Microfoundations of Macroeconomics
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Lecture – 25
Flexible Prices II

Welcome back. So, let us continue with the real business cycle model that we are discussing about and I hope you are now able to understand the difference between the neo classical and the Keynesians that we have. So, we will continue with that where we had left with the last session and we will start with the some reference that we have.

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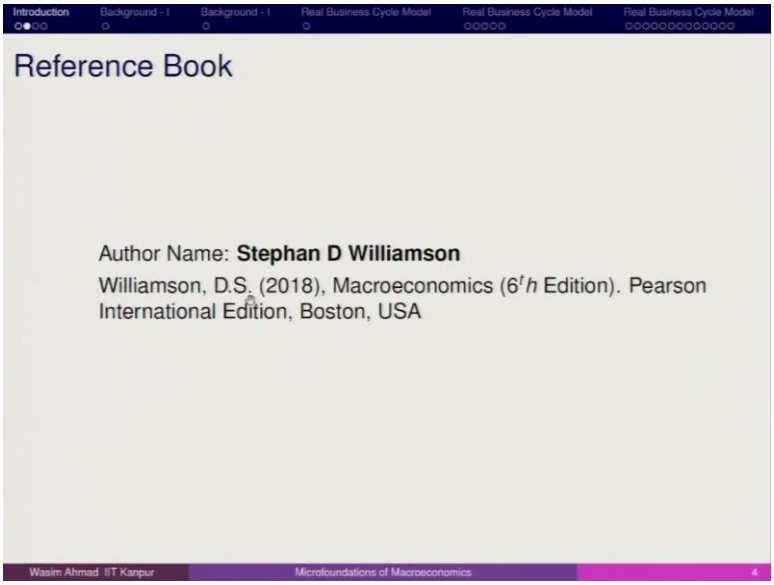

So, here the reference remains same. So, Stephen D. Williamson is the same reference book for this particular lecture.

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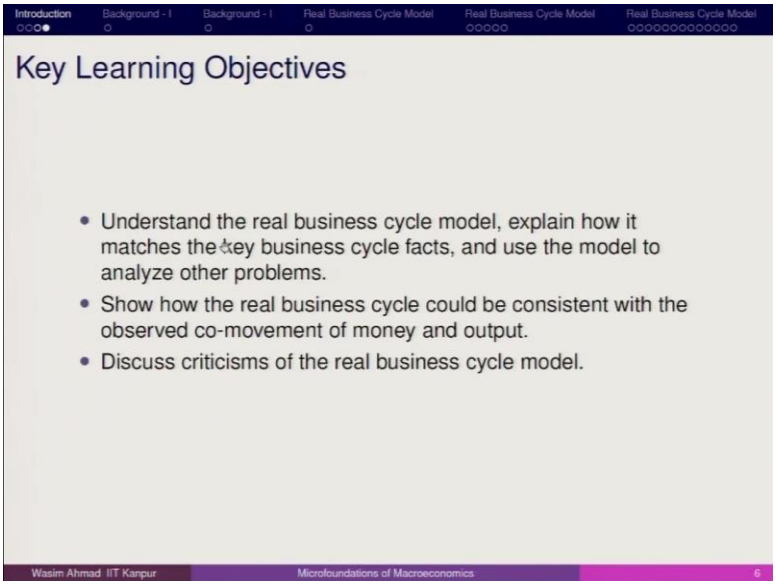

And we will have the understanding about the key learning objectives that we have. How the real business cycle model could be observed co-movement money and output. So, objectives remains same not much change. We have already covered these things.

