

[SQUEAKING]

[RUSTLING]

[CLICKING]

**PROFESSOR:** So let me continue with the IS-LM-PC model. In fact, I want to rush a little bit because I was overexcited with the SVB bank event. And I want to make sure that you certainly understand this model. It's going to be very important.

And I think it's one of the most important models in this course, as I said before. Also, I want to use it a little bit more, this model itself, to explain what is going on right now. Today, we got hit by a second shock from the financial system. And so it's getting exciting these days.

So let me skip all this and remind you that that's where we were. That's the IS-LM-PC model, which I said is nothing else than just integrating the IS-LM analysis with the Phillips curve. This is the IS part. And I said at this point, I will follow the book and assume that the central bank can control the real interest rate, rather than the nominal interest rate, which is what really controls in practice.

But I'm going to make that assumption so the pictures have less curves moving around when things are moving when we do the dynamics. But that's just a IS-LM, nothing different.

And then we look at the Phillips curve. And I said, well, this is not very useful because in the IS part I have output here and in the Phillips curve, I have inflation but then I have unemployment and I don't want to be carrying around three variables, endogenous variables.

And so it's difficult to diagram in three dimensions. Everything is less clear. So I'm going to replace this unemployment here for output. And it's very easy to do that with the production function we have because output is just equal to employment. And the employment is just equal to the labor force times 1 minus the rate of unemployment.

And we could define a concept of potential output as simply that output that happens when employment is equal to the natural level of employment, which is equal to the labor force times 1 minus the natural rate of unemployment.

And taking the difference, subtracting the second line from the first one, you get a concept that is used very frequently in macroeconomics, which is the concept of the output gap. An output gap refers to the difference between actual output and potential output, in which potential output is nothing else than the level of output that you get when unemployment is at the natural rate of unemployment.

So we get the output gap is related to the employment gap. And now we can replace the employment gap from here with the output gap. And we end up with a Phillips curve in the space of inflation and output gap, which is something we can integrate very easily with the IS-LM model that has output in it.

So the IS-LM model is really combining this equation with that equation, and some model about expected inflation. That's what the IS-LM-PC model is. So I gave you one example here, 1 mole of inflation. This is the case of the central banks do not like, an anchor inflation expectation.

That's my model of expectation, then my Phillips curve. I plug this into my Phillips curve and I get this relationship between the change in inflation and the output gap. And it's an increasing relationship. And that's what I'm plotting here.

For any given level, for any given level of  $Y_n$ , then as I increase output, the Phillips curve-- the change in inflation, the left hand side, the difference between inflation and expected inflation rises. That's the reason this upward sloping. And the reason this rises has to do with all the things that happen in the labor market.

If output rises, I mean, unemployment is falling. You need more employment to produce more output. If that's the case, it's more wage pressure that leads to a price pressure because there is a markup in between wages and prices. And that's the way you get into inflation.

So I gave you one example. It says, OK, suppose that we have some equilibrium level of output. This, which is the result of this monetary policy, this rate set by the central bank. And that's the IS, which is a function of the fiscal policy of the country, how confident are consumers, and all these kind of things.

So in quiz one, we really worry only about this top diagram. And all the shocks we had were shocks that happened in this top diagram. And we look at what happened to output, to equilibrium output as a result.

Now, this hasn't changed. It hasn't changed. That block is the same as it used to be. The only difference that we have here is that this level of output, which is the equilibrium level of output at any point in time, needs not be equal to potential output. And if it is not equal to potential output, that will lead to something with inflation-- inflation, disinflation, or something of that kind.

In this particular case, the equilibrium level of output, which is still determined as we used to determine, happens to be higher than the natural rate of output. And if output is higher than the rate of output, that means this is positive, which means inflation is rising. And that's exactly what we see here.

It means inflation is above expected inflation. When expected inflation is equal to log inflation, then that means inflation is rising. And that's what we have here. So any question about that?

So this is-- we just, what we did is kept analysis we used to have and now we added this diagram here at the bottom. Because it turns out that, yes, any equilibrium here, if I move the interest rate around, I'm going to change the level of output. All those are equilibrium levels output. But that doesn't mean that they're consistent with the natural-- with potential output.

And if it's not equal to potential output, it's a valid equilibrium at any point in time. But it's going to lead to issues on the inflation front. That's all.

