Micro Foundations of Macroeconomics
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Lecture - 26
Keynesian Coordination Failure Model

Welcome back. So, let us start, we were talking about the business cycle and I would say in the classical context and we try to understand that how we can think about the real business cycle model. And under that we were discussing about the Keynesian perspective. So, as I mentioned that during 1960s, 70s, 80s when people started accepting the idea of the neoclassicals about how we can think about or we can understand the business cycle dynamics with the help of the behaviour of consumer, firm, market, government.

We can think about introducing or making the efficient allocation in the economy with regard to the output and employment. So, here this has to deal more with the business cycle dynamics. Now we were discussing in the last session about the strategic complementarity model.

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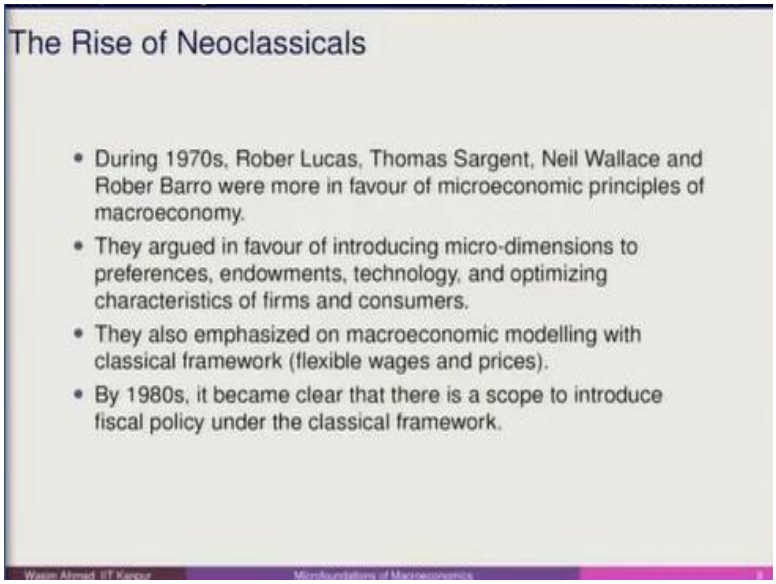

And under that we understood that how we can think about an economy which will have different set of rules and regulations to understand.

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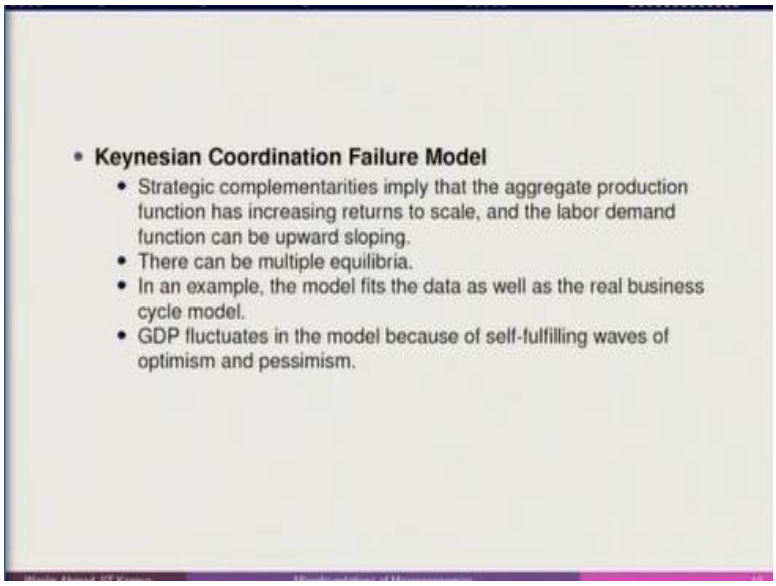

Now here what we were talking about is the Keynesian coordination failure models. In the last class I had given you or in the last session I had given you the brief background and we were discussing to some extent the complementarities. So, in the economy when we say about the strategy complementarity then it implies that the firms are also having incentives and they also look out for other firms that what they are doing.

