Macroeconomic Theory and Stabilization Policy
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Lecture – 21

The ISLMBP model, under a flexible exchange rate system where, the exchange rate is determined by the market and we found that in the model there is three dependent variables y, r and e the exchange rate. Then having set up the model we went into two multipliers, one relating to physical policy d Y d G, one relating to multi policy d Y d M. Both the multipliers have become weaker, if I recall the physical policy multiplier become weaker, but the multi policy multiplier d Y d M, I think that it become stronger because I will write the multipliers what we had. So, physical policy multiplier under flexible exchange rate system was what I had yesterday.

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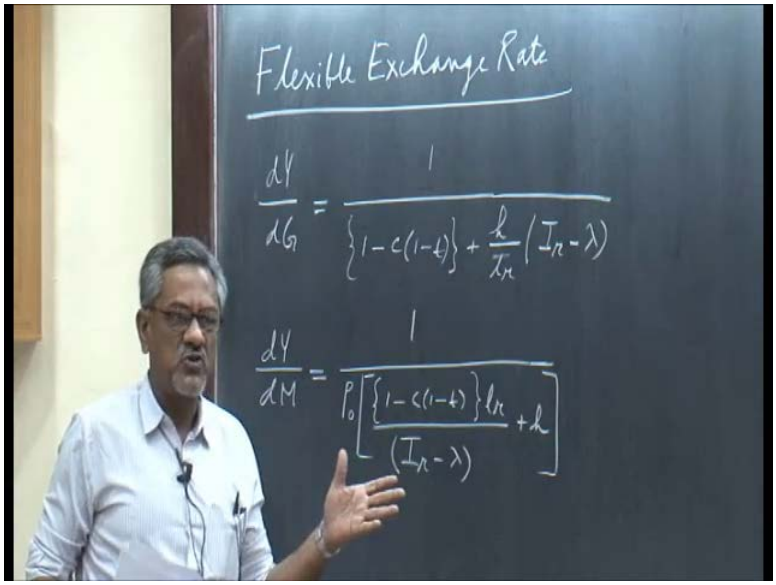

d Y d G was 1 over 1 minus c into 1 minus t, which I called k plus h divided by l r into I r minus lambda, this was the physical policy multiplier. Check if this is what we had yesterday, is this we had yesterday? The multi policy multiplier d Y d M was 1 over p dot into 1 minus c into 1 minus t l r divided by I r minus lambda slash h. Please check if this is the multiplier we had yesterday or not. Multiplier this is what we got on the board then my notes are consistent with what we derived in class yesterday.

Now, this will become the I s l m multiplier if lambda is equal to 0, you can check that, that was the I s l m multiplier lambda is equal to 0. So, a non 0 lambda means there is a larger denominator here means a smaller number here. Smaller number means the value of the ratio one over a smaller number is a bigger number. So, the money supply multiplier has become stronger.

The physical policy multiplier however if lambda is equal to 0 is the I s l m multiplier, if lambda is non 0 then a positive term is added because minus lambda into h over l r is a positive term. So, a positive term is added so the multiplier has become weaker compared to the I s l m, the money multiplier or the multi policy multiplier has become stronger. So, flexible exchange system multi policy has become stronger, physical policy has become weaker. Am I correct or not? This is very important to note, this is what we had yesterday. I had a diagrammatic explanation of this one.

Now, another important variable other than y and r, which we usually traditionally have in I s l m model also in the flexible exchange system, the exchange rate itself the presently in India is depreciating a lot. So, that would be something which might interest some people, what is the effect of expansionary multi policy or expansionary government expenditure policy on e because India has been pursuing an expansionary government expenditure policy, to bring the economy out of the recession last 2 years. So, they have been trying to do that in fact, the western world is trying to do that, but their currencies are not depreciating as the way Indian currency is depreciated.

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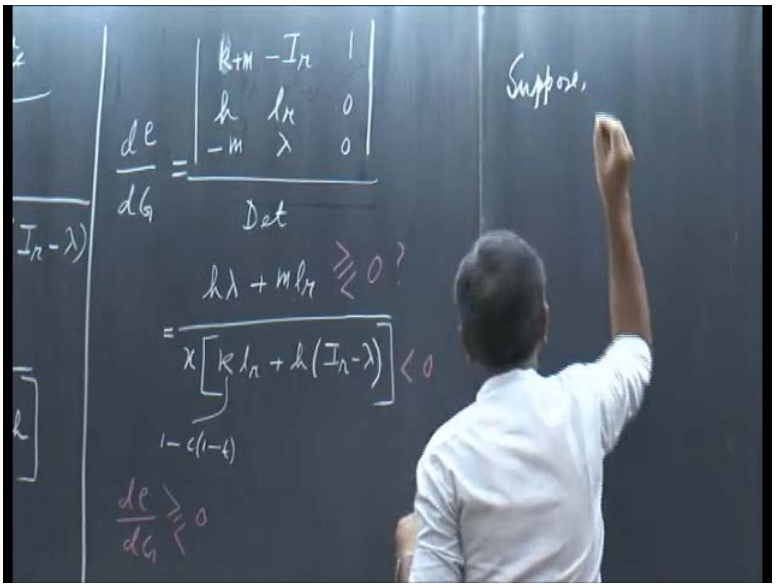

Now, what point of interest will be d e d G d e d M, now how to get that? If you go back to your notes yesterday then you will see d e d G is equal to d e is the last column of the matrix e column is the last column d Y column, d r column, d e column, last column d G. So, you will have what we called yesterday k minus I r and here 1 because d G is 1 0 0 this is 1 0 0 this column is coming here, last column. And it will be h l r yesterday I called that k, but my notes had k are different k. It should be k plus m, shall I write k plus m is it all right.

She is correct, absolutely correct k plus m k plus m and this one is minus m and this one lambda. Am I correct? Divided by the determinant, which I can write later, so this will be how much you expand by the last column because 0 0. Now, plus minus plus 1 into h lambda minus 1 is plus m l r, now divided by the determinant, what is the determinant? The determinant was x into k l r pus h I r minus lambda. This is the determinant, this is the determinant k, k is 1 minus c into 1 minus t k is equal to 1 minus c into 1 minus t, this k is 1 minus c into 1 minus t.