The second diagram here tells you that we get issues on the inflation front with any equilibrium level of output that is different from the natural rate of output. That's what this diagram does. And that's what happened. In the short run, that's what it does. So we keep doing what we used to do in the first seven lectures or so. And this diagram just tells us what are the implications for inflation. That's in the short run.

The medium run, we said, is when we start processing, which output converges back to the natural rate to potential output. How does that happen? Well, it involves the central bank. But it's not that the central bank is doing crazy things.

The central bank is reacting to what the economy is telling it needs to do. Here is a central bank that was before doing whatever change in the interest rate or in the IS delivered the equilibrium output here. Had an inflation of around 2%. That was consistent with the target it had.

Now suddenly it finds itself in a situation like this and inflation starts climbing. We get 3% one year, 4%, the next, 6, 9, in a situation like that. Well, it's very natural for that central bank, if it's a responsible central bank, to react to that.

And the only reaction the central bank can have, the main reaction can have, is to raise interest rates. And that's exactly what starts happening. The central bank finds itself with inflation, in this case that is accelerating. It will start increasing interest rate.

And this process of acceleration of inflation in this case would only stop when output is equal to the natural potential output. And we can define implicitly what that interest rate is. And we can call it the natural rate of interest rate. Sometimes we call it [INAUDIBLE] rate of interest rate, neutral interest rate,  $R^*$ , lots of names for this interest rate.

But this interest rate is simply the one that gives us an equilibrium output in our IS-LM diagram that is equal to potential output. Thus, that's all that this  $R^n$  means. And here I'm solving it as the rate that implicitly gives us an equilibrium output here that is equal to the natural rate of output that defines it implicitly. OK, there we are. Is all that clear? Yes, OK.

I think you're going to have a big chunk of your current pset about this model and so on. And that's a good thing. And you'll see it also in the next one. Because, again, I think this is important.

Then they talk about the difference between anchor and unanchor expectations. I said, look, here, we have a situation that suppose we started at 2%. And then we found ourselves in a situation like that. That means inflation starts building up. We go to 9% or so.

So now the Fed gets scared and it starts raising interest rates. So that's moving up, lowering output. And as it lowers output, reduces the output gap. And therefore, reduces the change in inflation here.

But inflation keeps rising in this particular model because expected inflation is an anchor. And I said, well, suppose that eventually the Fed gets to that interest rate here. So we get to a situation like that. And I ask the question, has the Fed solved the problem now?

OK, finally we get to a situation where the interest rate is equal to the natural rate of interest rate. That tells me that output is equal to potential output. That tells me here that inflation is not changing.

Problem is that we already had inflation of 9% at some point. So here, inflation stops rising in this particular model with expected inflation and anchor expected inflation. But stopping is not enough because that leaves us with a level of inflation of 9%.

That means that the Fed, in order to bring back inflation to 2%, it needs to go into this region. So inflation starts coming down from 9%, 7%, 6%, 5% and so on. So if you have an anchor expectation, an inflation overshoots, you're going to have to cause a recession, and probably a severe recession. There is no way around that.

And that's what the Fed has been struggling to do, is struggling not to. Because the Fed, we are in a situation-- not only in the US, but in the US in particular, where inflation is way above the target level. But expected inflation has been more or less stable. And so when people talk about being able to restore sort of reasonable levels of inflation in a soft landed manner, with a soft landing, that means that you don't need to cause a recession to bring inflation back to 2%. You just can bring it smoothly here.

With this model of expected, inflation doesn't work. But if the bank, central bank, has credibility and inflation remain anchored, people continue to believe that the Fed will go back to 2%. Then you don't need to cause a big recession. Otherwise, you need to invest in bringing expectations down. And the only way you can invest in doing that is causing a recession.

But that's the reason I said central banks worry so much about keeping inflation credibility, because otherwise they need to overshoot in order to restore a long run balance. Good.

Now, you may wonder, well, I mean, this looks pretty simple. And just, if you have a problem like this, just go quickly to that point there. And then the problem is over. You don't let inflation build to 9%, or something like that. You react immediately.

The problem is, there's a famous sentence that was coined by Milton Friedman, is that monetary policy acts on the economy with long and variable lags. So first of all, it's very difficult at any point in time to know where is potential output and what is a natural rate of unemployment. I mean, you sort of sense it. But the truth is that the only way you really know is by looking at inflation.