And in which all activities they are participating. If they think that whatever the firm is producing and if it is going to be sold immediately to the next firm or the activities of one firm depend upon the activities of some other firms in the economy which is very normal case. In the last session I had also given the example of some kind of picnic trip where you think that if some people are organizing and if everyone is going then you also feel to participate.

If no one is participating then you also avoid. So, in most of the economies that is the scenario we have that when we are discussing about the complementarities when we talk about the complementarities, we try to see some kind of interdependence that how in the economy one firm depends upon another. For example, a firm may be selling, for example a software company or the outlook of software company will depend upon how is the outlook of the hardware company.

So, if the hardware suppliers are more and if they have a good business then it is obvious that the software supplier will also have a good amount of sale and as a result, this particular form will also

survive and it will have profitability. But here it all depends upon the expectation. And once I talk about expectation which is unobservable. So, in the; economy when you have large set of individuals participating in different types of activities.

Then it is obvious that you will not have homogeneous expectation the expectation will vary. So, some of the agents may be expecting or have a very higher expectation about the economy a business cycle. Some individuals may not be having that kind of outlook. So, depending upon what the individual is considering in his or her expectation that matters a lot. That if the individuals are not just thinking about how they can think about making the expectation.

So, maybe it is adaptive. Maybe it is rational when they are incorporating all set of information. So, some individuals may be more bullish about the outlook of the economy whereas some other individuals may not be. So, here you have 2 types of variables to understand. One is the optimistic scenario that individuals are very optimistic. And one you have the pessimistic scenario where individuals are not pessimistic about certain outcomes.

And they feel that the economy or the outlook may not be better. So, there with regard to interdependence they have low expectation. Those who are optimistic with regard to interdependence complementarities they have higher expectation. So, this creates a scenario that in the economy if I am assuming to have only two equilibria where we have the optimistic and there you have the pessimistic.

If you have two equilibria then it is easier to understand but it can happen that in the economy you may have multiple equilibria that people may have slightly better expectation. Some people may have perfect foresight kind of understanding. Some individuals may have no understanding at all. So, those individuals have tried to incorporate in the economy it is not just mix of individuals. It also talks about certain macroeconomic dynamics.

So, Keynesian coordination failure model it helps in that. So, here the idea is that unlike the real business cycle model where prices and wages were flexible. And with that we try to understand that, how we can think about the aggregation of output? How certain policy variables like for

example monetary policy? How in assuming the neutrality condition? How it makes all other variables as pro cyclical in the business cycle understanding.

Here, since it is Keynesian model so ultimately the objective will be that how with the interference of the government, we are making the venous cycle understanding better. And more and more variables are making as procyclical. So, the idea is very good and it is having lot of applications. And you can apply such models in your understanding about the economy and macroeconomic aspect. So, in some cases this particular model may not be directly applicable.

So, then after this will be talking about the new Keynesian, so this is also coming from the salt water and there you will have the salt water understanding in a much better way.

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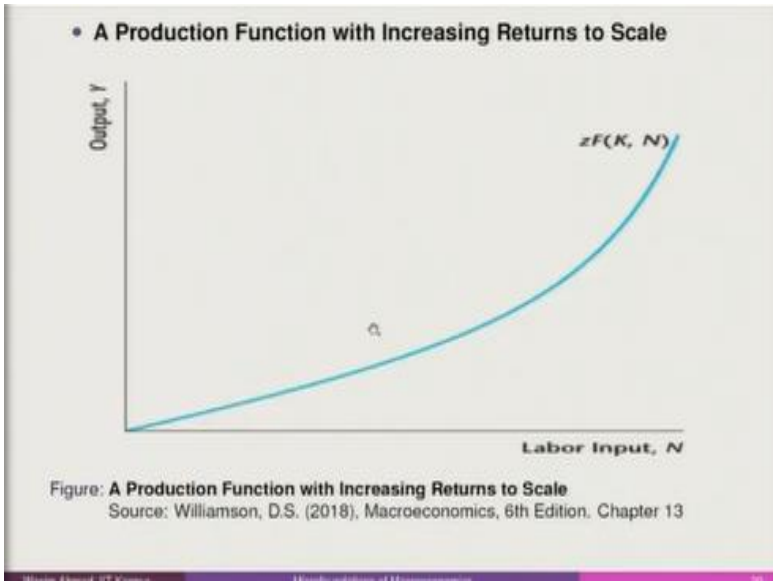

So, here the basic assumption is that in the economy firms are operating. And unlike the constant return to a scale here you have the increasing returns to a scale. It means that if you are doubling the input your output increases by more than double. So, if it is. So, here it makes also the increasing return to scale has certain characteristics that if you are talking about the scenarios where you have a very efficient technology.

