Macroeconomic Theory and Stabilization Policy
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Lecture - 15

What I would do today is that the, fiscal policy and the monetary policy that I briefly algebraically discussed, I will go into more these two polices because these are the polices that you will also hear on TV ((Refer Time: 00:42)). What the central bank is doing and what the government is doing on the fiscal site you keep on hearing that.

So, I will go into the effectiveness of these polices. I told you little bit that as you as add more features to the modern government policies becoming less effective I told you that, but I will going to more the effectiveness of these policies. So, my topic today will be continuation on what we were doing yesterday is the effectiveness of fiscal and monetary policies. I would do that those way I teach this course diagrammatically as well as algebraically. So, let me write down therefore, the summary what I did yesterday two policies I will take fiscal and monetary.

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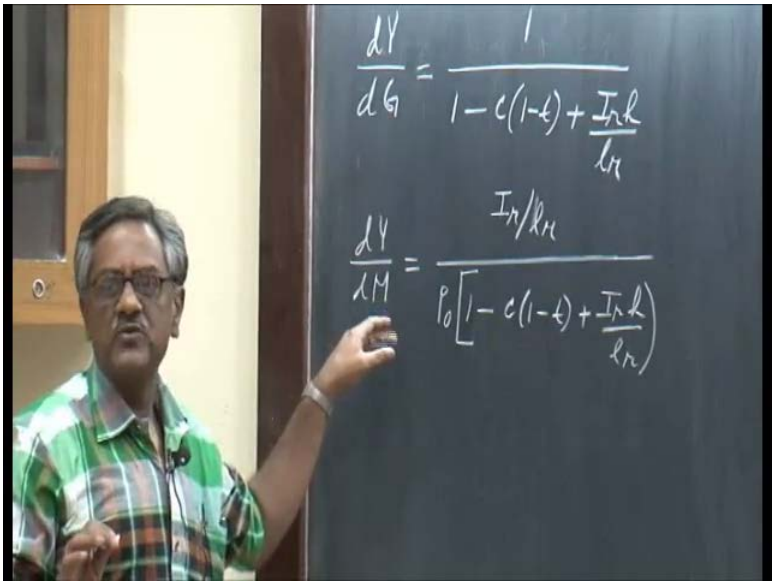

So, what I did was, there was a d y d G multiplier, in the fiscal frame work which was 1 minus c into 1 minus t plus I r h over I r, d y d m which was 1 over no it was I think I r

over l r was it I r over l r yes it was I r over l r into divided by P naught into 1 minus c into 1 minus t plus I r h over l r.

These are the two multipliers that I obtain and I called this fiscal policy multiplier and this is the monetary policy multiplier. I told you how government central bank can increases or decrease money supply. Simply, it can increase and decrease money supply by changing a CRR numbers.

If it changes CRR numbers, cash reserve ratio numbers, suppose it reduces immediately banks will have more cash because they do not have to give that cash with RBI, alright. Similarly, if the increases CRR banks will have less cash, because they will have to keep more cash with RBI. CRR is cash reserve ratio, that is out of the total deposits they collect through the accounts, saving account, current account, fixed deposit account. They are by law suppose to keep a percentage of this deposit with the central bank the central bank is RBI, every country has central bank. What is the name of central bank of USA Pentrolija. What is the name of central bank of England, bank of England very good. What is the name of central bank of Japan, bank of Tokyo. So, you have a every country has a central bank what is the name of central bank of India.

Student: RBI.

Very good [FL]

So, money supply change can be thought about coming through that channel CRR, there can be other changes also we did not talk about it. Now, d y d G is a fiscal policy multiplier I would consider that this another fiscal policy multiplier d y d t, I am going to ignore that in my discussion. Now, suppose you take the first 1 the fiscal policy the d y d G thing.

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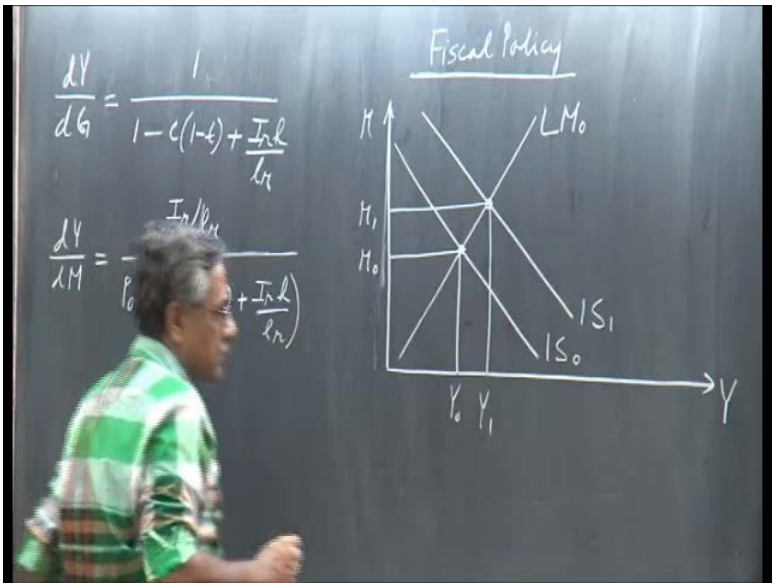

Now, question is when is fiscal policy effective. Now, you draw a diagram like y plain suppose this I S curve and this is L m. Now, what I am talking about this I S shift and how much output reach it 1 thing is clearly see that. Suppose, I S has shifted to say I S 1 and this is the normal multiplier I talked about yesterday output increase from y naught to y one, but I also said the rate of interest in economy will also increase.

According to this diagram, rate of interest also increase. So, because rate of interest increases this curve is out effective. So, fiscal policy not so effective because I r is non zero, but it will become more effective if I r is 0 all right. So, one case is if I r r is 0 it will become more effective all right. So, let us take case if I r is 0.