So it's inflation that really tells you that you are on one side or the other. It's very difficult to-- you have some historical average and so on. But these things do move around. So it's difficult to at any point in time to know whether you are at our end or not.

The second thing is that here everything happens immediately. If I move immediately, then output immediately jumps here. That's not the way monetary policy operates in practice. It takes time for monetary policy to affect the economy.

And so the situation that happened, I would say, until last week, was the Fed knew that the inflation was still too high. But it also knew that it had done a lot. It had hiked rates very aggressively by a lot. And since there are lags between the increase in interest rate and the decline in output, the Fed's concern was, well, it's clear that I still have inflation. But it may well be the case that when this thing finally hits the economy, it hits it too much and we end up in a recession, and an unwanted recession.

That was the concern. Now, what is happening right now, there is a little bit of a concern that we got to that point because things were very slow for a variety of reasons. But now something broke. And the question is, now that something has broken, will we sort of decelerate the economy very, very fast? And that's a concern. That's what is happening right now.

But that's what makes monetary policy much more difficult than this little diagram, is that you have all these lags, these uncertainties, and all these non-linearities. And suddenly things happen.

Let me tell you when things can go really, really wrong. It's not the issue now. But we were very close to that during the global recession. Japan has experienced several episodes like this, which is the following.

Suppose you have a situation where your inflation is low. Typically, these things happen in situations where inflation is low. And for whatever reason, your natural rate of unemployment is negative. So you have inflation close to 0, say. And then the natural rate of interest rate is negative.

What's the problem? Suppose you have a 0 lower bound. Well, you have a 0 lower bound means that you're not going to hit this rate. The best you can do with inflation is around 0. Then you set the nominal interest rate to 0. And then the real interest rate is around 0. Well, the problem is that at 0, you generate negative inflation.

But if you generate negative inflation and the nominal interest rate is fixed at 0, then now you get a positive real interest rate because the real interest rate is equal to the nominal interest rate, which is 0, minus inflation, expected inflation. But if your expected inflation or inflation is negative, minus, minus is positive.

So that means your real interest rate is actually positive. So you wanted something negative. But you end up with something positive. That means now you have a big gap here. So inflation, you get into deflation. Now inflation is very, very low. It gets very negative.

Well, as inflation gets more and more negative, your real interest rate keeps climbing. So you keep moving further and further away from the natural rate of interest rate. Thus, something that is very scary for an economist, that deflationary trap. And that's the way you get into deep recessions.

In fact, that's what happened during the Great Recession in the US. The no, during the Great Depression in the US. During the Great Recession, we were close to it, but we didn't get quite there because lots of things were done to prevent a repeat of the Great Depression.

One of the biggest problems with the Great Depression was that monetary policy was not against the 0 lower bound. But it was very slow to react. They were in a situation like in this diagram here. But they kept the interest rate high. And they moved very slowly. And when they tried to catch up, well, they went into deflationary environment. So the real interest rate was moving away from them, despite the fact that they were moving the nominal interest rate down.

And that you can see here. So the Great Depression starts around 1929. It starts really in 1929. Unemployment initially was low. The nominal interest rate was around 5%. And inflation rate, growth declined very rapidly. The inflation rate was around 0. So you had a one year-- the real interest rate was around 5%, as well.

Well, things got worse. Unemployment began to climb very rapidly. And so the Fed began to lower interest rates, nominal interest rate. Went from 5% to 4%. Those were unusually low interest rates for the time. But the problem is that the inflation by then was -2.5%. So the real interest rate-- they were lowering the nominal interest rate. But the real interest rate was rising.

And unemployment, accordingly, was rising, as well. It kept going. Then they began to cut the interest rate more aggressively. But we got into real deflation, -10% or so. So the real interest rate kept climbing. At that point was a very poor time interest rate hike, was a disaster for unemployment because it really hiked the interest rate, real interest rates even more. And eventually got out of it with a bunch of policies that were non-monetary policies. But that's what happened.

So the Great Depression was very much a story of this kind in which essentially we fell into depression so that interest rate began to climb and got the economy deeper and deeper into recession and unemployment higher and higher and so on. And at some point, monetary policy just didn't work. So that's the reason you have to essentially do massive fiscal policy to get out of it.