And this efficient technology is making you produce more and more output. In the same way that we saw in case of real business cycle that productivity shock created a very favourable scenario

for most of the macroeconomic variable. Just to complement that the Keynesian also introduced some kind of boosting factor into their model. And this increasing returns to a scale act as a boosting factor that this augments the rest of the variable.

So, this assumption is very stringent assumption. And one of the criticisms of the model is also the increasing returns to a scale which is very rare to find in most of the economies. Maybe certain industries will have such type of production behaviour. Maybe in case of services industry in terms of earning that if you are having 4 individuals producing a software and that software is having higher value but it also depends that how wide is the application of that software.

So, if more individuals are adding the dimension of how wide is the application of software, then of course the demand is going to boost. So, that kind of scenario or that kind of demand based production process may be a good example here.

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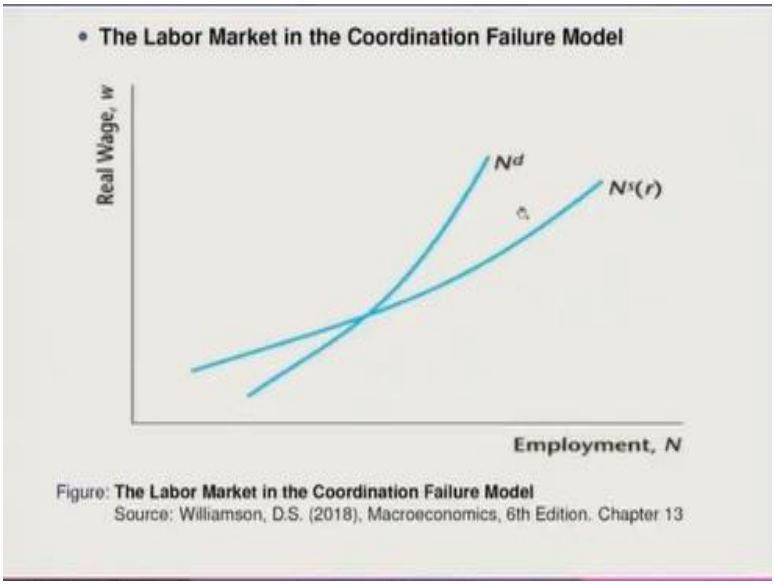

Figure: **The Labor Market in the Coordination Failure Model**
Source: Williamson, D.S. (2018), Macroeconomics, 6th Edition. Chapter 13

So, here in most of the cases what we saw that the demand for labour normally in case of when we talk about demand it is supposed to be the downward kind of behaviour. But here when we say about the labour demand it has the upward slope because of the increasing returns. And in most of the cases since it is about the increasing return which means that labour is also in a big demand. And most of the firms do not shy in hiring this amount labour.

So, the slope of this will be greater than the slope of the labour supply. So, this will be above this. So, this will be more restricted and compared to the labour supply which depends upon the rate of interest again that how the rate of inter scenario. So, increasing returns to a scale I would say it imposes certain kind of conditions which may not be easy to digest. And that is what these are the important limitations of this particular model.

But let us work out with certain kind of dynamics. For example, we can think about output supply we can think about the multiple equilibria. So, those things we will be discussing.