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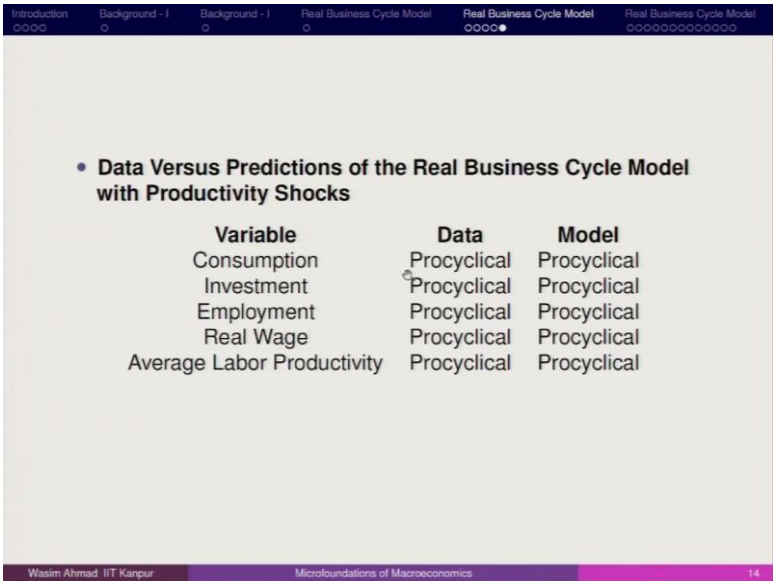

So, we will hear talking about how when we have the productivity shock so how this productivity shock is creating a favourable situation and when we can think about the consumption and investment, employment, real wages and average labor productivity becoming procyclical.

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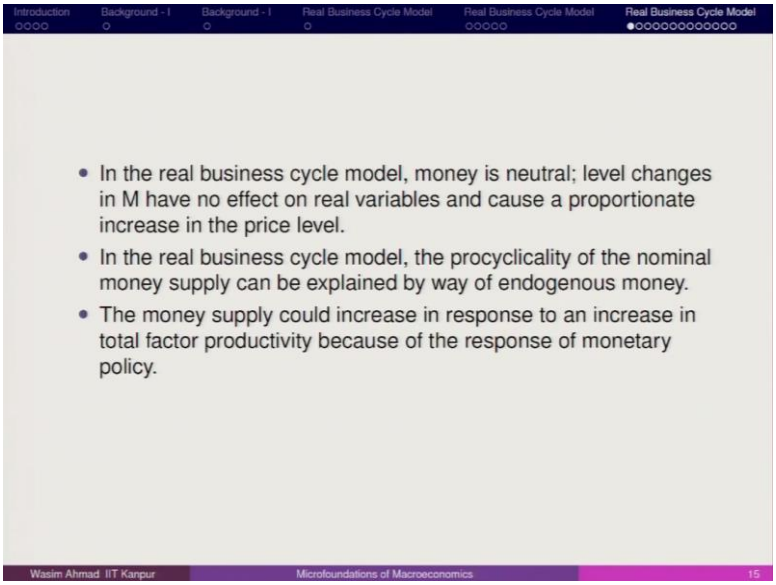

Now what we thought about that when we have money supply increase this money supply had a very I would say when we thought about money supply increasing we saw price decreasing so that became quite very odd to understand. So, we will now focus on that part. So, in the real business cycle model the money is neutral which means that if the money supply increasing by 10%.

It is leading to increase in the nominal variables by 10% the same. So, you have the easy transfer. Money supply increasing by 20% price also increasing by 20% so that we have the smoothness. We do not find that kind of increase in real variables, consumption investment and all what it also means if the Central Bank is planning to just go for helicopter to opt kind of thing then it may not work in most of the cases.

In the real business cycle model the procyclical of the money supply can be explained by the way of indigenous money. So, in the previous-to-previous session when we were talking about the monetary inter temporal model what we assumed that the money supply exogenous which means that it is not decided within the model. It is coming from outside the model so which means that the economic agents do not decide about the shape of monetary policy.

Monetary policy decided by the Central Bank and Central Bank takes independent decisions, but in a real business cycle model they did not confirm this idea and rather they argued that if the individuals are playing very important role if the economy consist of individual, firms and the markets then it is wise to assume that the money supply is an indigenous variable and in this context it became quite evident.

The money supply could increase in response to an increase in total factor productivity because of the response of the monetary policy. So, if you have some schemes launched by the government and if government is the sole I would say owner of the monetary and fiscal policy then it becomes really difficult in certain cases when we have the total factor productivity increasing scenarios you find that monetary policy get incentivize and they also offer incentive. So, that kind of understanding it is needed here.