Unfortunately my notes have 1 minus c into 1 minus t plus m because in my notes when I obtain this multipliers, I had the fixed exchange rate. So, k appeared within the m, there m was inside k. But yesterday I started with flexible exchange rate system where, the k turned out to be 1 minus c into 1 minus t. So, you can correct that yourself, there should not be any confusion. I said that also in my mail.

So, this is the situation now, look in the denominator. In the denominator what you have is, a plus term minus, minus, minus lambda into h is minus, so it is a negative value the determinant. Here you have a plus term and a minus term, so we do not know there is a big question mark. So, what is happening is d e d G can be greater than or equal to that mean it may not change, it may go up with g, it may go down, but we can make a few more observations, this is important.

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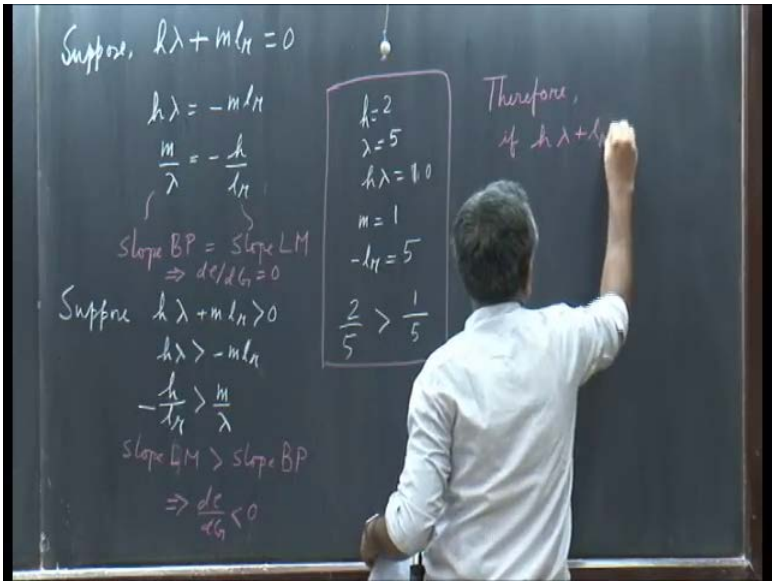

Look at the numerator h lambda plus m l r, suppose h lambda plus m l r is equal to 0. Suppose, is it possible plus term and a minus term, which means h lambda equal to minus m l r. So, what you have essentially therefore, is m over lambda is equal to minus h over l r, can I write that. Now you have very interesting thing, this is the slope B p and this is slope l m, am I correct or not? If the two slopes are same because they are upward sloping lines, there is no exchange rate effect. And now the question is if this is positive then what will happen?

Suppose, h lambda plus m l r is greater than 0, so if these 2 slopes are equal what I mean if they are equal, it implies d e d G equal to 0 that what I meant. But suppose h lambda plus m l r is greater then this is a positive term, this is the positive quantity. So, this implies h lambda will be greater than minus m l r. Now, it has become a positive term because minus l r is positive and m is positive. The question is if this positive term is

brought here then you have h over minus l r, can I write that greater than m over lambda minus l r is a positive quantity so I bring it down.

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Sign will reverse this is what I wanted to know. Why would sign reverse? Say this is 10 and this is 2 into say minus l r is 6, this is 10. Suppose, I take an example h is 2 lambda is 5, so h lambda is 10.

Student: ((Refer time: 14:56))

Now m is again say 1 and minus l r is say 5, so this condition is met. Now what I am saying minus l r h over minus l r, h is how much 2, so 2 over 5 whether this is greater than m, which is 1 over lambda, which is 5. The numbers I am talking about you just say sign would reverse, if a positive is exchanged the sign is not going to reverse minus l r, I have shifted. So, be careful before you say that I make mistakes, but to me it looks like an transposition.

I mean from one side to the other side, there are lots of mathematics people sitting here. Please check this again I make errors many mistakes, so I accept that, but please check if this is correct or not what I have done. Then what it is saying is h lambda is greater then that means the slope L m greater than slope B p then the numerator is positive, the denominator is negative. So, this would imply d e d G is less than 0, if government expenditure increases exchange rate will depreciate, e value would go down. Now therefore, if I put this numerical example in a box here, which you can check whether I am making mistake or not therefore, what we can conclude?

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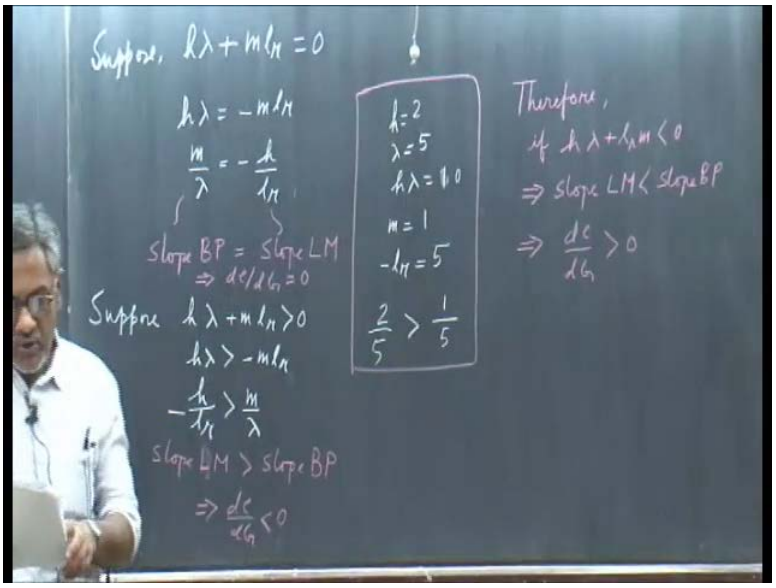

Therefore, if slope L m is less than less slope B p therefore, if h lambda plus l r m is less than 0, it would imply slope L m less than slope B p. It would also indicate the d e d G is greater than 0. That is as government expands its physical expenditures, the exchange rate will have a tendency to depreciate, e value going up means depreciate where, the slope L m is less than slope b p, which essential means B p is a stepper curve, L m is flatted curve.