Let me talk about some of the shocks we have discussed in the context of this more complete model now. And actually-- OK, let me talk about two canonical type shocks. You can have two broad type of shocks or policies in these models that you want to analyze.

Some of them are aggregate demand, either policies or shocks or whatever. Those are things that you know. Aggregate demand policies move the IS curve-- IS and LM, but moves operates in the goods market. So this is one case of a contractionary fiscal policy, a fiscal consolidation.

So what happens here? Suppose you start an equilibrium level of output equal to the natural rate of output. But now, for whatever reason, we're running deficits that are very large. You want to reduce the size of the deficit. Well, you move the IS to the left. Now you cut government expenditure. You increase taxes.

That will bring output below the natural rate of output. You go to the Phillips curve here. That means inflation now, you get into the deflationary forces or inflation starts declining. The result of that-- So in the short run, you get exactly what we had in lecture five, six or whatever. You get a contraction in real output.

But on top of that, you start getting inflation coming down, or even going negative. And as a result of that, the central bank will react. And it will react. And that reaction will stop when in the long run when output goes back to the initial level of output, its natural rate of output.

So the point of this picture that is new relative to things you already knew is that in the short run, you get very much the type of responses we had early on. In the medium run, in the medium run, you don't get that. A fiscal consolidation does not reduce output in the medium run.

The fiscal consolidation does is reduces the real interest rate in the medium run. So you see here, output eventually goes back to that level with a much lower real interest rate. The point is sometimes this path, this path takes your output down initially and then comes back, can be very painful. It can take a long time to generate a procession and so on. And sometimes it can happen in any sort of conditions and be faster and so on.

Many of the policies, agreements that people have, people that understand what they're talking about, had to do with the speed at which these things happen. So sometimes people can agree that you need a fiscal consolidation. But someone may think, no, this stuff is going to be very slow. And so I don't want to incur in a very deep recession for very long just to adjust a little bit the fiscal deficit. And others may think the opposite.

It's mostly about the speed. But shorter response to a fiscal consolidation or to any aggregate demand contraction is different than the medium term response. And again, the signals for the central bank that it needs to move interest rate, they all come from this block here-- inflation falling. That tells the central bank, oops, we may have a problem, and so on.

Another kind of shock that is more complicated and that has played a role actually very much in the recovery from COVID is some sort of supply side shock-- for example, an oil shock. The price of energy goes up or something like that.

Well, that one, how do you analyze that? A supply side shock is not something that comes from, that would go to the IS-LM part of the model. A supply side shock, remember, we analyze it when we analyze the natural rate of unemployment. It's something that affects the supply side of the economy.

We can model that as an increase in the markup. And we know that an increase in the markup will increase the natural rate of unemployment. That means that this shock will do what to potential output? So an energy shock, especially if it's a persistent one, will operate like a markup shock. And that we know will increase the natural rate of unemployment. So what happens to the potential output?

Goes down, of course. Output is equal to employment, to labor force times 1 minus the natural rate of unemployment. If the natural rate of unemployment goes up, then the potential output goes down.

So that is not a shift in the top diagram. It's a shift in the lower diagram. It says, we used to have this Phillips curve. And now the Phillips curve has shifted to the left. Because we have a new natural rate of an output. And remember, the natural rate of output is at that point when output equal to the natural rate of output does not produce inflationary forces.

What happened with this shock here? So suppose the economy was in this equilibrium here and now it gets hit by an oil shock. In the short run, if no one reacts, nothing happens to output. Doesn't move much. But what happens?

You see, if I don't move something in this part of the diagram, I'm not moving equilibrium output. In the short run, equilibrium output is determined exactly in the same way we have determined up to now. So if we get a markup shock, nothing happens to output. If nobody moves, nothing happens to output in the short run.

But what happens that we may not like?

**AUDIENCE:** [INAUDIBLE]

**PROFESSOR:** Exactly. What happens is the Phillips curve went up. Before, that level of output was consistent with no changes in inflation. Now, it's not. We get an increase in inflation.

So the first place where you'll see the effect of the oil shock here is inflation will pick up. Remember, the price of gasoline going up and all those things. Well, that's where you see it first. Before activity falls, you see it there.