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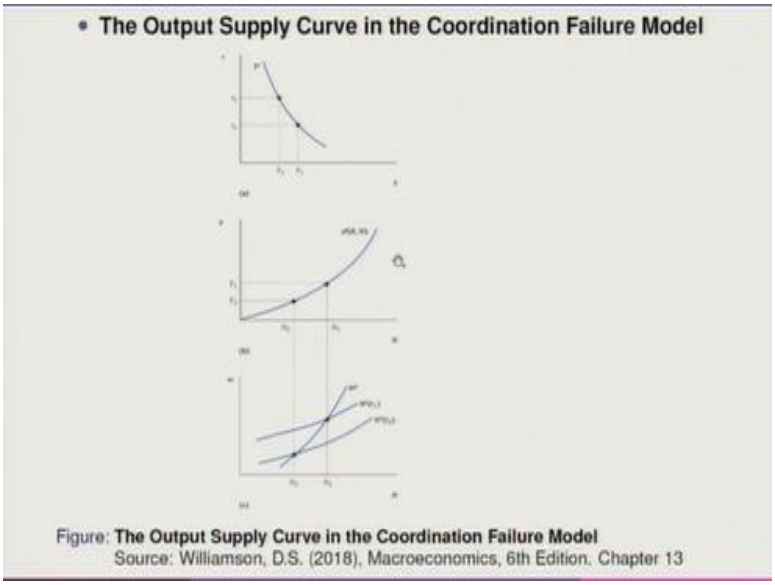

Figure: **The Output Supply Curve in the Coordination Failure Model**
Source: Williamson, D.S. (2018), Macroeconomics, 6th Edition, Chapter 13

So, output supply: So, here what we are seeing is that here we have the r_1 and with r_1 so here you have the Y and r. So, this axis you have the rate of interest which is a real rate of interest where we have inflation as 0. So, we are having both nominal and real equal coming from the previous to previous when we are talking about the monetary inter temporal model the fisherian framework. So, here we on the X axis it is the Y_2 Y_1.

And once we have Y_2 Y_1 then this shows the output. Now here we have the production function and as you can see when we are assuming the increasing returns to a scale. Then here, we have the output N_1 and demand and supply of labour here you have N_1 here. So, which means that the rate of interest r_1 it corresponds to N_1 Y_1. And then N_1 and here you can think about the W_1. But suppose you have the scenarios in which you have the rate of interest higher.

So, if the rate of interest is higher then this creates troubles. This is having some kind of impact direct impact on the labour supply. So, what happens that in this particular situation when you have the rate of interest higher may be the money supply increased. So, if the rate or you can think about a scenario in which the rate of interest is higher. So, maybe the situation in which we are incurring some kind of equilibrium model where we are superimposing this condition.

That in case if the rate of interest is higher then this is immediately having impact on the employment output. So, here will be employment lower and output will also be lower. But here we have the N_2 and N_2 what it implies that because of this rate of interest higher the representative consumer will be now more looking for substitution effect kind of scenario when your earnings are higher you will substitute or I would say you substitute more of.

Or you will go for substituting current leisure or future leisure for current leisure when you have the rate of interest higher. So, such kind of substitution what will immediately it will happen that here you have the labour supply going down. And as a result, you arrive at the equilibrium here. It will shift towards right. So, now individuals will be looking for a higher reward. So, that makes the situation much at point N_2.

Once I reach at point N_2 then what I find that because of this interest scenario that we have and this output supply. Let us first discuss what is output supply? Output supply is the level of equilibrium or I would say equilibrium at which the rate of interest or it shows the relationship between rate of interest and the output at which the labour market clears. The moment I say the output supply curve then this is what we have to assume.

So, with the rate of interest and the output scenarios we try to understand the equilibrium in the labour market and labour market equilibrium will always be with regard to the substitution and income effect because then whenever you have the rate of rent is higher you think that the labour will expect that since the reward is going to be higher in future. So, it is better that they will substitute for more I would say leisure so, this is how it works.

And as a result, your employment is going to be lower because people will be now substituting for this higher interest scenario creates an opportunity. And as a result, what we see is that demand for labour that we have it is also having a lower scenario and this is how it works. So, higher interest scenarios are not very good for the economy. And this ultimately reduces the employment reduces the output. And it also hinders the demand supply scenarios in the labour market.

So, this is what we have to understand. Here we have to understand the output supply curve. As I mentioned it that in the framework of interest at an output it shows that how the labour market reacts. So, this is how they try and understand.

