we lower interest rates. And if we're out of recession, we raise interest rates. So it's very simple. In fact, some people would say my job is not that hard because of that. [laughter] How hard could it be? But what these guys would be saying is that, no, no, if you got serious about heterogeneity, it'd be very complicated—very complicated to the point where it's not even clear central banks are doing anything like the right thing. That's the takeaway. At least my takeaway from Kaplan, Moll and Violante.

And similarly, with the Bhandari, Evans, Golosov and Sargent paper, very similar. Lots of different people. Idiosyncratic risk for everybody. They also get Gini coefficients, but they kind of come to the similar kind of conclusion.

So this paper, we're also going to get Gini coefficients about right for the U.S. economy. It's going to take a little while before we get to that part, but we'll get there. But nevertheless, you're going to be able to describe a monetary policy that does a good thing for every single person in the economy, no matter how rich they are, young and old, rich and poor. They're all going to like this monetary policy in this model. So the point is that I think you can make a case, at least in this baseline kind of a model, that you can conduct a good monetary policy for everybody in the economy.

There's going to be a lot of inequality in this model. It's a stylized model, which I'm only going to partially take to the data. If we really wanted to jazz it up, it'd get a lot more complicated, which you could do, but I'm not going to do here. There are credit markets in this economy. Credit markets became very important after the crisis as they play such an important role in the economy. And the typical macro model doesn't have any credit markets in it at all. That is pushed into the background. This model has a credit market front and center. And the role of this credit market is to move income over the life cycle. And I'll talk a lot about that.

The role of monetary policy in the model is to make sure that credit market is working correctly, because if that credit market isn't working correctly, then you're going to have people consuming the wrong amounts, they're going to be saving the wrong amounts, and this is going to mess everything up in the equilibrium. But optimal monetary policy can fix the problem in this economy, and optimal policy is going to look like nominal GDP targeting, which is one common prescription for monetary policy. I'll describe that in a lot of detail as I go through this talk.

The nominal GDP targeting result holds even when there's massive heterogeneity, as I'll make clear in a moment here. So the main result, if you want to just stare out the window here—it is pretty good. The main result is that nominal GDP targeting constitutes optimal monetary policy for the masses, at least in this model that has a bunch of simplifying assumptions.

All right. So we're going to have to walk through some basics on what the heck I'm talking about but without too many equations. Then we'll go to some pictures. I'll show you how the equilibrium of the economy works in some pictures. Then I'll do some Gini coefficients, and at the end I'll talk about monetary policy. So that's basically where we're going.

So this is a life-cycle model. And life-cycle models have been around for a long time in macroeconomics, popularized by Franco Modigliani, who got a Nobel Prize, but many others worked on them over the years. Basically, the idea is that every time period a new cohort of households or agents come into the economy, they make decisions for 241 periods, which is going to approximate quarters, and then they exit. You could say they die, but we're not going to say that. They just exit. They get very old, and they quit making economic decisions. The way you want to think about this is, this is a model for people that are autonomous households that are making their own decisions. So it's not a model when you're very, very young … We don't have anything to say about that. But once you're 20 or in your early 20s up until, let's say, your early 80s, you're making all your own decisions and everything. That's the group we're modeling here.

For those of you, I know there are a bunch of graduate students in here, this is all log preferences, so that's part of the trick, over consumption and leisure. Households are going to be given, when they come into this world, a productivity profile over their lifetime. That's going to be actually randomly assigned. I'm going to talk about that quite a bit. They're going to be different for different people. But this profile's going to have a very specific feature. It's going to be symmetric in a certain sense. It means you start at a low level of productivity early in life, you're more productive in the middle of life, you're most productive exactly in the middle of life, and then you get less productive later in life. And I'm going to make that whole thing be perfectly symmetric at the beginning and end of life. So that's going to be a key thing. Even though this is a complicated model, it's going to enable us to solve everything with pencil and paper.

These productivity units, what are these things? I have a certain unit, a certain amount of productivity. I can sell this on an open market at the going wage per efficiency unit in the market. So I can decide how much I want to work, and I can sell my productivity units that I have at that particular stage of life, and that's how I get my income. There's no population growth in this particular version.

What this is going to do is create a large private credit market essential to good macroeconomic performance. But how does this credit market work? It's something you all know. It has peak earning years. You've got people that are earning a lot in the middle of the life cycle. Those people want to save for retirement. You've also got people earlier in the life cycle who don't have much income. They would like to pull consumption forward in the life cycle. They would like to borrow. So there's a natural credit market in this economy just like there is in the real world, and that's the only credit market in this model.