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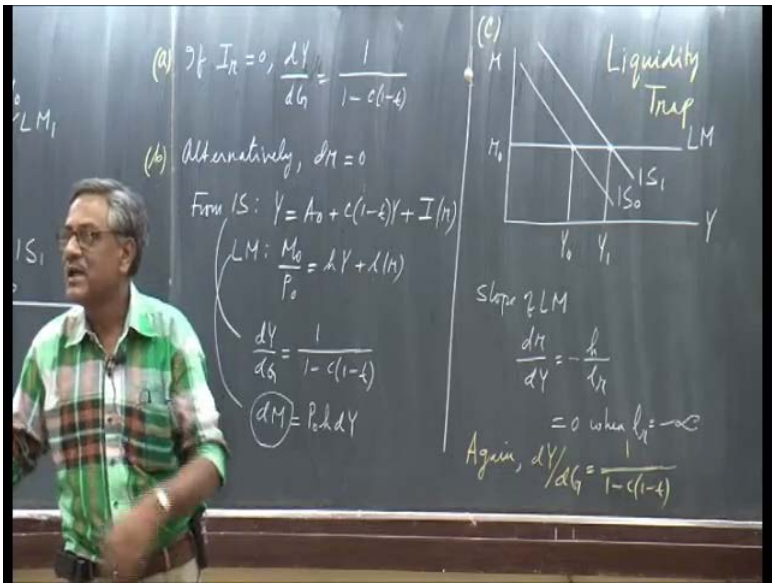

If I r is o then d y d G becomes 1 over 1 minus c into 1 minus t. So, effectiveness of fiscal policy is gone up because in the denominator you have lesser terms. So, I r is equal to 0 would mean if you recall the slop of the I S curve it was d r d y is equal to 1 minus c into 1 minus t divided I r that was the slop. So, I r 0 means what a ratio which was 0 in the denominator infinite slop which is a vertical line. So, I S becomes a vertical line.

Alternatively you can imagine, if government can control the inflation rate then what you have is alternatively if d r is equal to 0 through government policy government fixed the rate of interest, then you can see that output increase will be d r is equal to 0 is with new I S curve is a big increase some y time 1. Again if d r is 0 then from the I S and L m equation what you see, d r is equal to 0 that means, if you are totally differentiate you get d y d G from the first equation the solution is given.

The second equation, when you substitute d y there is some money supply change require to maintain that equilibrium because d r is 0 again. So, there will be an endogenous it becomes a recursive model or d r is equal to 0, would tell you the I S curve gives you the d y d g, which is 1 over 1 minus c into 1 minus t what does L m curve too.

Well I S curve tells you derives this is output increase, but what does L m curve too L m curve still there in this model it becomes a recursive model. So, when you put in the value of new y and r is 0 then you get the d m number to match that. So, L m curve

endogenously adjust and it will shift when d r is equal to 0. The L m curve will shift to L m endogenously all right. L m curve gives you a d m value which will be equal to which will be equal to P naught H into d y, whatever that d y is because the last term d r is 0.

So, it is all for d m here which means the L m curve would shift government will have to shifted to maintain the rate of interest because the rate of interest is always constant. So, effectiveness of fiscal policy increases effectiveness of fiscal policy increases. The other thing that you can note is that under which condition again you can have a similar situation. Suppose, the L m curve is flat note what will happen. You have I S and L m curve the L m curve is flat some rate of interest L m is flat, when I S shifts it can it seems to be that it will have the maximum impact.

It seems to be that you have a maximum impact, when L m curve shifts on I S shift, but L m horizontal means what, assumption. Slope of L m, recall the slope of L m up [FL] d r d y is equal to I think what you have is minus h over l r, please find out slope of L m its it is a d r d y is equal to minus h over l r slope of L m correct slope of L m all right.

Now, if you have that when you have L m flat means you are essentially a slop is 0. That means what happens to the parameter value here it becomes 0, when l r is minus infinity because if you find the infinite number here, then the value of the ratio is 0. Now, what is happening to the multiplier, if you go back to the multiplier l r goes to minus infinity means you tender this entire term 0. Same result the multiplier will be 1 over 1 minus into 1 minus t. Again what you have here I can write it with a different chalk, again d y d G under this situation will be equal to 1 over 1 minus c into 1 minus t same result.

So, these are the situations three cases here or all constant to appropriate some money supply policy, monetary policy, d r is equal to 0 this case. Then you have d G d y 1 over 1 minus into 1 minus t the model becomes recursive because the second equation solves for d m, money supply required L m has to shift to intersect I S here to give you the equilibrium.

The first case I describe I r is equal to 0, where I S curve will become vertical and it shifts all right. You get the same multiplier 1 over 1 minus c into 1 minus t. The third case that I discussed is that when the L m curve is horizontal, you have a same situation d y d G is equal to over 1 minus c into 1 minus t. So, essentially I have discussed three

cases a b and c this 1, when L m becomes horizontal. Fiscal policy becomes most effective.

Now, you can have you understood this and look what is the essential massage coming out the effectiveness of fiscal policy the way I discussed, d y d g. You do not allow r to change, if r changes there is some leaks crowding out a private investment and fiscal policy effectiveness go down. So, all these three cases you are not allowing r to change. This case with I S being vertical all right is I r is equal to 0 investment does not respond to r even if r changes. Second r does not change at all. So, there is no question or investment responding or not responding. Investment will not respond unless r changes. So, whatever be the sensitivity what is the number I r.

I subscript r whatever be the number and the third case also r does not change because L m is horizontal. So, r is fixed like that I think supply curve horizontal price is fixed Keynesian cross model. Keynesian cross model aggregate supply curve horizontal price therefore, fixed. So, all the changes are because of demand curve, I S curve is like that demand curve all these changes are only because of I S curve. There is no r change no crowding out effectiveness of fiscal policy is maximum 1 over 1 minus c into 1 minus t all right you see that. So, this is the effectiveness of fiscal policy at the maximum.

Now, you want to know effectiveness of fiscal policy going to the minimum. We will do that before I do that, this case is a particular interest was of lot of interest. Now, we there is not much of interest. This L m curve becoming horizontal, you can see from the L m equation what it means, r which is the minimum r this equation l r infinite. Essentially means there is the hardly role of money supply or y when a l r is any value of y. It can accommodate, when l r goes to infinity r which is the minimum value.

So, y and m over P does not make any sense in this equation. It is the redundant equation it becomes L m curve. What happens when l r is at the minimum what happens to the stock prices they are the maximum in some sense. So, nobody holding the stocks everybody has a cash balances intact. Rate of interest is very low from the bank that you get. L m curve is horizontal, this case is known as is famous is known as liquidity trap. In the literature, this is identified as liquidity trap. When l r goes to infinity minus infinity and L m becomes horizontal you have that means l r goes minus infinity means essentially speculative demand for money is highly sensitive.