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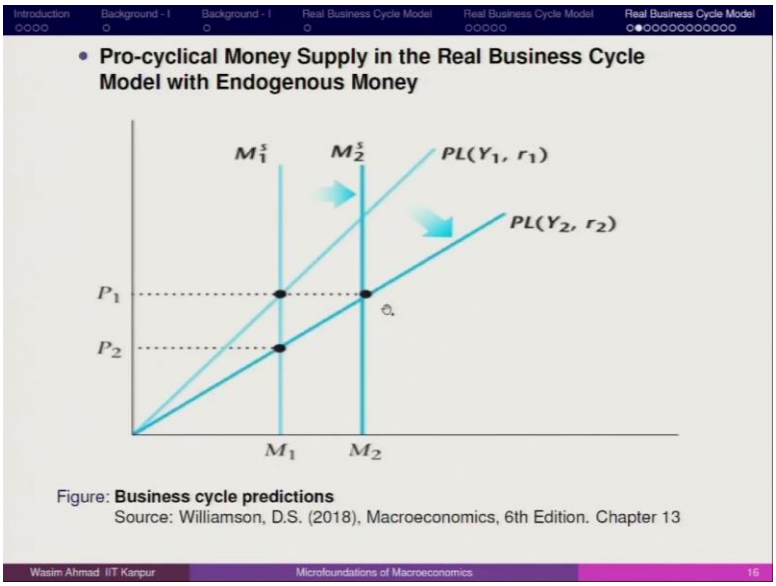

So, here it becomes easier when you have the money supply increase so you have the rightward shift because of that we also see that there will be a demand for money rising and so here if this money supply increase if it is not if the Central Bank role is just to maintain the price stability and if it goes for then we see that the price level does not change, but here you have the demand for money changing.

And demand for money once it changes then you have the role of rate of interest playing an important role. So, by this we say that even with the lower rate of interest the households are having more demand for money and this creates this type of scenario where we have the price almost constant. Though it should have been lower, but the Central Bank role is to maintain the price stability so this is how it looks like.

So, this is the title the procyclical money supply in the real business cycle model with endogenous money. Since it is decided within the model so the rate of interest that we had assumed here lower this comes into picture here and because of that we are finding such type

of behaviour with respect to price. So, which means that anything that we have here price increase this will translate into this.

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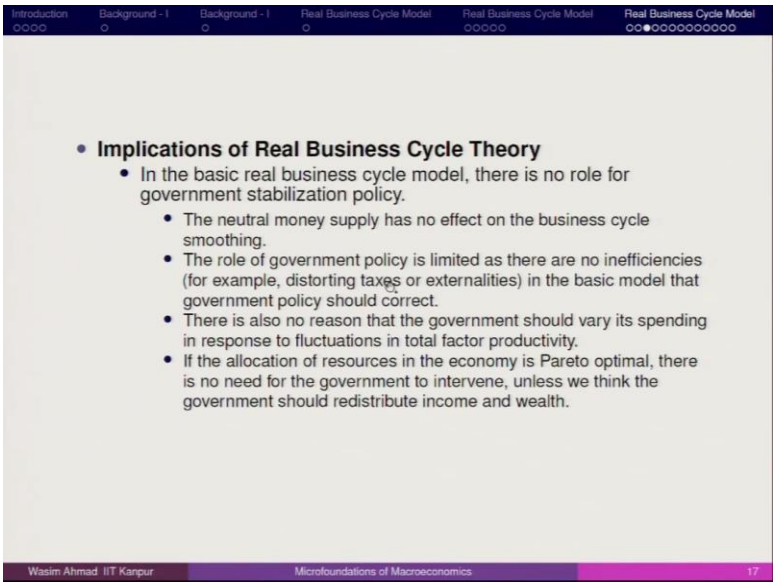

Now implication is that the neutral money supply has no effect on the business cycle model smoothing. The role of government policy is limited as we do not find any kind of inefficiencies in this particular model most of the variables are becoming procyclical and that is why once you do not deal with any kind of inefficiencies then there is no role of the government. So, inefficiency in the sense that we are talking about distorting taxes, externalities and this is how we try to interact.