That's what makes up the Phillips curve also, in the '70s and '80s. You can see lots of shocks of this kind. Initially, unemployment didn't move much, but inflation kept climbing. So that's what happens.

Well, obviously, when that happens, if it persists-- and typically central banks, if they think it's very short lived, they're not going to react to this stuff. But if it is persistent and they think it's persistent, then the reaction is what? Well, they need to-- this only means that the natural rate of interest has gone up because I need, for that same IS, I need to bring down equilibrium output. That means I need a higher natural rate of interest rate, or a higher  $R^*$ .

So what the Fed needs to do, the central bank needs to do, is just start increasing interest rates. That's a natural response. A lot of what happened during the COVID, why inflation picked up so much in COVID is because we had a shock of this kind. It was not energy. The energy shock came later. But it was supply side, transport costs, and stuff like that, the network, the production network and things like that broke down.

But they thought it was going to be very temporary. So understanding this model, they thought, OK, look, this, this curve will come back by itself, so better not react right now. Why? Because a recession is really, this curve will come down, back down by itself.

Well, the problem is that it didn't come back by itself that fast. Some things came up fairly fast. Some others did not. In particular, labor force participation did not come sufficiently fast back. And so that's the reason we stayed too long in a situation like this.

And that's one of the main reasons inflation sort crept up in the US, and also in other places in the world. In Europe, the big reason for why inflation picked up there is because this curve moved a lot up. Why is that?

**AUDIENCE:** [INAUDIBLE]

**PROFESSOR:** Exactly. They had a massive energy shock. And so that moved that curve up a lot. Good.

I want to now return to what is going on right now. Actually first, I'm going to-- yeah, right now, meaning the last few days. So it turns out that this diagram that I used for the fiscal consolidation shock can also be used to understand a little bit what happens with the Silicon Valley Bank event.

Remember, we model that as a credit shock. We said that  $x$  we had is like  $x$  going up. Well,  $x$  going up does exactly that. It moves IS to the left. So a shock to  $x$ , a panic of the kind that we saw, is that. It moves IS to the left. Why is that?

So for any given level, the safe, real interest rate, a panic, a shock to credit and so on, moves the IS to the left. Why is that?

**AUDIENCE:** [INAUDIBLE]

**PROFESSOR:** Exactly. So the safe interest rate doesn't go up. But what goes up is the cost of borrowing because firms need to pay this extra risk premium. And then for any given safe interest rate, the real interest rate, firms have to pay more, which means there is less investment for any given level of the real interest rate. And so the IS moves to the left.

And if that happens, then you start getting deflationary forces. So again, all this happens very quickly here. In reality, I told you there are lots of lags and so on. But markets begin to anticipate what will happen.

So markets begin to anticipate. So in the immediate, output doesn't collapse immediately or anything. And inflation doesn't collapse immediately. But markets realized that there are long lags. But there is a shock already. So it's likely that these things will happen. And it's likely that this will happen.

And it's also likely that the Fed will react to that. What should be the reaction of the Fed if this stuff gets to be persistent? How do you get out of a shock like that if you really want to go back there?

You cut interest rates. In the case of the US, they were hiking interest rates because we dealing with high inflation. This tells you, well, you should slow down the pace of hiking. Again, they don't do it immediately. They meet next week.

But the markets don't need to wait for the Fed. They anticipate what the Fed is likely to do and they start betting on that. So let me show you next a bunch of charts that show you that someone in the market understands these mechanics-- a lot of people, because the prices are moving exactly that way.

This is something-- this is the one year ahead inflation expectation, as traded in the market. It's called Inflation breakeven, the one year inflation break. So these things are traded in the market. And you can trade expected inflation all the maturities you want.

So this is what the market was expecting before this shock. We're getting hotter and hotter numbers. So the economy was-- inflation, expected inflation, as price in the market, was climbing one year out. And then the shock came. And look what had happened to expected inflation. Boom. It collapsed.

OK, why is that? Well, people thought this shock, that leads to that. That's what they thought. This bounce was markets got a little excited yesterday. It was a little risk on environment. Today they lost all that already for a shock I'm going to tell you about in a few minutes.

But anyways, the point I wanted to highlight is, again, expected inflation was getting a little out of control. And then this x shock came, the panic shock, and then immediately expected inflation declined because people anticipated something like this. The market anticipates something like that.