If the rate of interest is a little bit they do not hold any cash essentially. When rate of interest which is m naught some low level then people are totally indifferent between kind of holding bonds. They do not want to hold bonds, they hold a entire money in cash the indifferent between holding bonds and putting money in the bank, does not make any sense they do not want to do that. So, they hold entire cash. So, its infinite liquidity they have.

As if it looks like as if they do not have they do not hold any cash for transaction demand, that is not true. They hold money for transaction demand purposes, but the liquidity preference causes perfectly elastic. Basically, means that that price they can hold any amount of cash in the liquidity. So, government pumps in money, money does not go into transaction purposes at all. They all go and accumulate the liquidity balances of people.

Suppose, I S an individual have 1 bag here for transaction demand for cash 1 bag I keep for speculative demand for cash prices of stocks are. So, high I do not buy them. Rate of interest is so low I do not put money in the bank. Transaction demand for money I have already govern pumps in money. I receive some money from somewhere suppose all right they all go into the speculative basket.

So, what happens to the money if does not impact on the transaction demand, essentially becomes ineffective. So, later I will show you monetary policy becomes completely ineffective, which govern pumps in money it does not alter output. Output is only dependent upon the I S curve. If it shifts output will change, L m curve has no effect you can see that can you see that what I am saying L m curve becomes ineffective, like the Keynesian cross model supply curve is horizontal is ineffective some sense. It does not influence the output level.

Output depends entirely upon demand where it is. If demand shifts output will change if demand does not shift output does not change. If I S shift output will increase or decrease otherwise it will not. L m is completely passive, this is known as liquidity trap, they called that a liquidity trap. The banks are caught in liquidity trap, people do not want to move their cash out of the speculative balances either put into the bank or going to the stock market.

So, govern keeps on pumping cash hoping that the economy would rebound or more activity will begin nobody spends any extra. They all get accumulate somewhere you give money to somebody to have a better living, go to better school, eat better. It does not influence semantically when you give a money goes and puts in his locker, he does not spend it anymore locks it up.

It is a trap that is why the word trap is there, liquidity trap. So, liquidity trap you have fiscal policy maximum effectiveness because why what I am going to conclude is monetary policy has no effectiveness. All in economy and be done all the with is fiscal policy all right. Now, these situations are trying to tell you these three cases a b c is essentially going to truck over the effective the maximum effective of fiscal policy. Now, you tell me, the effectiveness of fiscal policy how very simply can start reducing, what will happen what you need diagrammatically. I S curve shifts, but output does not change what manipulation you can do.

Now, I will tell you economics, but what manipulation can you do here to show that effectiveness of fiscal policy, when I S shifts is hardly their on output. Remember effectiveness how much output changes. Effectiveness I am measuring, how much output changes. How would output change become smaller and smaller even I S is shifting a lot, what change you require in the diagram very good absolutely.

The L m becomes more vertical I S shifts output increases a less rate of interest increases. Lot you take any diagram rate on interest increases a lot absolutely. So, you can render fiscal policy less effective and can become totally ineffective as a matter of fact. The more you make L m curve stepper all right.

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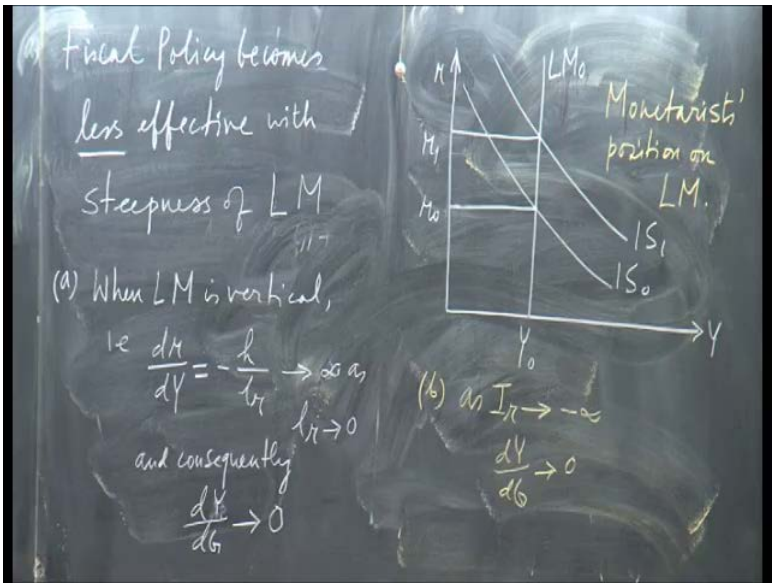

Fiscal policy becomes less effective with steepness of L m as a matter for L m becomes vertical. You can talk about one case, when L m is vertical. That means what is the slope situation d r d y of L m is minus h over l r. So, what be what has to be case when L m becomes vertical l r becomes 0. So, that is approaches infinity as l r approaches 0, fiscal policy look at the multiplier here if l r goes to 0 what happens to the ratio infinite.

One divided by some large number d y d G goes to 0. Consequently d y d G goes to 0. The diagrammatically what you have is just opposite of liquidity trap what you have is a vertical L m and you have an I S curve. So, if I S shifts to I S 1, all that happens is rate of interest increases from r naught to r 1. Output gets stuck at y naught, 0 effectiveness d y d G is 0, no change in output.

This is just opposite of liquidity trap where L m is horizontal and only fiscal policy was effective. It is just opposite, when L m is vertical fiscal policy is completely ineffective, completely ineffective, totally ineffective all right. So, now you tell me if the classical position is government policy do not work, what kind of a model they will build. Suppose, they want to fight with the Keynesian, what kind of assumption they will have. They want to say government has no role to play what will they do. They would like to show d y dg is 0. So, in their moral you would expect L m curve to be vertical very simple.

Classical macroeconomics when they would fight with the Keynesian, one clever thing they can easily do is, to show that L m is vertical [FL] because d y d G will be approaching 0. The most steep it is and a Keynesians, if they want to show fiscal policy effectiveness they would go more and more into flatter L m. More and more L m is flatter the large multiplier will become flattest L m horizontal multiplier is maximum.

You just saw that, all right. Another very exceptional situation may arise, I do not know what it is called there is no name for it by the way this L m vertical L m was popularized by a branch of classical macroeconomists. They were known as monetarists, this was the monetary position on L m. Monetarists took this position monetarists position on Lm.