What we're talking about here is privately issued household debt, and the model is so simple that you [could] just think of somebody who's 35 years old. They want to buy a house. They get a piece of paper, they give it to somebody who's 55 years old and say, "I'll pay you back later. Can I please have my house now?" And then you get into your house, and then when you get older, you pay it back. And that's good for this person who was 55 years old, because they need the income when they're in retirement. So it's very natural in that sense. And so I want to think of this privately issued debt as being like mortgage-backed securities. There are no mortgage-backed securities actually in this model. It's a very abstract model. But this is how you should think about the asset that's in this

model. And as you know, housing debt like this was very important during the crisis, and it's a big market. Probably on the order of 15 trillion dollars. That's trillion with a T, a big number. So lots of household debt out there of that type.

Now, the way modern macroeconomics works is there's got to be something wrong with the world, because if there isn't something wrong, there's nothing for the monetary policymaker to come in and fix. So what's wrong in this economy is non-state contingent nominal contracting. The loans are dispersed and repaid in the unit of account—in nominal terms—and are not contingent on income realizations. So there's two parts to this. The non-state contingent part is a violation of basic economic theory. You should be borrowing, and you'd pay back more in the good state of the world, and you'd pay back less in the bad state of the world. But we don't see that in the real world. What we see is you just borrow your 100,000 dollars and that's it, and you say, "I'm going to pay you back a nominal rate of interest in the future." That is not correct according to economic theory. So it should be state contingent, and it should be not done in nominal terms. It should be done in real terms. But the fact that it's done in nominal terms means that the monetary authority might be able to fix it by moving the price level around. That's exactly what's going to happen in this model here.

Now, we've got to produce output. We're going to do that in the very simplest way that we can do it. There's just going to be some labor multiplied by something, and that will give you some output. And it's going to turn out that this labor input, the hours worked will actually be constant. I'll talk about that quite a bit here. This other thing that multiplies the labor input is the level of technology. How good of technology do we have? How much can we produce with an hour of work? That thing is going to grow at a stochastic rate. So for you graduate students in here, this is a heterogeneous-agent economy with an aggregate shock. You don't see that very often. And now we're going to solve it with pencil and paper. So I thought this was a cool aspect of this. We're going to not worry about the zero lower bound. We had an earlier version of this, now forthcoming in a journal, where we talk all about zero lower bound issues. I'm not going to talk about those today. What's basically going to happen here is that the real wage is going to grow. It's going to grow. It's a growing economy. It's going to grow at this stochastic rate over time.

There's an all-important timing protocol about how these models work, and it's just critical to how it works. So nature moves first and determines some draw in this random process. That determines the wage. The policymaker gets to observe that and then gets to decide what to do with the price level. And then households make their decisions for all future periods. So this is a critical timing protocol.

Households are all going to meet together, and some households want to borrow and some households want to lend, depending on where they are in the life cycle. They're all going to meet together in a big room just like this, and they're all going to agree on a nominal interest rate and the various amounts that they want to borrow and lend. This nominal interest rate is going to turn out to be exactly the same as the expected rate of nominal GDP growth in the equilibrium of this model. This is very handy. This is part of what makes everything easy to decide. So we're sitting there in this room. We all decide that the nominal interest rate should be, let's say, 4 percent, because we think the real growth rate is going to be 2 percent, and we're adding 2 percent on that for inflation, so we come to a conclusion that it should be nominal … [inaudible] … contracts that are going to set down a

4 percent nominal interest rate. Of course, in the next period, nature is going to choose some shock and the real growth rate won't be exactly that, but this is just an expectation.

The policymaker then is going to follow a nominal GDP targeting rule that's going to give the complete markets consumption allocations. There have been previous papers on this that influenced us: Kevin Sheedy from the London School of Economics and Evan Koenig at the Dallas Fed. Basically the policy is that when growth is high, inflation should be low, and when growth is low, inflation should be high. So inflation is countercyclical relative to growth.

If the policymaker does this, what you get is something called equity share contracting. Equity share contracting is known to be optimal when preferences are homothetic as they are here. So what is equity share contracting? It's a way to share risk in a market. So what it means is I might not be that productive today because I'm early in the life cycle. You might be quite productive because you're in the middle of the life cycle. So you've got a lot of income today and I don't have much income today. If we just consumed what we made in our jobs, I'm not going to consume very much and you're going to consume a lot. But that's not how this model works because there's a private credit market that's smoothing out that consumption. So I'm actually going to borrow and consume a certain amount. You're going to lend and consume a certain amount. We're actually going to consume exactly the same amount because we're sharing. That's called equity share contracting. So we all get a piece of the pie. However much output everybody in this room would produce, we would all get our share of the pie, even though some are contributing not very much and some are contributing a lot to the production of that pie.