There is also no reason that the government should vary a suspending in response to fluctuations in total factor productivity so this is how it looks for that government should vary should go for higher spending or it should have the variations with regard to total factor production which is not needed because we do not see any kind of inefficiencies. Second thing is that the allocation is perfect.

So, it is ideal so if it is satisfying the optimal criteria the pareto optimal multi criteria then also we do not require. So, in the one period model we had assumed that we have a social planner so as such social planner role is not needed here because here we have a most of the things becoming optimal automatically. So, this is how the real business cycle is known for.

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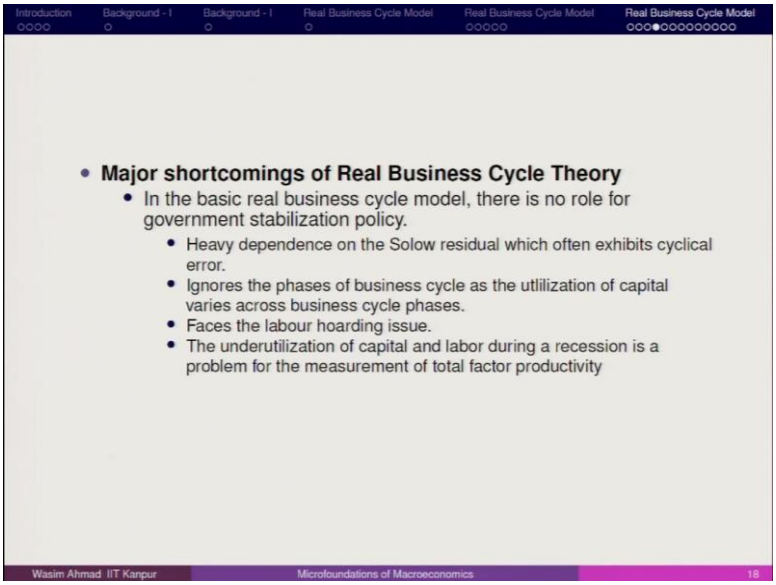

Now the major shortcomings of the real business cycle theory if you think about. So, the first thing is that it depends upon the solow residual and it has been often found by studies that solow residual is having a limitation with regard to the trend GDP and the cyclical variations that it offers and because of this we often find that it is not the accurate measure for the total factor productivity.

Total factor productivity could be linked with the how much is the expenditure on R&D and how it is decided and in which direction it is moving. So, that could be one of the value additions. Real business cycle school of economic thought does not take into account different phases of business cycle. So, as in the last session as I mention about the business cycle that business cycle will have two phases one is the peak and another is trough or expansion or contraction.

So, if you have expansion and contraction taking place then this particular business cycle model explains about in most of the cases it explains about the business cycle dynamics in the expansion phase because total factor productivity increase if you are thinking in the positive sense than it happens in most of the cases during the normal period because firms do not care about making investment because they know that the marginal product of capital is going to be higher.

So, it is better they would go for, but once you have slow down. So, for example, during the peak period when you have the expansion so all the machinery and everything is working optimally and you have more employment and people are just working 24 hours to produce the

output during slow down it may not be the same. So, the real business cycle school of economic thought does not take into account.

So, once we have the factor productivity increasing it does not mean that it is increasing even during the recession period. During recession period it may happen that the firm will go for labor hoardings because they know that if they lay off these labors then they will be getting job somewhere else, some other companies will hire or they may not be able to get these labor again at the right time when the economy recovers or it is in the recovery phase.

So, most of the labor hoarding issue it is not being discussed by the real business cycle school of economic thought and these are the major limitations of this. So, I hope with this background you have some kind of understanding about the real business cycle school of economic thought. Now we will be talking about so Kydland and Prescott model that we discuss about real business cycle.

It has wide applications and you will find that in macroeconomic literature if you are working on real business cycle school of economic thought even if you know about it, it is well appreciated because they know more about such type of behaviour and you should know about such type of behaviour in the economy especially the macroeconomic dimensions because it is important that you should be focusing not just on the demand side, but also on the supply side of the economy.

How total factor productivity is increasing. You may not be relying more on the solow residual, but you can calculate productivity by different factors and then you can see how these things are working.