This is what they thought L m is going to be, this is monetarists position on L m. In Keynesian book you will find liquidity trap, they would not talk about that at all. So, these are two groups fighting with each other. It is a political philosophy essentially. One believes in capital system, free society right wing. They called right wing people where the private sector will do good, robin can only do harm. The other position is Keynesian position, where government has definite role to play, at least in the short and in the medium run. So, they want to show d y d G non 0 d y t t non 0. Even d y d m they want to show non 0.

So, this L m position is a vertical position, that you have here, is that classical position in senses. Classical macroeconomics they were had L m. So, the post classical economist who follow the tradition like the monetarists when I S L m was paper was written and they were using I S L m framework were using this L m curve. In classical days earlier to twenty century, late ninety century there were no I S L m function. It was only written in the forties and fifties I forgotten when after Keynesian's book came out in ninety thirty six.

So, around sixties fifties sixties monetarist were using because it has become popular in the literature. So, they did not avoid it, but they were very clever. In order to prove their position they would say no L m [FL], L m vertical [FL]. I will never come up with data and also something to prove that and as soon as I do that d y d G will become ineffective.

Do you understand the debate. Now, in macroeconomics little bit that is why I am saying this is the most important portion of the syllabus I am doing right. Now, [FL]one more case can appear can happen case number b here. If this is a and this is b you can see that

is multiplier will become ineffective. If I r goes to infinity, if I r goes to infinity minus infinity it can also, but I do not know what it is called at least algebraically it is a possible, as I r approaches minus infinity d y d G approaches 0. You can see that I r approaches minus infinity d G d g will approaches 0.

I r approaches minus infinity means what will be the shape of the I S curve, what is the shape of the I S curve I r goes to minus infinity means what is the shape of the I S curve what is the slop of the I S, horizontal very good. So, I S becomes horizontal and L m whatever be it slope becomes effective in some sense can change output I S can change output. So, I S goes to minus infinity is essentially the I S curve. Now, I do not have I S curve has the solution for rate of interest all right. The L m curve determines the multiplier y.

D y d m [FL] they will determine the value of output, I S curve is ineffective. When somebody becomes horizontal the other curve decides what will happen this is I am repeating myself, Keynesian cross model begin with this assumption. Suppose, there is a excess of supply in the economy. So, that aggregate supply curve is horizontal. Now you tell me how much output it depends upon demand [FL] all right. So, this is another possibility, but I have any heard in name like liquidity trap monetarist L m curve [FL] or the classical position on L m I have not heard that.

So, in many textbooks you know how they write, how they draw the L m curve. Many textbooks to make a compromise L m what they do in many textbooks just for fun I am telling you. In all the textbooks when I started reading macroeconomics I used output see it may they those books may still be there in the library, what they would do in all the textbooks is that. They would draw they would draw an L m function a very L m function what they would do is to cover all the situations.

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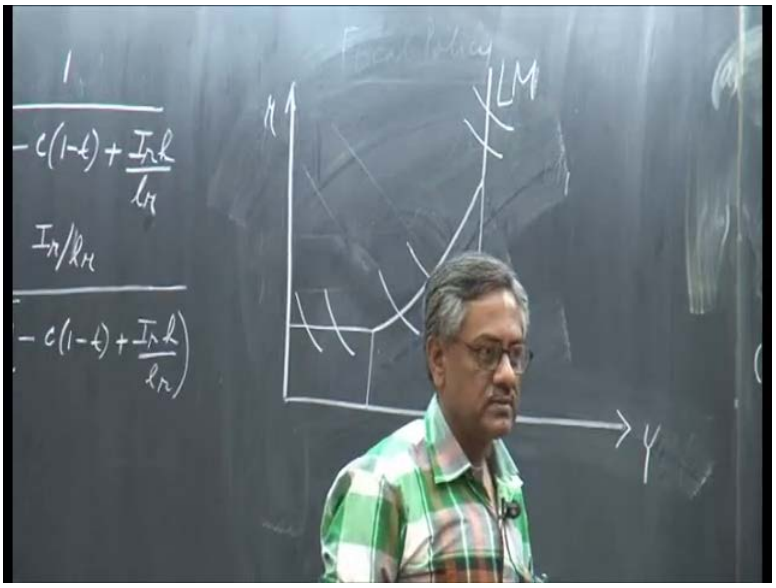

So, this is y this is r and they would draw L m like this first horizontal then the L m may grew and then it will become vertical. So, there are clearly two three potions. One have to here and beyond that. This is the one I drew, this is the liquidity trap, this is the classical position. This is how they would draw the L m function many books used to do that and they would say look if I S is here, then I S is very effective if I S is here there is some crowd is out going on.

Rate of interest is increasing and if I S is here no effectiveness. One diagram they used to draw. I did not understand initially what they are drawing, but later I understood why they drawing them. To cover these situations there are vey debates going on in the literature, journal articles this and then fight, academic fight not fess fight [FL] and then what they used to do.

Now, have you understood effectiveness and ineffectiveness of fiscal policy. The next part what I want to do I will start that is a effectiveness of the monetary policy, which is very similarly, to this. I will take this multiplier and you can see the parameters are the same because they have come from the same model.

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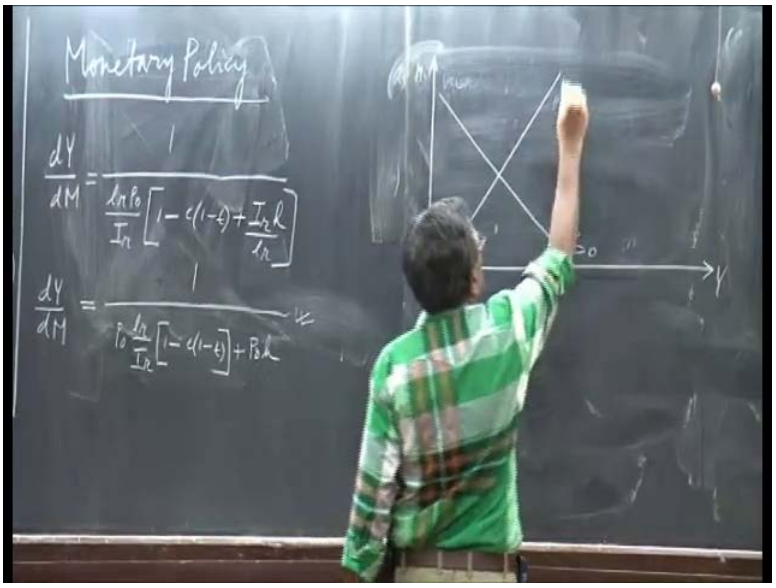

So, the next part will be the effectiveness of monetary policy. So, the next part is a effectiveness of monetary policy. You can see one thing that this multiplier is very cumbersome. Can we do one thing, can we multiply this by l r over I r top and bottom then it will be 1 and you have your d y d m is equal to 1 divided l r p naught over I r bracket 1 minus c into 1 minus t plus I r h over l r.