So this is a feature of the equilibrium of the model. This is generalized in this paper. Only people that share the same productivity profile over their whole life are going to consume the same amount. There might be other people that have a lower productivity profile. All the people on that profile also consume the same amount. But these guys are going to consume more than these guys. I'll talk about that as we get to the pictures here in just a moment.

So the nominal GDP targeting, what it's doing is providing some insurance in this economy. You're insured against all these future shocks, so you get back to the complete markets sort of outcome.

The real interest rate in this economy is exactly equal to the output growth rate at every date, even in the stochastic economy. You could think of that as a Wicksellian natural rate of interest for those of you in here that have studied New Keynesian macro. It's just like New Keynesian macro.

Let's see if we can get to some stuff on life-cycle productivity here, and then we'll go to some pictures that describe the equilibrium. So when the people come into this economy, they get assigned one of these productivity profiles, and we're going to actually randomly assign these profiles. Something happened to these people in the first 20 years of their life, and we don't have anything about that in this model. But some people came out with high productivity profiles, some people came out with low productivity profiles, and that's that. We're just taking that as input in the model. So once you're assigned one of these things, you can't shake it. So you can't do anything about it in this model. You're stuck with it for your whole life. Now, you might say that's a crazy assumption, but I want to

cite this paper by Huggett, Ventura and Yaron, which is a famous paper. What they said, based on empirical work, was that the human capital that was around for 20-year-olds would explain most of the variance of their whole life-cycle profile of income, savings and wealth. So you can predict a lot if you know the characteristics of a group of 20-year-olds as far as how they're going to evolve over their lifetime. So we're going to go to the extreme and say there are no shocks after you're 20 years old. You're 20 years old, you get assigned one of these things. There are no shocks after that. This is a trick to reduce and control the amount of heterogeneity in this economy. A lot of the literature also has shocks after you're 20 years old. Every day you get a new shock, and boy, that makes things complicated. So we're going to back off that based on Huggett, Ventura and Yaron a little bit in order to be able to solve our economy.

So here's a baseline productivity profile. Very simple. Looks very innocuous. You're more productive, on the order of 50 percent more productive, in the middle of the life cycle than you are at the beginning or the end of the life cycle. And I'm going to show you a lot of pictures like this. I just wanted to help you think about how to read these. Recall we're thinking about 241 periods in this guy's lifetime. You can think of this as that's the productivity profile I'm going to have over my life, but it's going to be better to look at this as a cross section. These are all the people that are alive at all these various stages of life from zero up to 240. And some of them have lower productivity, some of them have higher productivity. That's the nature of the life cycle. Now, this is just the baseline profile. It is symmetric. It does peak. It has a nice feature that means people don't actually retire in this model. They work very few hours, but they don't actually retire. We can do interior solutions for the whole thing.

Now what we're going to do is draw a scaling factor that's going to scale the same profile here, the baseline profile. It's going to scale it up and down by just multiplying by a number drawn from a uniform distribution. And if the scale factor was one, then everybody would get this profile when they're 20 years old. But we're not going to do that. Our scale factor is going to be six and a half. So some of them are going to get this thing multiplied by six and a half, and other people are going to get this thing divided by six and a half, and you get this picture here.

So now you start talking about the masses of people in this economy. The horizontal axis is those 241 cohorts that are all alive at a point in time, and the vertical scale shows the scaling factor for all these different profiles. That very top profile there, that's Tom Brady and Gisele. Gisele actually has more than Tom, I think, is the way I understand it. So they've got the top profile there. And then I'm down here on the very bottom. Mine looks actually almost completely flat, but it's not flat. It actually has the same pattern as the very top one. It just looks—on this kind of scale—it's going to look very flat. So this is what we're talking about. There's a wide range of productivity, and in addition to that, you've got all this hump-shape stuff in the middle of the life cycle.

Now, what's going to happen in this economy is an interesting thing. All those different people with all those different productivity profiles are going to work exactly the same amount at the different stages of the life cycle. And that's what this picture is showing here. So again, think of this as a cross section. You've got people that just came into the model—the zero on the horizontal axis on the left. And you've got people that are exiting the economy—the 240 guy over there on the right. And the

blue line is how many hours they're going to work. The vertical axis is the number of hours between zero and one. So you could work 24 hours a day, seven days a week, 365 days a year. That would be a one on this scale. Or you could be a total slacker and work zero. That would be the zero on the scale. Or some percentage in between. The blue line shows what the equilibrium of the model says. But there's only one blue line. Even though there's a zillion people here, there's only one blue line. Why is that? Everybody works the same amount no matter how rich or poor they are, so the taxi driver, at middle age, is going to work 40 hours a week. The doctor who's middle aged, also going to work 40 hours a week. Tom and Gisele, also going to work 40 hours a week in middle age. And they're going to work much less at the beginning and the end of the life cycle. The green line there is just the opposite of the blue line. That's the leisure. You're going to take less leisure in the middle of the life cycle and more in the beginning and the end.