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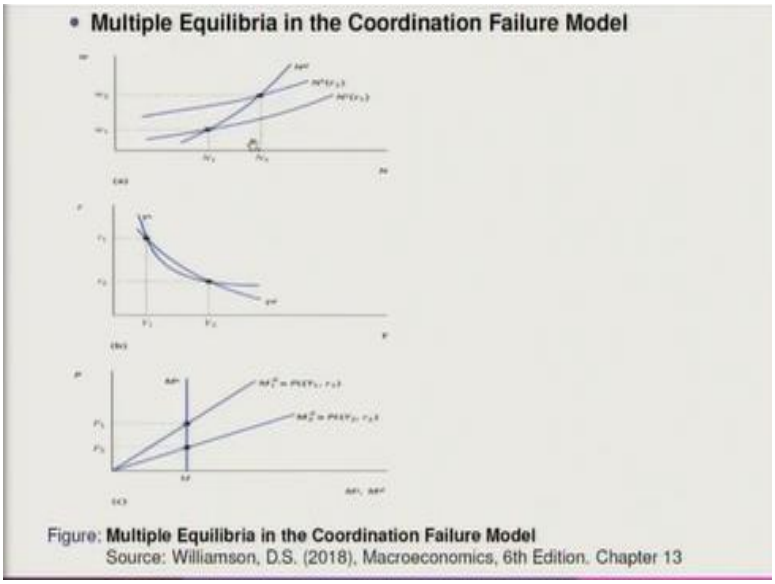

Figure: **Multiple Equilibria in the Coordination Failure Model**
Source: Williamson, D.S. (2018), Macroeconomics, 6th Edition. Chapter 13

Now here we are talking about the multiple equilibria. Now as I mentioned in the beginning that when we have the multiple equilibria then we can think about the scenario in which we have a half of the individual as an optimistic and half of individuals as pessimistic. But it can happen that there will be multiple equilibria. So, here you have further degrees of optimism and further degrees of pessimism that you can decide about.

So, what typically happens is that here you have a W_1N_1 and here you have W_2N_2. Corresponding to this W_1N_1 so, this is the labour market we have. And this is the scenario in which we are talking about the output and the rate of interest. So, here we have a Y_s and here we have the Y_d. So, output

demand and output supply. Now, you can think about this situation as the pessimistic scenarios where the rate of interest is higher and output is lower.

Optimistic scenario corresponds to this r_2 and Y_2. So, which means that at the; lower rate of interest your output is higher. Now with this particular here when we talk about the money supply then here the money supply is fixed. At this price, you can think about when we have such type of scenario corresponding to r_1. So, at this rate of interest whenever we see so at r_2 the rate of interest is lower.

So, here again you have the money demand changing quite aggressively. And this leads to what we have the right word shift right of the money demand and this leads to a lower price level. So, this is how it implies. But what is important to understand is that in the low equilibria scenario one of the reasons could be that because of this particular change that you have here that I mentioned about that.

In the pessimistic scenario it may also happen that because of the certain pessimistic expectations the participation of labour in the economy is much lower because they have very lower expectations. So, they do not supply that much amount of labour. So, they will be having some kind of understanding that anyway the wage is not going to increase. So, let us not supply that much amount of labour less work for lesser number of hours.

And this will create further trouble in the economy. Whereas in the optimistic scenario this is quite opposite that individual's are having higher expectation that the future outlook is going to be better. They will have higher increase in the wage rate because productivity has increased and this productivity increase will have further increase in their current and future income. And they can think about a higher level of consumption in both periods.

And you can directly link this particular scenario with what we have discussed in inter temporal framework. So, in case optimistic scenario it becomes easier to understand. That is how the individuals are reacting to two different sets of the expectation with regard to the future earnings,

future livelihood, future consumption, current consumption. So, here is the best scenario. So, here it becomes more or less augmenting scenarios for the economy.

Since the rate of interest is lower so, you can think about the money supply increase. And this money supply increase has resulted in the lower rate of interest. And, this has created a better favourable scenario for investment and all others even consumption and since we have the money demand change and this change leading to price decline. So, this is also good. So, in case of optimistic means good scenarios, what are the situations?