And B p can be a stepper curve simple reason B p is a stepper curve is that the lambda capital movements in sentivity between the countries are a small number. Say India and other countries capital movement is a smaller number compared to other countries. And our marginal propend to import may be high or both, either or both. So, B p is a stepper line than Indian L m curve, L m is the flatten line where, expansionary government expenditure policy can depreciate the currency.

I am not saying that is the explanation for your current story in India that the exchange rate vise v us dollar is becoming weaker, depreciating over time from 47 to 57. But our result is coming out from this model, which says if your B p is steep because your propensity to import is high or lambda is a small number. That is the capital movement sensitivity like say your social networking skills gives you a social creates a society of people and the interaction is can be either strong or weak.

Somebody who does not effectively socialize the social interactions are weaker, somebody who does effectively socialize social interactions are much stronger. I remember I used to have friends in my childhood days where, in his house or sometimes his herd house, there is always some friends sitting there. Any time of the house I visited him unbelievable even at night somebody is sitting there. I mean it may be more than one person so the sensitivity of capital movement with respect to India may be weak but international countries are not so important to them to invest in India.

Do we do get money movements, but not that important or the sensitivity is very high depending upon what policies we adopt. The foreigners decide whether to put in capital into Indian market or not lambda. Suppose, I am saying India is still coming out of the old resin of fixed exchange rate system, not having free market etcetera, lots of bureaucracy rate, rape rate, tape poor lots of poor people. Industries just growing there claiming that the industry is growing a lot, but actually it just coming out some of the sectors are doing well, may be the software industry is doing well BPU etcetera lot more.

This kind of a setup where huge agricultural sector, lots of poor people, lots of people under poverty international capital movement is not that strong so small lambda number will make B p line quite steep and L m curve is flatten compared to that. L m curve is flattening when l r is sensitive or h is small or transaction demand coefficient is probably quite small compared to other countries. I do not know who knows for whatever be, there is the possibility the expansionary government expenditure policy will increase.

Similarly, you can do another exercise where, you look at monitory policy and you can look at d e d M and the same kind of a situation. This is very interesting in case d e d M you will get what you received yesterday, but on expansionary monitory policy is adopted on unambiguously e value goes up d e d M is positive. So, currency in very depreciates for expansionary monitory policy what I have found, you can find that out you can check from your notes you.

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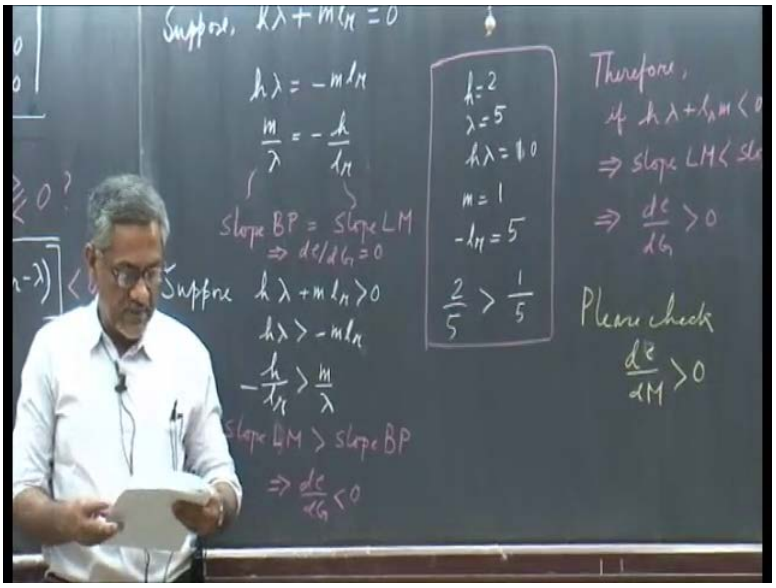

Pease check d e d M is positive that means if expansionary monitory policy is adopted, unambiguously e will go up currency will depreciate with respect to foreign currency exchange rate in monitory policy rate. Now, look at this if you look at the main fix setup, yesterday we had there can be a foreign interest rate policy also. Foreign interest changes which is very important between Europe and North America, any time in US interest rate changes or the Central European bank is a euro.

So, they have a central European bank now not every country having a Central bank. All European Union countries will have one central bank as if one country exists. So, there is a central bank of Europe, your European central bank if the change interest rates, which they can to something called bank rate or US does change it, they are always anxious to know, now what is going to happen? So, every time before US Federal government that bank is called Federalism bank, they do into meeting huddle, they announce pre announce on second of July.

Federalism bank is going to decide what the bank rate is going to be [Foreign Language]. I tell you it is like panic bottle like your father was in air; you are having lots of fun no studies, nothing playing with friends, suddenly you here second July, your father is returning [Foreign Language].

So, federalism is going into huddle going into meeting board room meeting with famous American economist there usually at the help chairman. And they would announce a new

interest rate policy [Foreign Language] there was a story that a Greek student of classmate of mine told me when I was doing PhD. He said Surajit, you now we have a say in Europe, he is from Greece, and he has become a famous Economist today.

He say we have a say if America sneezes, Europe gets the cold across the Atlantic, America just has sneeze across the Atlantic, Europe gets the cold that hypersensitive, hyper connected they are. So, interest rate policy becomes very important. Now, I go to the old fashioned policies that we used to have, when I was growing up this is the fixed exchange rate system in India where, several bank would maintain the exchange rate either by pumping in dollar or buying dollar, if there is surplus and would not allow exchange rate to change by law.

So any exchange rate policy issue and therefore, e is a constant term. So, you can talk about d Y d e, if e changes through policy liked d Y d G. So, what will happen to the model, 3 equations we have what are the unknowns? Three equations should have three dependent variables, so let me talk about the fixed exchange rate system. This part I hope you have understood flexible system. Now, in a fixed exchange rate system you have some problem with the model change.