OK. So this is income. This is labor income in this economy, the equilibrium of this economy. And now what you see is that people are more productive in the middle of life. They also work more hours in the middle of life. So now you get labor earnings getting really high in the middle of life. You get a number like seven on the top there, and at the very bottom guy you get a number probably close to zero. So the ratio between the highest earner and the lowest earner, even in that cohort, is very large. … One thing about this picture here—the area between zero and 60, that would be like the time between 20 and 35 [years old], there's the same number of people there. There's still a million people in every cohort, but they're all scrunched together. They're all labor income poor. The same with the guys on the very right here. They're labor income poor. The people in the middle have high productivity and they're working like crazy, so they have high income. So we're going to get a Gini. We're going to calculate a Gini coefficient for this in just a minute here. So this is an equilibrium cross section of labor income in the model. I better not go on too long here, so I'm going to speed up.

Here's the consumption in the model. I said that there was equity share contracting in the model. So what happens is all these people smooth out their consumption. So all the doctors, which are the very top guys, they consume at the top of the red box with a flat line. The middle guys consume the red line going across. So what they're doing is they're splitting up the economic pie. As long as they're on the same labor productivity profile, they're splitting up the economic pie by using credit markets.

This is my favorite picture. This is net asset holding in the economy. People in the first half of the life cycle, they borrow. They're trying to pull consumption forward in the life cycle. The people in the second half of the life cycle are saving. They're the asset holders in the economy. It's the right-hand side of this that is going to create the Gini coefficient for financial wealth, because we don't count the negative part when we count financial wealth, so that's why the Gini coefficient for financial wealth is going to be so much bigger.

All right. Let me do some other pictures about different ways to define income. Let me talk a little bit about Gini coefficients, and then I'll finish up. A Gini coefficient is a measure of inequality. It's a number between zero and one. For consumption, it's relatively low. About 32 [percent]. For income, we'll take the 51. It's usually in the 50s. Financial wealth, very high in the U.S. About 80. So when people look at these numbers, they're usually looking at the income and wealth Ginis, which are very high compared to other countries. And if we calibrate this model a little bit, here's the income,

consumption and wealth Gini. Across the top is what it is in the U.S. data. I'm talking about using a uniform distribution to select those productivity profiles. You get your Gini coefficient, 51.6, consumption Gini, 31.8. Very close. The wealth Gini is a little bit low, 72.7. A little bit low. But basically you get a ton of inequality in the baseline equilibrium of this economy.

Nevertheless, you've got optimal monetary policy in this economy, and it really is done by having these countercyclical price-level movements. You can interpret the policy also in interest rate terms, and I'm going to skip that in the interest of time here. But you might say, "Well, gee, Jim, I want to see where the federal funds rate should be." These charts would show you where the federal funds rate is going to be, and I'm going to skip quickly over them so I don't get into that discussion too much. [laughter]

OK. So let's conclude. What this paper does is attribute observed levels of inequality to life-cycle effects in conjunction with heterogeneous life-cycle productivity profiles. All households in the model face a problem of smoothing life-cycle consumption. Everybody faces this problem whether you're rich or you're poor. You've still got to smooth over the life cycle. How do you smooth? You use the credit market. So the policymaker wants to make sure the credit market is working properly so that people can smooth their life-cycle consumption. In this model, they can do that. There's a simple friction in that world. But the policymaker can mitigate that friction. And when they mitigate it, they're mitigating it for all 300 million people in this economy. So you're helping everybody by doing this. That's what I mean by optimal monetary policy for the masses.

Now the last thought on this is people often ask me, "Well, does monetary policy affect inequality?" And you say to yourself, "Well, yes." Because if you didn't follow the right monetary policy, Gini coefficients would be different. The amount of consumption of the different households would be different, the amount of asset holdings of the different households would be different, the amount of income of the different households would be different, and this would change all the Gini coefficients. So yeah, it would affect inequality. It would show up in different numbers for the economy if you didn't do this properly. The U.S. has probably not been following nominal GDP targeting over the postwar era. So yeah, I would say that one way to think of it is that there is some feedback from monetary policy, but maybe not in the strict sense that people think. People think strictly in terms of transferring income and wealth across people. It's not quite as simple as that. It's facilitating a market. The market is supposed to be transferring income and wealth appropriately across households. So I'll leave you with that thought, and I'll stop there.

So thanks for your patience, and I'm happy to take questions on this or anything else you want to talk about. So thanks a lot.