The employment increasing, wage rate is increasing. You have the lower interest rate output is increasing and also, the money demand is also changing and price is getting lower. So, which means that we are able to understand the business cycle in a much better way under these good equilibria whereas bad equilibria is a scenario where this has to be ruled out.

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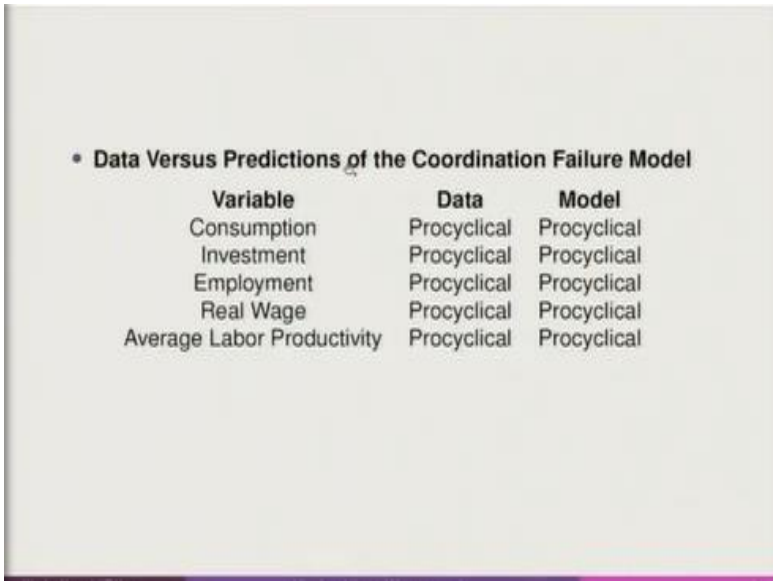

So, in this situation it becomes important to think about the coordination failure. So, what we had understood in the case of a real business cycle model is that we talked about the consumption which is the procyclical, investment procyclical, employment procyclical, real wage procyclical, average labour productivity also becomes procyclical. So, Keynesians almost countered the idea of the classicals when they mention about the real business cycle model.

That how, when they were emphasizing more on productivity shock which is also some kind of increasing return to a scale that the Keynesians introduced later. So, once I have the productivity increase then this is also creating a favourable scenario to understand the business cycle. Keynesians also countered that that debate and then they started this coordination failure model. And they also proved that it also has the same kind of implications on business cycle that we have for the neoclassical.

So, I hope it is clear that how the classical idea and Keynesian ideas are responding to each other and how these two ideas are really useful. So, you can think in that direction.

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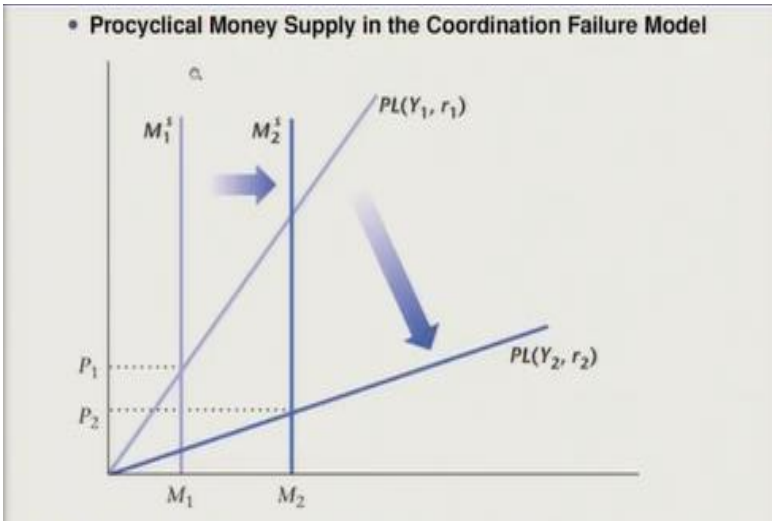

Figure: **Procyclical Money Supply in the Coordination Failure Model**
Source: Williamson, D.S. (2018), Macroeconomics, 6th Edition, Chapter 13

So, here we have the procyclical money supply in the coordination failure model when we have money supply increase what it leads to the money demand scenario changes. And as a result, what we see is the price decrease. So, here we have money supply increase M_1 to M_2. And this leads to what we have the price getting lower. And what the coordination failure model suggest. So, let me first give you some idea about.