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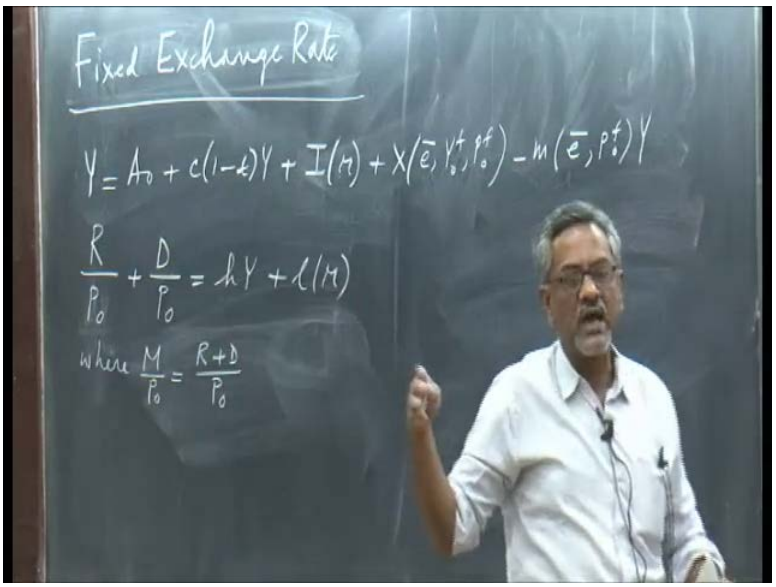

So, let me see whether you understand this or not. The change will occur in the L m function, which was alright, I did not change anything in that function, I changed the I s function added a new function B p function. Now, the L m function will change with

fixed exchange rate system and you have to appreciate this point then it is easy the model. It is the same method I s curve, which is y is equal to A naught plus c into 1 minus t y plus I r plus x e function of y f and p f, you can have some numbers 0 0, some fixed numbers minus import, which is the function of e and p f, I think I said into y.

Now, in the fixed exchange rate system let us call that bar, e bar, e bar its fixed, e is equal to e bar say. Now, the L m function will have a very interesting component, one is r one is d instead of money supply. And you wonder why is it so where, m over p naught is equal to r plus d over p naught. And are wondering sir what is r and what is d, why is the L m function? Money supply portion the variable is split into 2 parts, which one is the bigger, which one is the smaller is not the issue, why is it broken up? Reason is every time Central Bank suppose, this surplus currency the exchange rate has a tendency to depreciate exchange rate.

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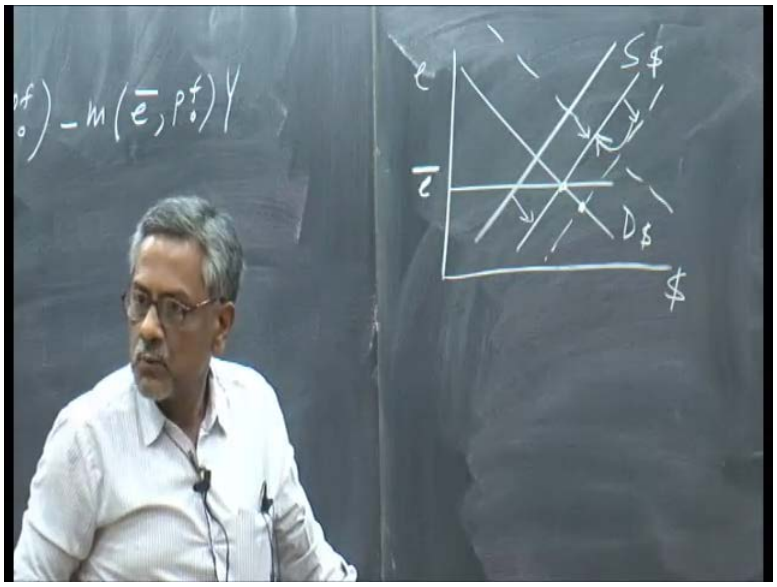

Remember fixed exchange rate system dollar e demand for dollar, supply of dollar and suppose the exchange rate is here. Now, it has a tendency to go down alright and what maintain this, this is the supply of dollar that RBI will have to supply. Suppose, in the market the supply of dollar shifts further, the exchange rate will have a tendency to go down from here to here. So what RBI will have to do, will have to buy that supply so that the supply curve goes back supply of dollar to that level. It will have to mop up the excess like there is [FL], if it the economic transactions repeating too much of supply of

foreign exchange in the market then our Central Bank will have to purchase that foreign exchange.

Take it out from the market because there is the downward pressure in the exchange rate and it does not want to that to go down. It wants that to remain at e bar, the exchange rate has a tendency to go down to this point. So, it will take out the excess supply, so the supply of dollar shifts back to the opposition where, it intersects at e bar. So, when it does the buying of excess supply, which is in the market now like in our agriculture markets, it happens.

I will tell you about this story later, there is a excess that famers produce to government in order to give them a good income does not want price to come down, they buy that output from the farmers. And a portion they leave it the farmers to sell it in the market. So, the market price does not get too depressed and the farmers do not have a low income because the price is going to determine the income of the farmers, at what price they were selling.

So, in this case is as soon as there is excess supply, it will mop up squeeze out the excess supply of foreign exchange from the market. If there are excess demands because demands are going up, it will pump in and shift the supply curve to the right to bring down the exchange rate. Because in case excess demand exchange rate will have a tendency to go up, lower excess demand exchange rate will have a tendency to go up, it will have to shift the supply curve enough to bring it down to e bar level.

So, it does this actively intervention in the foreign exchange market to maintain exchange rate at e bar, it actively intervenes. Whenever there is a supply, it mops up the excess supply whenever there is a excess demand, it supply pumps in for the exchange. So, it has to have a large reservoir of exchange for exchange reserves to do that carry out that activity [FL].

Now, when suppose it is mopping up excess supply of foreign exchange, what is happening? It is in private hands exporters etcetera who earned a lot from Europe or South East Asia came back and these excess supply is mopping up it is says dollar. So, how do they do that? Lets tell them give the dollar to me I give you the rupee value of that dollar to you, so buy it with rupee like buying a good. So, Central bank gives rupee to you, you will have to alert and you hand over dollar to me, the Central bank.

So, the rupee what you do? The rupee you go and deposit in the bank account, some of you may keep that in your home for current transaction purpose. Usually you go and deposit in the bank. Now, money supply will continuously go up and down, a part of the money supply not because Central bank is changing money supply, but because of foreign exchange market intervention by the Central bank. In case of surplus reserves, separate dollar when it buys money supply in the economy will go up that will come through r called reserves, money supply goes up.