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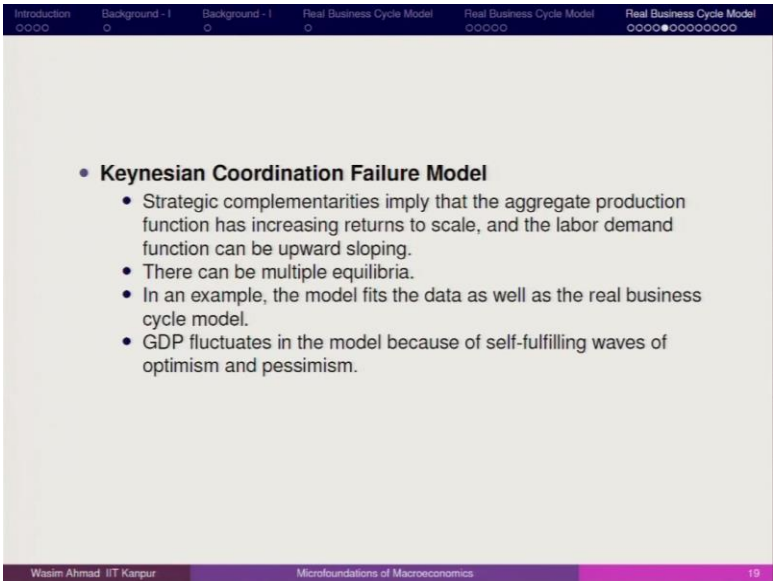

Now let us start with the Keynesian model. So, Keynesian argued that the real business cycle model explains more or less the explanations in the context of or it is linked more or less with the supply side thinking about the demand and supply for labor, money supply and then you have the output. So, overall it creates a very rosy scenario, but it has certain limitations.

So, Keynesian school of economic thought launch and attack with model what they call it as Keynesian coordination failure model. Now what does mean by the coordination failure? Coordination failure has lot of meaning so they had very innovative idea that if you find everything good in the economy then you have a hard behaviour among the investors, among the firms, among the household.

So, it is also linked with some kind of consumption behavior what we call it the demonstration effect where you demonstrate your consumption behavior or you try to copy from someone else. So, it starts with very good example that if you think that someone is organizing a party you have a colleague friends your college colleague or university colleagues are going for a party or going for a picnic trip.

And you know that no one is going then you will also be having the similar kind of attitude and you will also simply cancel or will not be interested, but if you have planned a picnic and it is organized by a good set of wealth planners and among the group if you think that some people are efficient and they organize the picnic very efficiently. So, what will happen that everyone will be interested.

And then if you have the information that everyone is going on that picnic then you would also like to follow them. So, what is the learning here. Learning here is that in the economy if you have a good scenarios then you find that everyone is trying to make things out of it and they are following one another. So, here you have the chain of reactions happening. So, maybe if you are software supplier than you would like that how much if there is enough supply of hardware, enough sale of hardware then your software will also be dependent upon that.

In the same way if you have a good income generated and if you know that if you have a households are earning good amount of wage and it is creating a good favourable situation for the household they are not worried about current and future consumption even if there is variation there is smooth out then you know that certain group of consumer will be asking for certain types of goods and services.

Then the demand and supply of those services will also increase. For example if you think that you want to buy car and everyone is recommending that you should buy this car and this car feedback is really good, everyone is excited about it, you can see that you have lot of that model car accepted by household and there is a good review coming up. So, everyone is following the news and development.

It means that you will be also tempted to go for that kind of trendy car. So, in the same situation you have at the coordination level. So, what the coordination means? Coordination means that there is some kind of strategic complementarities in the economy. So, one sector is dependent on another so if you have a food supply chain in food supply chain if the thing that there will be enough demand in the market.

Then they will be only buying the input from the farmers. So, farmer who is producing those inputs he will be also further incentivized to invest more and produce more and once he is able to sell to the food supplier then food supplier is also happy because their goods are also being sold. So, if everything is good in the economy you find a strong strategic complementarities.

And if it is not good then we do not see that kind of behaviour. So, that is what we are calling it here a strategic complementarities. It shows that the aggregate production function has an increasing return to its scale. So far in most of the models it is very common to assume that

you have a constant return to scale. So, once you have the constant return to scale it means that by increasing one unit of inputs we are able to get only one unit of output.