Now, we can have this thing l r over I r multiplied inside. So, you have p naught into l r over I r and 1 minus c into 1 minus t plus if you multiply that P naught into l r l r I r I r will cancel out you have P naught h right. This version I will use, when I would I would discuss effectiveness of monetary policy. This is the version I would used d y over d m not the other version. So, I am going to concentrate on this.

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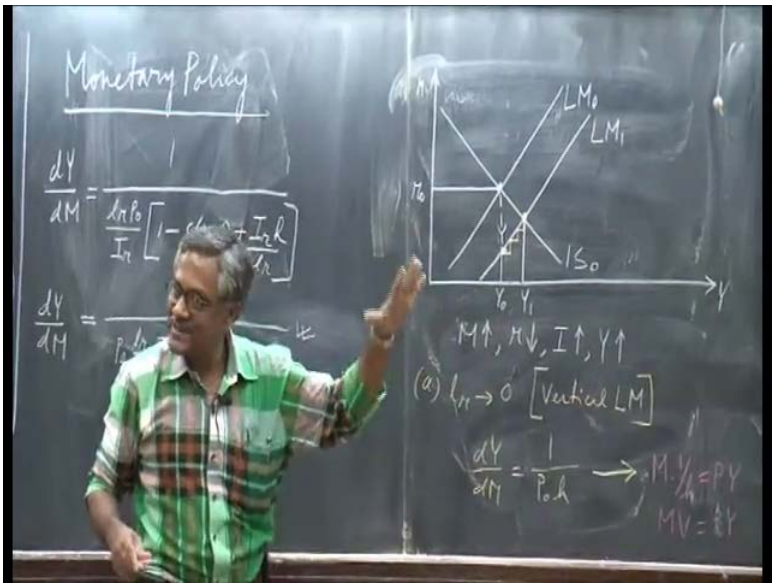

So, essentially what I would do, I would draw the diagram again. I S L m by there here is if money supply increases L m will shift idea here. You have the initially equilibrium point and you will reach a new equilibrium point. This is a r naught as money supply increases the supply of money excess supply of money what will happen, prices will go down. So, what happens? Essentially the rate of interest would initially drop a lot all the way up to here. Then when rate of interest drops, first here you will have m increases then rate of interest drops, then private investment increases, then output increases. These stages will go through.

So, rate of interest drops private investment increases demand increases then output increases. So, output increases a little bit let me use a color chalk here. Rate of interest drops to clear the money market it is more flexible variable. Then output adjustments are sluggish. So, slowly output increases as investment picks up more demand, investment is part of demand I S curve [FL] part of demand. So, output increases, but then goes to l m. So, rate of interest now climbs up to clear the money market, goes to L m to settle the money market equilibrium.

Again there is some more output increase as private investment peaks up then it goes to L m. So, in kind of step function wise it reaches the new equilibrium point. This is the d y d m, this is how money supply or monetary policy becomes effective this is how it works, according to the textbook according to our theoretical generalization. In real life it

may work quite differently, that is the different story all together. In different country it will work differently India [FL]. So, we are do not talk about that, but what I am trying is generally what happens as L m shifted means money supply increases, when people have excess money rate of interest drops to clear the money market.

When your rate of interest drops to clear the money market, private investment gets the boost because cost of bond is low. So, demand increases for machines, companies start producing more output there is a multiplier effect comes now. So, companies if place more demand there is more demand place from companies for goods.

So, companies produce more, more income is generated people spend more on consumer goods also. Then investment peaks up more in the consumer goods as well and then output increases income increases goes on until it reaches the equilibrium point. Reaching I told you about the stability conditions that these models are stable. I proved that yesterday that given the assumption these models are stable. Now, so the economy reaches the equilibrium, but of course, god knows whether the model should stability under these assumptions or not.

That is an important you can check that out, various critical assumptions if I make volute original model I r goes to infinity I r goes to 0 l r goes to infinity l r goes to 0, whether stability conditions still hold or not we have to checked that we have not checked that. So, this is how you reach the equilibrium point L m. The question is this increase in output, whether it is more or less. This is the effective y naught and here y 1 here y naught to y 1, when it is the maximum when it is a minimum. You can see one thing, if you can reduce the number arrives in the denominator the value increases.

So, suppose I take l r goes to minus infinity liquidity trap what will happen. [FL] do not take l r goes to infinity suppose I take the case l r goes to 0 the classical position take the case l r approaches 0 classical position, monetarist position vertical L m. This is the case of vertical L m I just take about that, when l r approaches 0 what will happen here. The multiplier is most effective this whole term is 0. So, multiplier become d y over d m is equal 1 over P naught h. So, here d y over d m is equal to 1 over P naught h, do you recall anything from this.

A Similar thing you got earlier, if you integrate this roughly you get an expression m into 1 over h is equal to P y right. This gives you and old expression you saw that in the

classical model, what was that expression you saw that in the classical model. This brings back some memory is it, m into 1 over h is equal to P y which we wrote there m v is equal to P y do you remember. Quantity theory of money, where did you get quantity theory of money, in connection without discussion on classical model and l r goes to 0 vertical L m.

I just told you it is just a descendent of the classical macroeconomist who were assuming that. Now, you see the consistency do you get the result you get, from the Keynesian model I S L m model, you get a result which is the classical result on Keynesian I S L m model. Did you see that the cleverness, just one small thing they would assumed that l r goes to 0, you get exactly the same result that you got from the classical model do you see that.

Except we do not the labor supply, the labor demand and labor market we are ignoring at here, but just a money market L m equation money market equation you get it from here. So, L m vertical I told I am telling you in connection with fiscal policy that is the monetarist position, they used to take you see that. Now, the result d y s m maximum most effective.