Suppose, now this excess demand reserves hide e, what will happen? Central bank will now carry these banks of foreign exchange to these people, who want foreign exchange [FL] and sell them. How are they selling them? You handover Indian rupee to me, I give you US dollar with which you make the purchases excess demand. So, you handover rupee to me and I give you the dollar, the rupee in the economy is going down as you get the reserves from me.

So, this component r will go down because it is no longer in the economy, money is not circulating. You come, you go to your bank, you take your money out buy the u s dollar that you need. So, the r component will go up and down, up and down depending upon Central bank intervention. Therefore, money supply which earlier used to be only D which is called domestic credit, which is created by the Central bank operations etcetera CRR and all those SLR.

What we have in India that affects the amount of money supply is what domestic money supply, which is domestic credit. A part of the money supply is affected by the Central bank intervention in the foreign exchange market. If there is surplus reserves then Central bank buys the reserves and pumps in money cash. You get the cash; you had the dollar initially as exporter. Now, you get the cash, I get the reserves so r component goes up cash component in economy because of reserve exchange goes up.

And another case when there is excess demand for reserves, the money supply component goes down because you take the dollar and you spend the dollar abroad, whatever you are buying. So, there are two components of money supply and therefore, L n curve becomes endogenous, it keeps on shifting back and forth, back and forth. So, L n curve becomes endogenous, where r is called the component of money supply because of reserved changes that is foreign exchange reserve.

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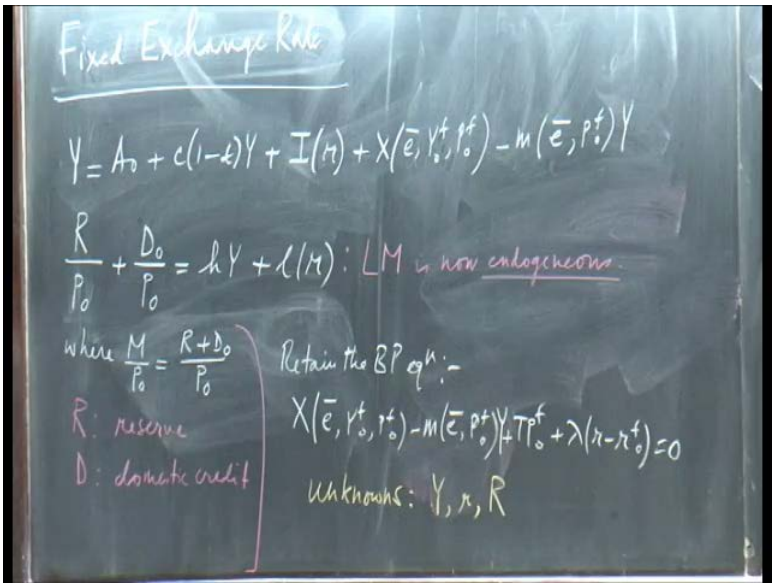

And D is called domestic credit, which used to be earlier our money supply, definition of money supply because of Central bank policies etcetera. This component of money supply is because foreign exchanges reserve intervention by Central bank. This component money supply is a normal money supply, which I am not calling M, I am calling it D now, the term used is domestic credit. Earlier, when we had only M look at the M definition, no R component, we had M the same thing as D.

Now M, the total supply of money in the economy would not vary with foreign exchange market activities one because of domestic policies, how much bank gives you loan, how much deposit you keep there? Because of that loan and the normal credit multipliers etcetera, which you do not know they operate. So, what you have to appreciate at this stage is that, L m curve becomes endogenous because money supply component.

Even if government does not change D nothing happens in Indian economy to change D, R component can hold this change depending upon whether you have balance of payment surplus or balance of payment deficit. R component will always change, if you have excess demand, if you have excess supply for dollar, R component will get affected. Say for the total money supply will always get affected, even if government does not adopt an expansionary multi policy or a contractual multi policy via D.

So, there the important fact is, this says that the L m curve is now endogenous; it will shift back and forth. Hamming said that, if you agree with me Hamming said that then

the third equation is the same B p equation retain the B p equation. So, B p equation was x now e bar y f naught p f naught minus m e bar p f naught plus transfer payments some constant amount plus lambda into r minus r f naught equal to 0. Retain the B p equation the L m is now endogenous, the I s curve is that. I made a mistake imports y, y is missing.

So, retain except e will be e bar is a fixed exchange rate system. So, what are the three components therefore, the endogenous variables. What are the three endogenous variables now? Therefore, can you tell me, what are the three endogenous variables? The unknown in a system of equation Y, R as before what is the third one reserved R, it will keep on changing depending on the surplus or deficit in the balance of payment. And money supply will still be D, you can call that d naught if wish, which is decided by the government d naught, but it is not M naught anymore.

It is not fixed, M will keep on changing because R will keep on changing although D may not be changing, D is our earlier m. So, one thing I would do mechanically and then you return, we will do the multipliers. I would do mechanically two things, one if you agree with me totally differentiate the system.

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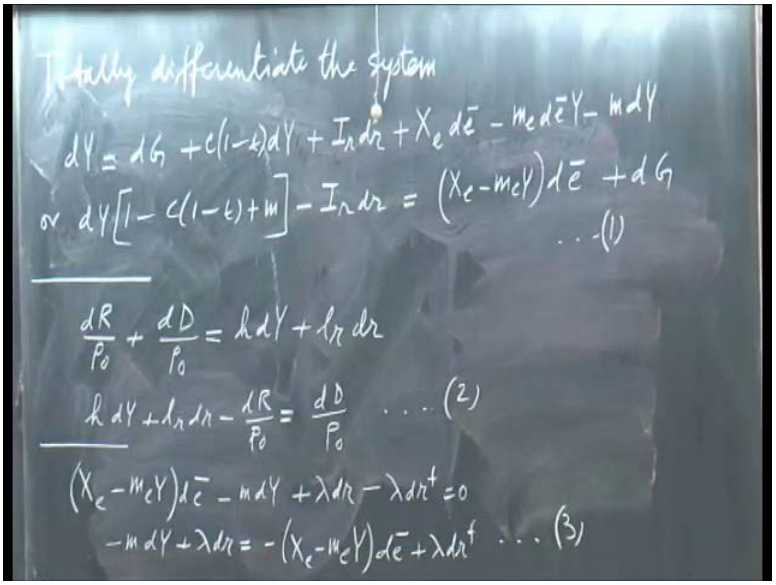

So, I totally differentiate the system, so what you have is d Y is equal to d G, I am just going to take one component out from A naught d G because I am interested in physical policy d G d Y is equal to d G plus c into 1 minus t d Y plus I r d r. Then exports I have a

very funny situation here, I am not going to talk about exports as a function of exchange rate as an endogenous variable, it will go the right hand side as a policy variable now. So, x e d you can call that e bar, if you wish the fixed value minus n e d e bar y minus m d Y.