But if you are increasing one unit of input and if you are able to produce 50 units of output that we call it as the increasing return to scale and the labor demand function can be upward sloping. There can be multiple equilibria in the sense that one group may be more optimistic another group may be pessimistic. So, the optimism and pessimism that we have in the economy it has lot to deal with such type of strategic complementarities.

So there it becomes really important. The Keynesian school of economic thought when they argued with this coordination for your model they said that if in the economy if you do not have strategic complementarities playing important role then it becomes really difficult to fit the data in the model and then what Keynesian had come up with the evidence that whatever model they had assumed it fits well with the data.

And it had fitted well with the data and it also explained the real business cycle dynamics in a better way. So, here we have the GDP fluctuates in the model because of the self fulfilling waves of optimism and pessimism so this is how they try to explain. So, overall what is the meaning of the Keynesian coordination model? So, Keynesian coordination model talks about the inter dependence between the industries, between firms, between sectors.

And then one firm may be using the output of one sector other intermediate good for producing the final product. So, they also you have the strategic case of complementarities.

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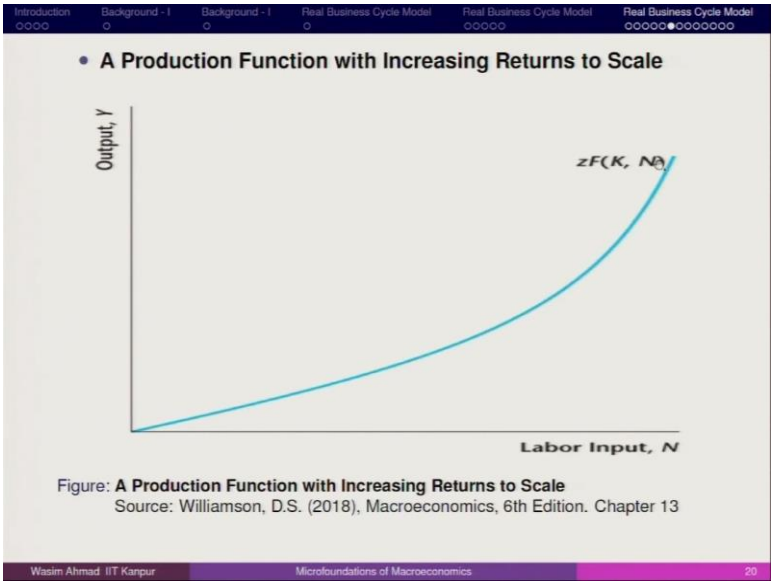

So, this is what it says that the production function will have the increasing return to scale. So, once we have the increasing returns to scale so this shows about that you have the output and here you have the labor and as you increase the labor your output also increases by the same amount, but after some point of time it increases more than what you have input.

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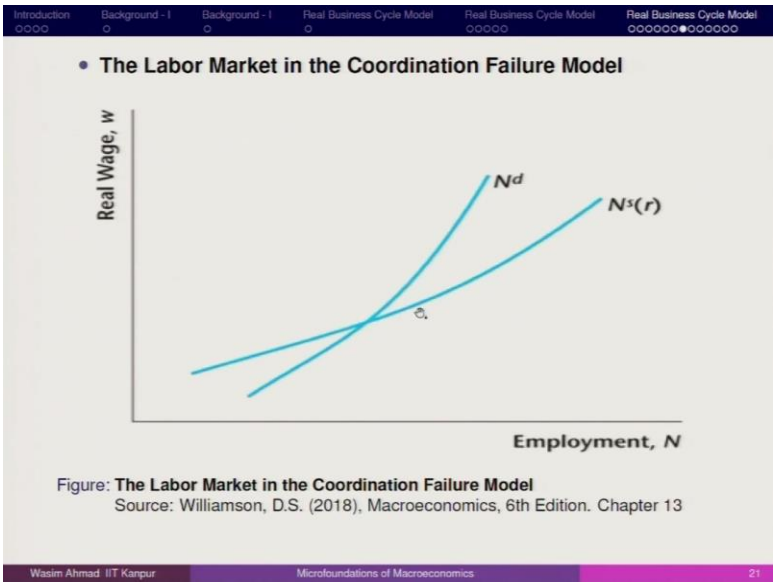

And it will have always be the case that demand for labor will be greater than because if it is about the increasing returns to scale then we will have such type of coordination so here you will have the demand for a labor will be higher than the supply. So, slope of this will be higher than slope of this. So, this is mainly has to deal with the increasing return to scale and this is how we try to prove it.