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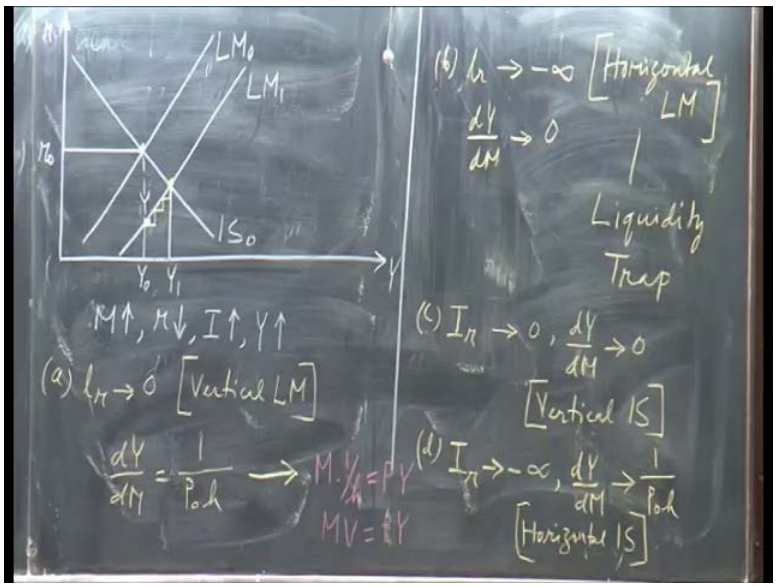

You can see now here, two cases we can discuss when l r now goes to minus infinity, two cases we can discuss here. What happens l r goes to minus infinity, l r goes to minus infinity what happens to the multiplier d y d m then goes to where 0 L m is horizontal.

This is the case when L m is horizontal, just opposite this is the case when L m is horizontal, d y d m goes to 0. When fiscal policy is most effective, I was talking about that this morning fiscal policy becomes very effective when L m is horizontal only I S determines output.

So, this is the case l r goes to minus infinity, the liquidity trap case. This is the liquidity trap this is the case where we discuss liquidity trap. So, there are two polar case is here, l r goes to infinity and L m goes that. Another one you can take in terms of I r which really does not make much sense. If I r goes to 0 what happens, infinite [FL] d y d m will go to 0, I r goes to 0, then d y d m also goes to 0. This is another case I r goes to 0 means I S is vertical.

L m becomes completely ineffective, if I S is vertical. This is the case where, you have vertical I S. The other one, I r goes to 0 minus infinity very sensitive what happens case d I r goes to 0 minus infinity what happens d y d m minus infinity means this is 0. So, you get the quantity theory result I s becomes horizontal. So, you have d y d m is the same one over P naught h this is the case where you have horizontal I S. Again monetary policy is very effective horizontal I S, again monetary policy is very effective, when I S is horizontal [FL] the other function determines output.

X axis [FL] change we are trying to note the changes in the x axis if policy shifts. If some grainer becomes horizontal x axis [FL] change because of that line will come. Only the other function will determine what will happen to the x axis value and horizontal mean y axis value is fixed. So, this is what I am trying to say.

So, in case of a and in case of d, you have maximum effectiveness of monetary policy. In case of b and in case of d horizontal L m and vertical I S in these two cases you have 0 effectiveness, completely ineffective monetary policy. Simple from algebra, simply from algebra you are getting all these results. I have not done anything new. So, essentially we were playing with the parameter values I r [FL] what is number, l r what is the number basically these two parameters because these two determine the slope of the I S and l m.

So, the slop of the I S and L m is the change because of change in I r or l r, you have different kind of effectiveness ineffectiveness or whatever or fiscal policy and monetary policy. Let me just tell you one thing here, you just note it down right in the beginning today I discussed a case where d r is 0 d r is 0. In that case fiscal policy becomes more

effective the I S curve determines the output and the L m curve determine androgynously money supply because. In I S L m model there are two variables that you determine the fine solution like a simultaneous equation model x and y, x and y here are rate of interest and output.

Now, if one of the variable is. Now, fixed like rate of interest what will happen to the model. The model becomes recursive because from the I S curve you determine the d y d G suppose or y is solved. From the L m curve you determine what is the amount of money supply require for that rate of interest to be there. Let me draw the diagram again this is also a type of monetary policy, where I said that fiscal policy becomes most effective when d r is 0 rate of interest does not change.

Is also a kind of monetary policy in many journal articles books I have seen. So, when they talk about monetary policy, they talk two type of things. They say m change is monetary policy. So, we looked at that d y d m multipliers. Another one they say holding rate of interest constant is also a kind of monetary policy. In this kind of monetary policy what we find is fiscal policy is most effective. Monetary policy is passive because money supply would change to keep the rate of interest there, whatever the amount of money is require when I S shift.

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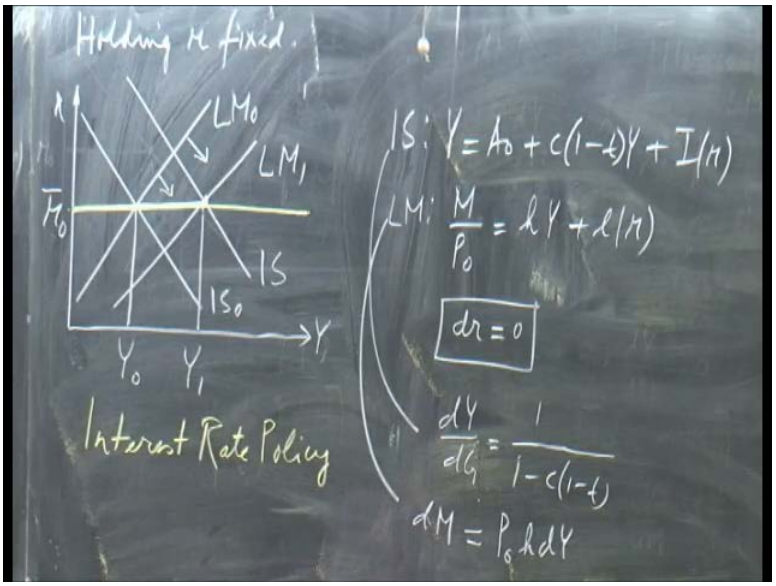

Let me explain this once more because this is probably not becoming clear to you. A monetary policy I am talking about is holding r constant, r is fixed holding at a fixed

value. So, what you have is, suppose this is y this is r this is I S and this is L m, they all normal shaped, upper sloping L m downward slopping. This is the rate of interest and government says hold it there constant fixed it. So now when I S shift and rate of interest is held constant, this is the output change that you will get y naught to y 1, but what will happen to l m.