What is that? This is the market's expected next hike. So March 22nd, the Fed will decide on the increase in interest rate. Remember, the Fed had decided, as I said in the previous lecture, to go for a path of 50 basis points initially, very high. But since a couple of meetings ago, they decided to slow down to 25 basis points, precisely because they want to wait and see a bit what [INAUDIBLE] do we have?

I mean, there's long variable lags. They have increased rates a lot and so on. So they have gone back to a pace of 25. So if you see somewhere here, in February 22, if you ask the market, what do you think will be the next hike? There will be lots of answers-- trades, and so on. But when I say answers, I mean what is price, what is traded, these financial instruments.

The average answer was 30 basis points. 30 basis point is that most of the people thought that they were going to increase the interest rate by 25 basis points. And there were a few guys out there that thought the Fed doesn't increase the interest rate by 33 basis points. That's 25, 50, 75.

So this 30 meant that almost everyone thought it was going to be 25, but there were a few people that were concerned that it could be higher than that. What happened here? We started getting very hot numbers on inflation.

And so all of a sudden the equilibrium changed dramatically and we went to 45, which means most people then thought in the market that the next hike on March 22 was going to be 50 basis points. And a few people said stay at 25. That's the reason this is 0.5. But it was almost priced in that. When people say pricing, they are talking about this.

What is the hike that's priced in? It's this statistic. Look, that's what happened with the Silicon Valley bank event, a collapse in this thing. Now, it's trading at around 13 basis points. That means most of the people think, the traders here think, that there will be no hike at all.

So a few days ago, they all thought there was going to be 50 basis points, which is a big hike. And now most people think there will be no hike whatsoever. But a few think that it's going to be 25. Actually, it's almost 50/50. I think today is a little lower than that. But it's almost 50/50 that it's 25 or 0. That's what it is.

But had you asked anyone around here, and certainly around here, is there any chance of 0, and there will be no one, literally. That contract was not traded. OK well, you see things happen. Accidents happen. So now that's where we are at.

Now, if this all lasts a week and everything gets resolved, it doesn't have a lot of macroeconomic consequences. It's just a little panic. You know, some people make money. Some people lose money, and so on. But this can be a very problematic shock, actually,

Because what you see here, this is the size, this is Silicon Valley Bank. These are all the banks smaller than that. It turns out that all this bank at this moment are reshuffling their portfolios, are becoming very conservative. Because they don't want to be exposed to similar risks. They realize that the environment became very unfriendly to-- there can be ransomed banks in any moment, despite the fact that it's a big policy package out there.

But people are still withdrawing lots of deposits from small banks, small and regional banks. And they all deposited it in JP Morgan, you know, the big banks. So there's lots of deposits that, despite the insurance, the blanket insurance that is implicit, at least at the moment, lots of deposits from these sectors are moving to these major banks here.

That's called a flight to quality. Now, the problem of that for the economy as a whole is that small banks and regional banks play a huge role in lending. I think a little more than 50%, for example, of the commercial and industrial loans are made by small banks.

80% of the mortgages are given by a small bank. So it has a big potential consequence. What I'm trying to say is that x may stay high for quite a bit of time. And that's the reason, there is anticipation that this will have macroeconomic consequences. And as a result of that, that the Fed will react, that inflation will change, and all that.

So that's where we were at on Monday. Remember when we had the lecture, I was telling you more or less that the story. What is this? You can read it there, but it may not mean much to you. But what I'm highlighting is this. This is pretty big.

35% decline. This is an equity. It's a share. So this is the value of the equity of a pretty major bank, Credit Suisse. So Credit Suisse has been in trouble for a while. But today got into really big trouble and saw a massive collapse in the equity shares. In fact, they stopped trading for a while and so on.

This thing here-- you know, I updated your slides many times today because I began to look at this event around here. And then the thing kept going and they stopped, kept going, and so on. And I'm not sure where he's at now. I stopped-- at what time did I stop? 9:00 in the morning. And I was awake at 4:45 today. So they tell you this was pretty intense.

But what this is is the credit default swaps on Credit Suisse. Credit default swap is whenever it's a bond issued by a bank, you can buy an insurance on that bond. So if the bond defaults on you, you then use the insurance and you get paid. So these things for banks normally are very small numbers, but for Credit Suisse, bigger than for other big banks because they've been in trouble for a while, all sorts of trouble.