So, this will become therefore d Y into 1 minus c into 1 minus t plus m minus I r d r is equal to again x c minus m e y, which will be small x. And I now have d e bar exchange rate policy plus d G, government expenditure physical policy that will remain. This is the I s function then the L m function, I will have d r over p naught, I can also talk about d D a money supply policy p naught is equal to h d Y plus l r d r. So, I can write this as h d Y plus l r d r minus d r over p naught is equal to d D over p naught, which will be our monitory policy issue.

And the last equation will be x e minus m e y d e bar then you have minus m d Y then I can have plus lambda d r and I can also talk about foreign interest rate issues lambda d r f is equal to 0. Now, this d bar d r f will go the right hand side. So, minus m d Y plus lambda d r is equal to minus x e minus m e y d bar plus lambda d plus lambda minus lambda that side will become plus lambda.

So this is essentially my first equation that I need, this is the second equation that I need and this is the third equation that I need, which all have to be arranged in a matrix form. I am using the same method all have to arrange in the matrix format. Now, fixed exchange rate system, let us look at the determinant what will be the determinant, put it in the matrix format look into the determinant.

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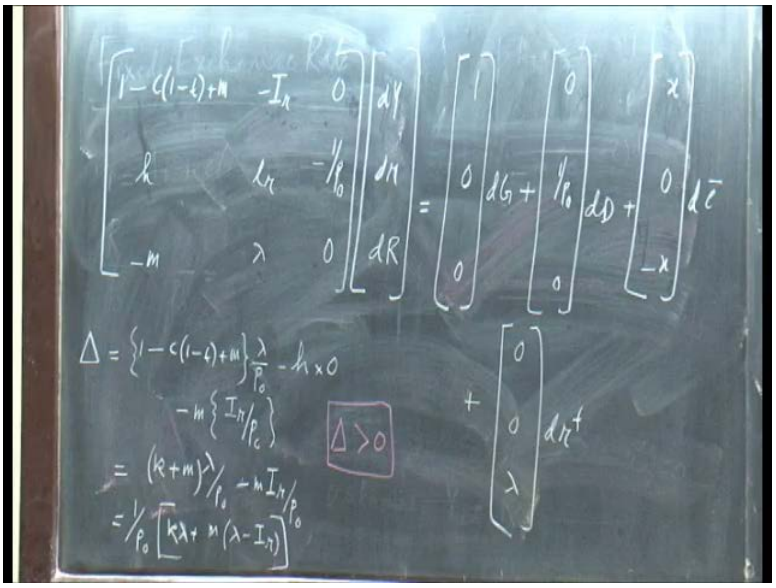

The determinant y column will be 1 minus c into 1 minus t plus m, all column will be minus I r and capital R there is a 0 value here minus 1 over p naught and a 0 value. And from the l m equation numbered two here will be h and it will be l r. And the last equation it will be minus m and I think lambda. So, this is the matrix, this matrix has d Y d r and d capital R, 1 0 0 d G plus monitory policy will be d D. So, that will be 0 1 over p naught 0 d D then the exchange rate policy devaluation etcetera.

First equation it will be small x, second equation 0, last equation is minus small x d e bar. Now, the small x remembers you can go into the foreign interest rate multiplier also, if you wish. You can go into that it be 0 0 and it will be lambda d r f. Now, let us check the determinant in this case call that delta, this call it delta. So, delta the determinant is 1 minus c into 1 minus t l r into 0 minus, minus plus lambda o p naught. So, you have 1 minus c into 1 minus t plus m multiplied with what l r is equal to 0 minus, minus plus lambda over p naught. You have lambda over p naught 1 minus c 1 minus t.

Second suppose, I expand by the this factor here, it will be minus h I r is equal to 0 into 0 is 0 lambda into 0 is 0 0 plus h into 0, last term minus M is minus M into minus, minus plus I r over p naught and minus M plus I r into over p naught l r into 0, so that is all you have. So, this multiplier is k plus m into lambda over p naught plus M minus m I r over p naught. So, you can factor out p naught, if you wish. So, you have k plus m lambda and minus m I r, you can take M out you have lambda minus I r.

M if you factor out M into lambda and minus M if it comes out is I r m, so it will be k into lambda and this will be k into lambda that is what you are saying k into lambda. What is the sign of this? Positive, positive this is positive minus I r, this whole thing is positive. The sign is positive, delta is positive unambiguously delta is positive.

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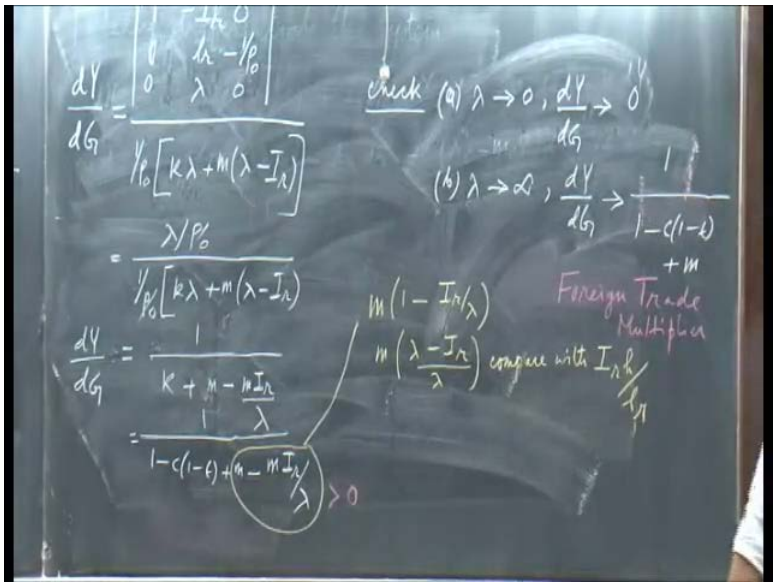