That individuals in the; economy so, here the idea is that when will be the situation when we are able to wipe out this W_1 N_1 and here, we have r_1 Y_1. And here we have P_1 scenarios that when we are able to make this particular context relevant. So, when will be the situation? So, if your

economy is doing really good, all the sectors are doing really well then in that situation it becomes really important.

Now many business cycle theorists link these particular phenomena with regard to what they call it the sun spot theory. In case of sun spot the idea is that there will be some leading factors in the economy that will further boost the optimism scenarios so it creates so the number of pessimists which are there in the economy. And if you have more sun spots in the economy then the number of pessimists falling in that direction will reduce.

And as a result, your economy moves in the upward direction and most of the variables react in a procyclical manner. So, sun spot is the major and even the Keynes suggested that you have animal spirits kind of situation where we think about Alan, I would say Greenspan mentioned about the irrational exuberance and also, he had mentioned about a term which is linked what we call it the if you think about the variable then he had recommended that a stock market can act as a sun spot.

Because it is having some kind of overlooking scenario. So, the bad equilibria and the good equilibria that we have in the economy with regard to the pessimist and optimists so good equilibria and bad equilibria. So, good equilibria is linked with the optimistic scenario. Bad equilibria linked with the pessimistic scenario. These two scenarios are having good and bad. So, the frequency occurrence of good and good will create always a better scenario.

The frequency occurrence of bad and bad will always be having the recessionary scenarios. So, from the business cycle language this is how it works. So, this is how we try and understand here. So, procyclical money supply in the coordination failure model. So, this is how it looks like that in most of the cases price is going to be down and this is coming from here nothing much to say. Only thing is that you have money supply increase.

And why it is happening? Because the role of the central bank is that you have to at least control the inflation and if the central government is not reacting then that matters a lot. So, if the; money supply increase rate of interest is going to be lower and then you have the money demand changing.

and this creates further scenarios for the labour to react accordingly in the labour market. And this further creates the coordination failure problem.

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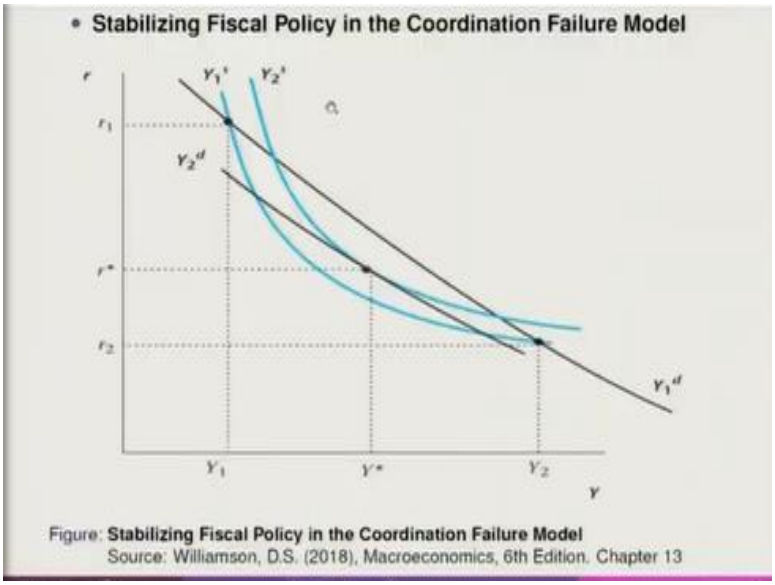

Figure: **Stabilizing Fiscal Policy in the Coordination Failure Model**
Source: Williamson, D.S. (2018), Macroeconomics, 6th Edition. Chapter 13

Now here stabilization of fiscal policy in the coordination failure model. So, here, what they say about the money supply in the coordination failure model that unlike the neutrality condition that we superimpose in case of real business cycle, here they do not follow. In most of the Keynesian economics what they say that the money is non-neutral in the short run. In the long run it becomes neutral. So, that argument they further carry forward.