But look at that spike there. I mean, that's pretty big for these kind of things. It's not Lehman yet, but big. So anyway, that caused a little panic today.

This is the stock prices of the main European banks. It's sold today. So look at this. It was a little rally yesterday and so on. I mean, this is the decline as a result of the US problem, the Silicon Valley Bank's. Then a rally yesterday. And then Credit Suisse happened. And you had a big decline in all the major banks in Europe.

The US banks are also declining. But that was bigger for the major banks. The Vix, remember I told you last week, last Monday, about this indicator of fear in the market, which is really the price of put options? I'm simplifying things. I mean, protection for big declines on the equity market.

Again, it began to spike very, very sharply as a result. This is what happened with the US event. Then yesterday we got a rally, risk on type thing. And then today we got a new event.

Look at this. I like this picture. What this is. Let me tell you what the blue line is. The blue line is the market expected federal funds rate at different dates in the future. Today the federal funds rate is around 4 and 1/2. And this is what the market expects.

So they expected the Fed to continue to hike interest rates and to reach a peak around in June 14 in that meeting of the order of 5.3% or so. That's what's the average. There's lots of dispersion. That people are betting on 6%, but that's the average. That's what people expected.

The yellow things is the number of hikes that you're likely to see. So you're likely to see one hike in the next meeting, another one in the next meeting, and another one in the next meeting. And then stop and begin sort of cutting rates. That was expected path on Friday-- 10th was Friday. More or less around there. Maybe Thursday, I don't remember.

But anyway, that was expected path. So still, hike rates reach a peak of 5.3% and still pretty high interest rates by the end of the year. That was expected path. That's the way it looks now. Very different.

Now people are expecting very small changes now, I showed you. It's like 13 basis points what people expect. Still people expect sort of a hike, but small one. Now they expect the peak to be sort of in May and then the Fed to start cutting very aggressively to at the end of the year, end up with much lower rates than today.

So this is exactly what I was telling you before. The market is anticipating that we had a huge contraction in the IS because  $x$  went up a lot. The major consequences, that is going to be lower inflation. Yes, we have a problem.

I mean, if the US did not have 5.5% of inflation today, I can assure you that the Fed would have come out and said, we cut the rates right now. The only reason they're not cutting right now is because we have two problems. We have the financial panic on one side and we have the high inflation on the other side.

So they have to balance these two forces. But the expectation of the market is that the balance of two forces is going to be dominated by the contraction in aggregate demand much sooner than people were expecting. So that's what the market is pricing at the moment. And what I'm saying is, I was trying to highlight that this is very consistent with that. It's just the market looking ahead, but what is likely to happen.

It started from a situation which is a little bit more complicated, again, because we already had high inflation. Well, I do not know, really. I mean, it is on one hand, more complicated because we have a problem of high inflation. On the other hand, having high inflation allows you to cut the real interest rate much more aggressively. Because if you bring the nominal interest rate to 0 and you have inflation of 5%, that allows you to cut the real interest rate to -5%.

Well, if you start with a situation where your inflation is 0, you don't have any space to cut the real interest rate. So the Fed can be very aggressive here. And the only reason is not being very, very aggressive-- They were very aggressive in terms of supporting deposits and all that. But they can be very aggressive in terms of interest rate cuts if the need arises. Hopefully we won't. But they have a space because we're starting from a much higher level of inflation. That helps.

It hurts in the sense that it will delay the reaction. But it helps in the sense that they have much more space for policy. What is this? This is just one year interest rates. That reflects the previous picture, as well. One year out rates were over 5% a few days ago and now are in the low 4s. And this picture I kept updating, as you can see. It was really dropping fast.

That's a big change. The one year rate, 60 basis points, that's a big change. So that's where we're at. And from the next lecture, I'm going to start with growth. But any questions about this?

OK. I don't want to start growth now in four minutes. But so the set of topics we're going to discuss from the next lecture are very different, subject to not having any major events. If there is a major event, I'm going to reshuffle things so we can talk about financial panics and things of that kind. Let's hope that it can stick to the program and do growth in the next week.

OK, good. Have a good weekend.