Now, let us get into some multipliers, let us see d Y d G 1 0 0 minus I r 0 l r minus 1 over p naught. Here you have lambda 0 divided by one over p naught into k lambda plus M lambda minus I r 1 into this 0 minus, minus plus lambda over p naught. So, it will be lambda over p naught divided by one over p naught into k lambda plus m lambda minus I r. So, this p naught p naught cancels out, if you divided by lambda it will be 1 divided by k plus m lambda divided by lambda is m minus m I r divided by lambda.

So, this is your d Y d G multiplier. Now, what has happened to this? It is clearly if you open this, elaborate this 1 over k it will be 1 minus c into 1 minus t plus m minus m I r over lambda. You clearly see this was the Kenchen cross model multiplier, but plus m and minus m I r over lambda is added plus term.

So, it weaker than the Kenchen cross model multiplier, however we cannot say whether it is weaker than the is l m multiplier because where what we had there is 1 over 1 minus into 1 minus plus I r h over l r. So, m minus m I r over lambda has to be compared with I r h over l r then we can say whether things have improved or different or deteriorated.

This term, this term, this term m into 1 minus I r over lambda, so it is m into lambda minus I r over lambda has to compared with I r h over l r.

Then only we can say whether this multiplier is weaker or stronger compared to the I s l m multiplier. We cannot say that, but it is definitely weaker than the Kenchen cross model multiplier because there is bunch of positive terms, this is positive, this is unambiguously positive m minus m I r over lambda is positive. So, the multiplier is weaker than the Kenchen cross multiplier, but whether it is weaker or stronger or it is the same as the I s l m multiplier.

We do not know number 1 point, number 2 what you need to check is these two case that I am trying to tell you always check two cases in this multipliers. Check two cases, a what happens to d Y d G, when lambda goes 0, 1 over this multiplier what will it be? It is infinity d Y d goes to 0 b lambda goes to infinity because very large, what happens to d Y d G? This term 0 so it becomes 1 over 1 minus c into 1 minus t plus m, this is the multiplier that we have d Y d G.

As lambda goes to infinity, two cases you would always check then you should check l r, but there is no l r term so we cannot check l r. But this need to be checked, this thing 1 over 1 minus c into 1 minus t plus m is very well known in the literature in the international economics literature, which comes out here as lambda goes to infinity. What happens that it becomes, it is a very well know multiplier in international economics this multiplier has a name called Foreign trade multiplier.

This multiplier has a name which is foreign trade multiplier many people know this for a long times it is there, so its origin a Kenchen model. The foreign trade multiplier's origin is a Kenchen model because ISLMBP is very much a Kenchen model, these ISLM functions you were using. So, this foreign trade multiplier has been there a long time this d Y d G is equal to 1 over 1 minus a into 1 minus t plus m is very well known for a trade multiplier, very simple not much complication. If we have time we will do a diagrammatic thing of at least one multiplier.

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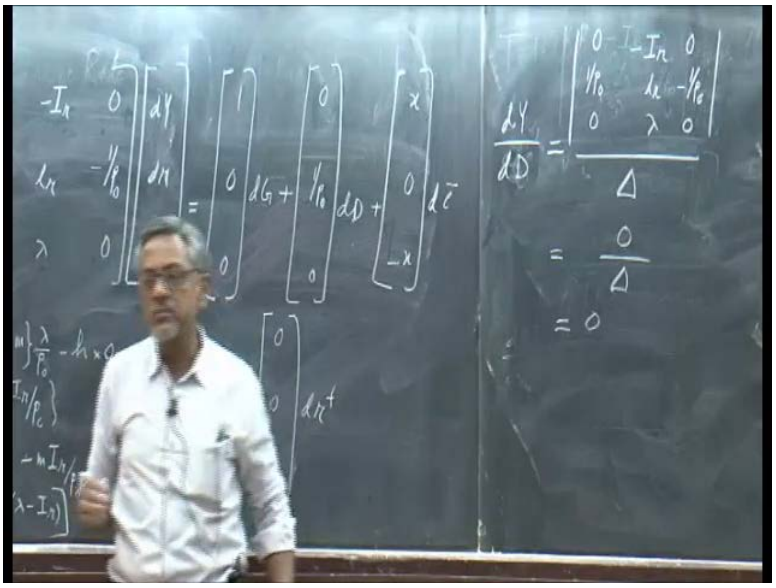

Next is what I want to do is I want to go into the money supply multiplier, which is very interesting, d Y d M so d M is not there, so it will be d D d y d D. d Y d D is the first column replaced by 0 1 over p naught 0, is that one over p naught? So, the first column will become 0 1 over p naught 0, second column is minus I r, l r lambda, third column is 0 minus 1 over p naught and 0. So, the determinant of this divided by delta. Now, what is this delta, we know the delta what will be the value?

So, in a fixed exchange rate system monitory policy does not work at all with or without any specific assumption. In this model monitory policy just does not work unbelievable result, fixed exchange rate system monitory policy does not work very simple result. Now, let us check which fascinates me is devaluation, government announces a higher e value from tomorrow policy issue devaluation. Let us check devaluation or evaluation.