L m does not intersect, there you say this is equilibrium situation. Equilibrium is when I S and L m intersect. So, what government does is that then depending upon where r value is they will shift the L m out. So, that L m is shifted out by a passive money supply increase to accommodate that r value at that level. See it is a passive thing, first say I S shifts when government fiscal policy government undertake the fiscal policy. In order to keep r fixed they in shift to L m to intersect at that point to L m 1. It is a passive shift away l m.

It is not money supply first increases [FL]. This is a passive kind of money supply responds in order to keep r at a particular level, is another kind of monetary policy of in the talk about which is called interest rate policy. Interest rate policy often they call it. This interest rate policy is also a type of monetary policy. Interest rate policy is also a kind of a monetary policy [FL]. So, the interest rate is kind of held at a fixed value this yellow line. Now, if I shift there will be upward tendency interest rate to go up, how can they keep it at level.

They can create excess money pump in money. So, the L m shift and keep down the interest rate until it is held at that level. So, L m essentially shift all the way to L m 1, to intersect with I S and interest rate is held there. So, this kind of passive monetary adjustment they do. So, in terms of I S and L m function when you have I S function like y is equal to a naught plus c into 1 minus t y plus I r and you have the L m function m over P naught look I did not write m naught I wrote m over P naught is equal to h y plus l r, suppose you have that.

What I am saying if d r is equal to 0, if you put this assumption then you totally differentiate. The first equation will give you the d y d G value, which will be 1 over 1 minus c into 1 minus t because d r is 0 I r d r is 0 d r, r is not going to change. So, d y d G will be simply 1 over 1 minus c into 1 minus t [FL].

Now, what is the L m function doing. It will have an L m shift by increasing m. So, that it can accommodate that y. So, this equation essentially gives you the amount of d m require because of d y d G change. So, you can get from here d m is equal to P naught h d y, whatever d y you had and d l r d r is 0, d r i already said 0. So, you get the value m. So, this equation becomes a recursive model. First equation solves for y second equation solves for m require to maintain r at a fixed level. This is called interest rate policy another kind of monetary policy. Where money supply changes is very passive it is not money supply is initially increases. There is something happens in economy say government plans fiscal expenditures.

Now, they want to keep rate of interest fixed. So, they would keep the rate of interest at that level by accommodating require amount by making a required amount of change in money supply. So, you solve for d m. So, this equation becomes two unknowns y and m, r is no longer an unknown. It is a recursive model same I S L m model becomes a recursive model. Two unknowns are there y and m and r is fixed held constant called interest rate policy. You can have of course, other fiscal multiplier d y d t, you can discuss that also. When it is effective and it is not effective similarly, conditions.

There does not shift parallel, the I S shift with the slope change. You can find out when it becomes effective it is same results you will get because its why the I S curve it will come and when you have that result. Now, let me tell you one thing which you should bother me which textbooks do not usually talk about in that details, but there is one more issue involve here. I am talking about government expenditure increase the. So, government is in real terms spending more building, more bridges, highways, dams, what power plants may be, what government where does government spend money

So, various things government is doing, but I never said how is the government financing the expenditure. I never brought into the picture the government budget issues. Now, textbooks do not talk about. They say fiscal policy expansion if is fiscal policy g increases I S shift should to the right there is crowding out effect, it is not so effective etcetera they never talk about how g increase.

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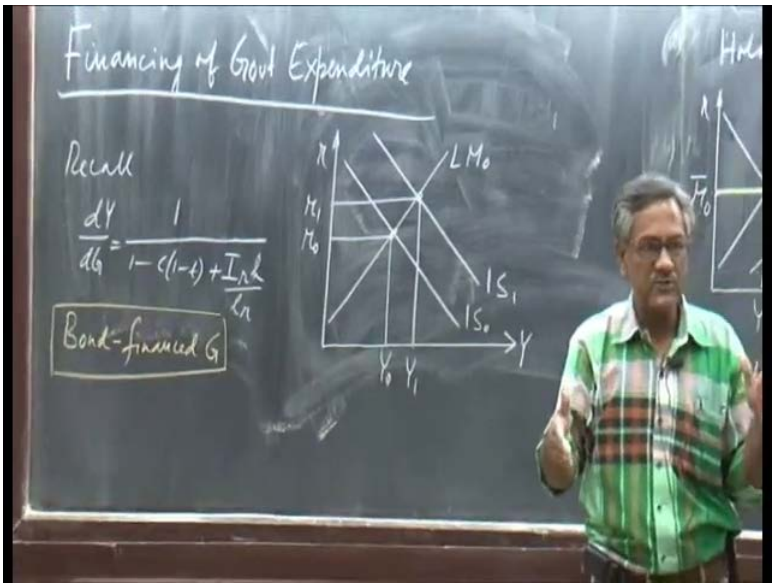

Now, so a topic that I have now a sub topic financing of government expenditure, how do you do. I talked about government expenditure, but how do I finance them how does government finance them financing of government expenditure. The expenditure multiplier that you have seen from me, and what have been using whole entire morning today.

Now it is nearly noon eleven fifteen, is that you have recall the multiplier what had d y d G was equal to 1 over 1 minus c into 1 minus t plus I r h over held r. This government expenditure multiplier, you can ask me sir this is the government expenditure multiplier, but you did never told you that you never told us that how was g financed. Well if you look at the multiplier diagrammatically, what is happening is the following. There is an I S curve and there is an L m curve.

So, when I shift what we notice is that, output increases rate of interest also increases. So, what kind of expenditure policy did government have, where in economy the rate of interest has gone up and output is increased. When I thought about it realize that the expenditure policy government would have had here, is a bond financing expenditure policy, why is it so. You may ask me sir, why is you think this kind of g increase I S shifts rate of interest increases bond financed government expenditure. This case is bond financed g, this is bond financed g. Why is it bond financed g because when government bond financed what he does, I hope you would enjoy this.

Government wants to spend more does not have a cash. Even they have cash they want to collect cash to spend it. What get about not having cash may be they have cash, but they want to spend it from new cash what will they do. They will sell bonds to say infrastructure expenditure, they selling infrastructure bonds. So, you and me who have surplus cash even companies can go and buy infrastructure bonds. You must have seen advertisement of infrastructure bonds even at rev three, where you have a parking area there should be huge signboard on some infrastructure bond. Rev three been infrastructure bond [FL] advertisement [FL].