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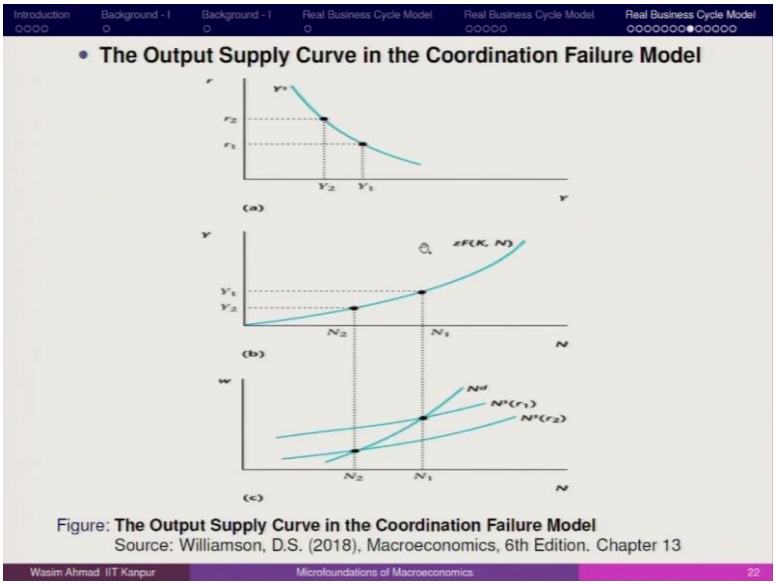

So, here what they mean by this is if you have the output and here you have such type of scenarios if you have the rate of interest increasing what is the meaning of this so this is the r 1 is the equilibrium scenario if you have the rate of interest increasing then if this is how we are thinking about. So, if the rate of interest increases then we find that this rate of interest increase is leading to decrease in output.

And this decrease in output it is having further impact on the demand on the labor supply and this labor supply is having further impact on the demand and supply of labor. So, earlier we were having here which means that here we had more wages, more labor, but because of this shock that you have because of the rate of interest increase what we are seeing that here the coordination is not playing important role.

And as a result here you have the wage rate becoming lower and the labor supply is also getting lower. So, if we think about in the coordination setup so what it means that in the macroeconomic scenarios if you have the rate of interest higher then this rate of interest higher it can be linked with the further distortion in your output and you will find that whatever you have the output decreasing Y_1 to Y_2 it has more to deal with the labor supply.

So, labor supply is decreasing strongly than the original point. So here we are N_1 and here we are seeing N_2 and the demand and supply of labor also changes. So, here you have N_1 and N_2 playing important role.

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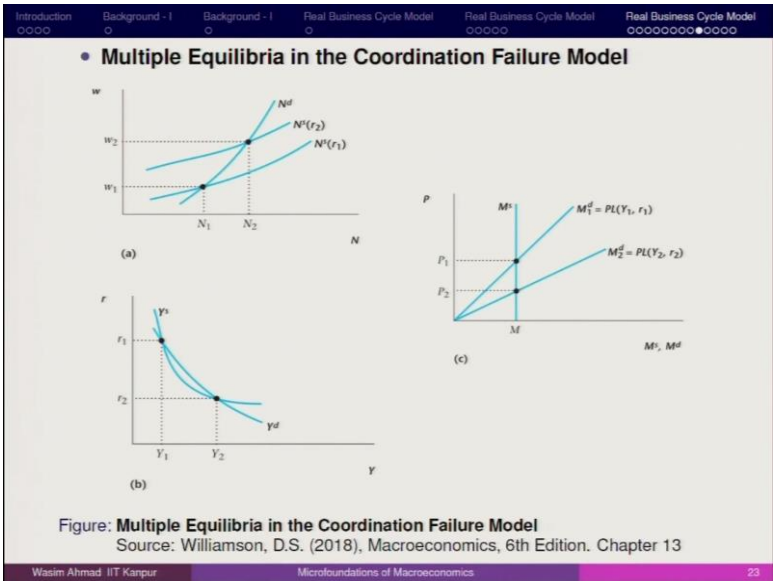