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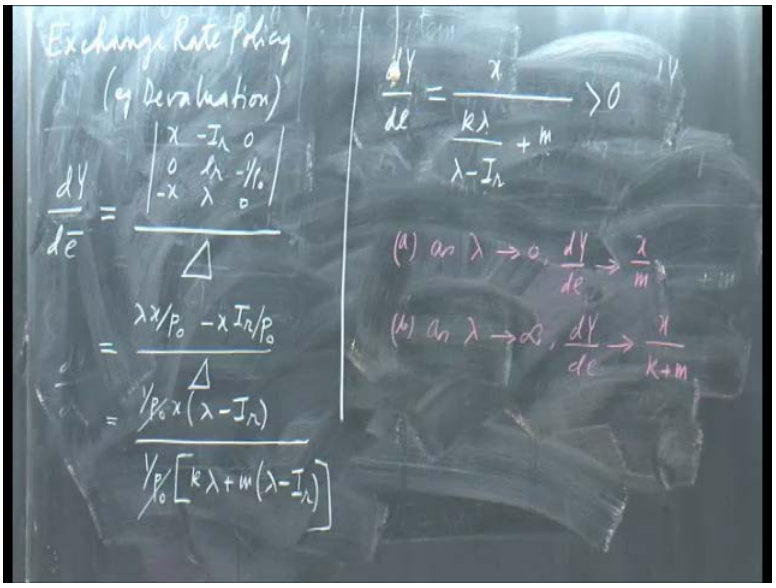

Let us check exchange rate policy this is very interesting like devaluation. So, we need to check d Y d e bar, d e bar is x 0 minus z, so first determinant of x 0 minus x second minus I r this is l r lambda then 0 minus 1 over p naught 0 divided by delta. Now, x into this into this is 0 and minus 1 is plus, so you have lambda x over p naught then 0 then minus x into this into this is minus, minus plus I r over p naught, am I correct or not? Now, this p naught business get cancels out, you have a p naught there.

So, you can have 1 over p naught factor and you have x factor out then you have lambda minus I r in the numerator and in the denominator you have 1 over p naught into what you have k lambda plus m lambda minus I r. So, this fellow goes now, you can divide it by lambda minus I r if you want then what you have is d Y d e is equal to x divided by k lambda over lambda minus I r and here you have plus m. Now, x is positive this is positive, this is positive, this is positive so this value is this greater than 0. Please check whether this is correct or not.

We need to check two cases, two cases we need to check a, as lambda approaches 0, d Y d e approaches x over m, b as the lambda becomes bigger d Y d e approaches, what will it be x by k plus m I am getting x by k, k includes 1 minus c into 1 minus t. Here it included m 1 by k plus m, so this approaches x over k plus m. So, with increase within the mobility of capital devaluation policy becomes less affective because you have k plus

m. As lambda increases your k plus m and as lambda falls you have only m, which is better k plus m is a bigger is a smaller number.

So, with capital mobility increasing under fixed exchange rate system, devaluation becomes relatively ineffective policy. Now, I want to tell you here when the India devaluation, its fixed exchange rate system all through the 50s 60s and 70s, I remember whenever this buying and selling of dollar by the Central bank became difficult, the exchange the balance of payment account deteriorated because of huge trade deficit and deficit elsewhere.

They often adopted a devaluation policy to rescue the economy, why would they do that? What they did that, dollar we were trying to sell at some numbers say 30 rupees per dollar, those days I am talking about 20 dollar. Let us change this and some time the devaluate by 66 percent. So, imagine 66 percent devaluation which means whatever dollar was the price of Indian rupee price of dollar went up by 66 percent huge amount.

So, why would they do that? The reason is they thought of the following things. Try to understand the policy devaluation policy; the multiplier in algebra is there. What they are trying to achieve is you have a situation that means you have situation of huge excess demand for reserves Central bank just cannot supply that dollar. So, when they devaluate they hope that the demand for dollar will come down just like, when prices increased devaluation means price increasing from e bar being 20 rupees to e bar being 30 rupees per dollar.

That what it means you are expecting that as the price of foreign exchange will go up, the import will come down. How they why they adopted devaluation as a policy often in a fixed exchange rate system? We do not have it now, we had it and there were 1966 foreign, they are the huge devaluation, they had devaluation many times. Second reason if the dollar rupee value of dollar goes up that means, the rupee is depreciating.

There is a possibility that a person holding dollar in some country will be able to buy more Indian goods, if the prices remain same this is another reason. So, exports night increase, but those days unfortunately India did not have many goods which were competitive in the export market. So, even if devaluate dollar by 60 percent and above 60 percent currency devaluation or 30 percent or whatever, it may not work because your exports are not liked by the international market. Only thing that get work is that this

greed you have to buy goods abroad become down because if you devaluate, the dollar becomes very expensive, very expensive when you devaluate.

So, there is greed that will come down because price have gone up like father would scold a son, no I would not because the price is too high. So, you may cut back on imports. Now, you can see one thing that is also not very certain because as lambda value changes say, earlier we had a lambda nearly 0 so with 0 lambda one can say good news devaluation will be more effective than lambda becoming a large number. Because when lambda a large number it becomes k plus m, when lambda becomes a small number it becomes only x over k.

Do you understand what I am saying? So, these are the factors that would matter. Now, I hope you can read my notes, look up all the exercises I have done, you can do plenty of exercises here because you have three endogenous variable y, r and capital R. You can obtain a multiplier with g with respect to all d r d G d capital R d G then d Y d e bar d small r d e bar d capital R d e bar, you can obtain all these multipliers. And I have done that in my handout, which I submitted a softcopy.

So, you can work it out yourself and check with my notes whether you are getting the right results or not. The broadly speaking what happens when you open the economy; even a simple ISLM model becomes very complicated. Now, what the complications are I will try to bring them in bit by bit I first define the balance of payments account for their items. Then I set up an algebraic model, which is an extension of the ISLM model with the third equation, the balance of payments equation. And then I went into through exchange rate regimes flexible and fixed, I did the flexible first and the fixed my notes.

Unfortunately has the fixed first then the flexible, but you can check that. But always when you into open economy, you check the sensitivity of your result with respect to lambda value because lambda is a very important value in today's world. Lot of financial crisis you would not have in the world, if lambda did not exist in fact. But the fact that lambda exists and prop dense of free market policies, that you should be market should be free, world should be connected in the worlds of Bill Clinton.

It should be global village, it is a globe with all villages connected you have a problem, something happens here can affect there. That story I told you US gets a cold US sneezes and Europe gets the cold suffers for a month, create one month help or headache for

Europe, so connected they are. India some people says that India is also getting there; it will be so connected anyway it is a long way to go. So, this all that I wanted to teach you, open economy. If you have a questions you can ask me, if you have no more questions what I would do is I would stop lecturing of course.