So, here what is the idea behind? Idea behind is that here you have the Y_1^d. So, here you have the output demand and here you have the output supply. Here you can think about the bad and here you have the good and this is the ideal situation. In ideal situation how this is created? This ideal situation is created when you have some kind of taxation or government comes into picture and government cuts the expenditure.

If government is going to cut the expenditure, then individuals will also be reacting the same way. So, their present value of current tax will be much lower than this. This makes the understanding easier that people will react. So, consumption and all other variables will react. And ultimately there will be some kind of convergence. This is what I said that you have to remove the pessimistic scenarios move towards the optimistic and this is how it looks like that.

Because of the labour market adjustment, you have the Y_2^s now touching upon. So, once I have the Y_1^d here. So, because of this the government expenditure or some kind of positive sentiment given to the households or individuals this leads to what we have the output almost having the parallel line. And it is shifting down and this shifting down when it is tangent to Y_2^s which is Y_1^s and Y_2^s here then this is having r^* and Y^* .

And this r star and Y^* give us the scenario that the pessimist and optimist scenario can have the middle path and this is how it shows. So, in case of fiscal policy what typically happens is that when you have the rate of interest higher at this level individual's will be thinking about current and future leisure. Which one will be higher and lower? Here at this point the individuals are more comfortable. So, they have lower interest rate and higher output.

But because of these two scenarios, extreme scenarios the individuals may also be thinking that let us not go for that kind of work that they used to do earlier. So, as a result you have the parallel shifting down and this is how it works here.

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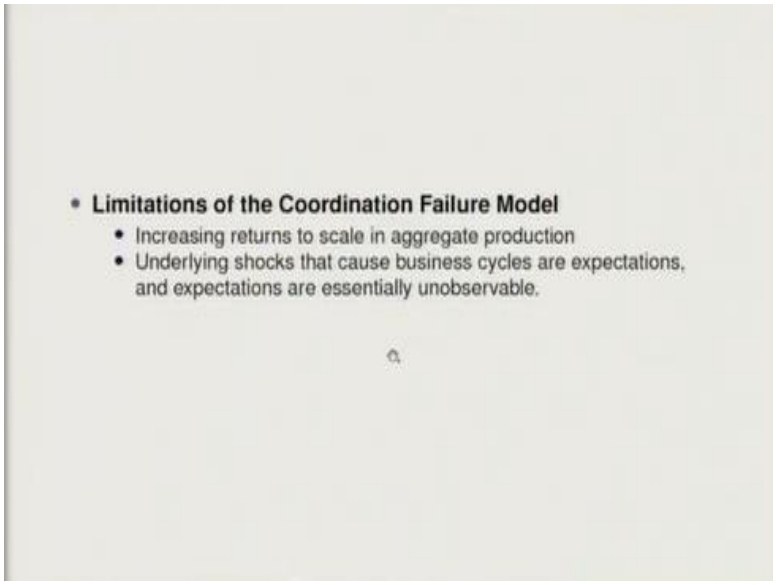

There are certain limitations that we normally encounter in case of coordination failure model that the assumption of increasing returns to a scale makes the model difficult to understand in the real-life scenarios. Second thing is about the expectations that when you are seeing superimposing

expectations with regard to certain macroeconomic scenarios binary, cycle scenarios. Then, it becomes really difficult to understand that how it works.

Your expectations are unobservable. So, I think all these two limitations we have already highlighted. So, I am stopping it here. I hope you have been able to understand the perspective that how we can think about a scenario where even if you have a Keynesian perspective under flexible and I would say prices. So, neo classical this is what they try to explain from both Keynesian and classical perspective that how we can understand the business cycle.

And since in the Keynesian role of the government becomes important. So, they introduce the government also. But unlike the real business cycle here we are saying that the money supply is not neutral. And the government policy becomes really important to bring stabilization in the economy. So, I am stopping it here. Thank you so much.