Now in case of multiple equilibria if you have multiple equilibria case then that becomes important to look at. If you have the multiple equilibria then there we try to explain that if you have multiple equilibria then role of optimism and pessimism will play important role. So, if you have the role of optimism and pessimism so here you can think about r_1 and here we have r_2.

So, if you think that if you have a good optimism and pessimism so one group of individuals so maybe if you think about the multiple equilibria then this could be a situation wherein we are thinking about equilibrium scenario where the optimist there are two groups. One group is having some kind of equilibrium and this particular group is optimistic. Another group is pessimist.

And if you have a optimistic and pessimistic scenario playing very important role I think I have shown that. So, if you have a optimistic and pessimistic scenarios playing very important role then in that setup it becomes important to see how you can think about. So, there will be role of sun spot. What do you mean by sun spots? Sun spots are basically the situations wherein we are creating some kind of optimistic scenarios for the industry, for the firm.

And there they think that either because either productivity has increased or either it is going to be the low interest rate environment or either it is going to be because of the government intervention. So, you have the government incentives given either because of the tax reduction or the increase in government expenditure. So, once we have such type of expectation then

what typically happens that one group of investors will be or one group of firms or the strategic complementarities existing in a particular firm setup will flourish.

And they will be going for increasing the production, they will be hiring more labor. So, this creates a really favourable scenario for the business cycle model, but in another typical model what typically happens that if you have pessimistic scenario then in that setup it may happen that it is because of the increase of taxes. So, government maybe increasing taxes you have decrease in money supply scenario, increase in interest rate environment.

And they are not very bullish about. So, in most of the economies you will find that; you find certain sun spots. So, for example, in case of Indian economy or any global economy if you think about sun spot so best example will be the stock market. If the stock market is going up so it is showing some kind of optimistic scenario so there you have sun spot that this can be identified sun spot because it creates a favourable scenario.

It is forward looking variable and this forward looking variable it is incentivizing the firms to look for a better investment opportunities, look for better growth opportunities, invest more, hire more labor, create more employment, create more consumption, create more output and everything should become a procyclical scenarios. So, in procyclical scenarios it becomes really, really important to look at that how we are looking at.

So, if you have a productivity increase this could be because of these reasons that I mentioned. So, as a result what do you have is that here you have w 1 and what we see is that here you have a w 2 because of this if this is what we are assuming about the optimistic scenario. So the wage rate has increase and then here you have the labor supply increasing as a result what we see is that your output is increasing.

And what we see in case of classical so that mentioned about real business cycle new classical this is the same scenario we observe that money demand increases, the cash holding increases and then you have the price decreasing. So, this also creates a favourable situation. So, multiple equilibria has lot of meaning in macroeconomics especially with regard to the business cycle.

And we will be spending some more time on this particular setup and we will try to setup and we will try to understand we will revisit the multiple equilibria again because it is very

interesting topic to look at and maybe I will add one or two examples here to showcase that how the coordination failure model which is one of the important tools of the Keynesian school of macroeconomic where they talk about that certain interdependence between firms one firm dependent upon another, one good is purchased by one firm.

And it is also dependent upon the sale of another then it becomes really important to see that how the agents are interacting with each other and how this create the scenario. So, I will be stopping it here and then I will have one more session dedicated on this Keynesian coordination model and then in that we will try to further see that how we can understand or we can have the harmonization between the real business cycle school of economic thought or coordination failure model.

And how we can harmonize these two conflicting ideas in the context of monetary and the fiscal setup and then we will see that whether the Keynesian is making more sense than the neo classical and how these two models are evolving, but overall I hope it has helped you understand the coordination models in a better way. I am stopping it here. Thank you so much.