So, what is infrastructure bond he selling bonds. So, it is a five year, ten year period bond. Bond premises to pay you an interest rate per annum and you can buy as much as you want, the amount you want to investment. It tells you how you can buy them you can, but a ten thousand rupee bond, you can buy fifty thousand rupee bond, you can buy 1 lakh rupee bond ten lakh rupee bond whatever, you buy the bond.

Now, when bond is financed and money comes what happens from the private sector money gets like a drain channelize into the government's hand. So, private sector money supply reduces, banks do not have that money, it goes to the government right now. So, people take their money out from the savings account whatever account where they had and give it to government. So, banks a short of cash. So, when you have excess demand for money what happens.

Rate of interest increases, you see rate of interest rise. There is no money play here. So, money supply must have been same except it got transport from the private economy to the government and then the government would spend it back and pump in back into the economy. So, over the period money supply does not change, but ultimately rate of interest is goes up because the money would go to the different directions.

So, to me it looks like a bond financed government expenditure that will create a situation like this. Then when government spend more income is produced more demand for goods will come, when the demand for goods, demand for money would increase further h y transaction demand for money. Same amount of money is in economy well demand for money is increasing and the rate of interest increase remains permanent. Demand for income, income goes up demand for goods, goods goes up. I spend more

government has not pump in money L m has not shifts same money is floating in the economy [FL].

So, transaction demand for money increases and I told you the simple formula to remember, when demand increases more than supply prices will go up. When supply increases more than demand, prices will come down excess supply [FL] price fall excess demand [FL] price rises. I told you the general simple first day economics framework you should keep in mind. So, this must be bond financed government expenditure, but there can be other routes government can increase taxes.

We did the balance budget multiplier. So, how about government has going for a balance budgeting increasing g, what will happen. Tax financed I can go for tax financing government can raise taxes, our prime ministry our finance ministry can increase taxes because he is more spending government has to do. Next is the case of tax financed government expenditure.

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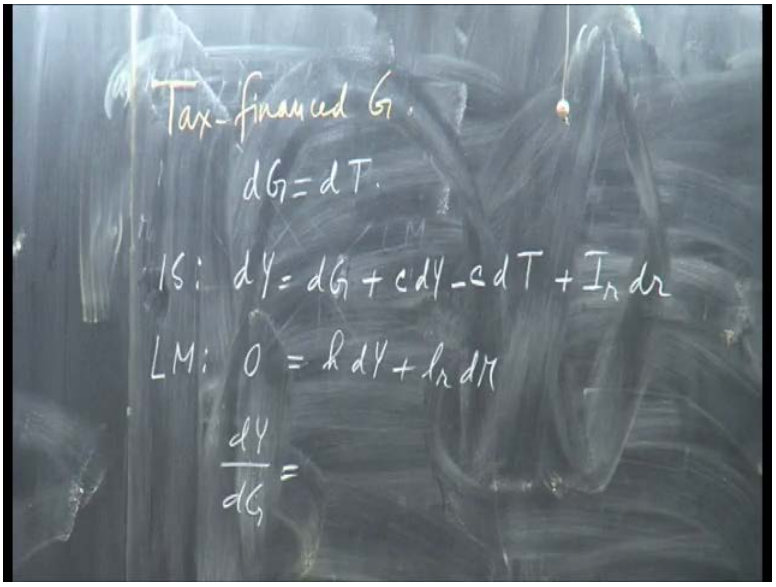

Tax financed G what will happen to tax financed G. You remember when I taught that Keynesian, in the context of Keynesian cross model. That when taxes are used to financed government expenditure what called that balance budget, where we say d G is equal to d T, total tax revenue and d T involves small rate of change because capital T is a function of y through small t capital T is small t y [FL] small t must be changing [FL]. So, this is called balance budget multiplier.

So. Now, go back to the I S curve you will see the multiplier would not be this it is a different multiplier. So, the multiplier will be from I S function what you have d y is equal to d a plus which is d G from d a, c what did you has c into 1 minus t and t y is equal to capital T. So, you have c d y minus c, c into t y is d T. From the I S equation c into 1 minus c [FL] open the brackets c y minus c t y, t y is capital T. So, I am differentiating that capital T, d T all right plus I r d r. Then L m equation what you have is 0 d m over P 0, no money supply change taxes are increased is equal to h d y plus l r d r.

Now, please substitute for d r and find out what d y d G is, please do the algebra let me have some water to drink find out what that algebra is please do that d y d G [FL] d r [FL] eliminate d r. This simple arithmetic you can do how much is d y d G tell me whoever has an answer

Student: ((Refer Time: 01:07:37))

Very good 1 minus c divided 1 minus c plus I r h over l r, very good yes absolutely correct that is the answer yes. This is what you are saying is 1 minus c over 1 minus c plus I r h over l r very good. Now, is this value 1 anymore balance budget multiplier was 1, in Keynesian cross model, what is this value less than 1. So, all that effectiveness of fiscal policy that I discussed was based on bond financed fiscal policy. Then went to the various assumptions.

Now, if you go into various modes of financing government expenditure. Again the issue of effectiveness of fiscal policy is coming up. If it is tax financed fiscal policy multiplier is not even equal to 1 or greater than 1. Without any specific assumption, any restrictive assumption the fiscal policy multiplier to begin with in case of balance budget is increasing government expenditure is less than 1. That means if hundred crores government spends today in real terms, the net output increase will be less than hundred crores.

Imagine the situation of the government, no multiplier at work. Multiplier without even any restriction is less than 1 however, if look at the balance budget multiplier which is not even want. So, by spending hundred cores do not they get extra income of hundred cores. Pathetic situation tragedy, but if you can render I r a h over l r 0, under some assumption you have at least 1. That old balance budget multiplier what saw in the context of Keynesian cross model.

So, the question is the best that you can do if you have a balance budget it increases the multiplier. It is to have an economy, where I r is 0 no crowding out or l r going to minus infinity which is liquidity trap. Situation when L m is horizontal, then you can have the best balance budget multiplier and that two hardly any multiplying going on because the multiplier value is 1. 1 minus c over 1 minus c cancels out 1, 1 is hardly any multiplier. The word multiplier means you have a multiplier which is more than 1 at least, may not be very large multiplier, but more than 1 at least multiplying by 1 means hardly any multiply.

Unity is no multiplier do you understand what I am saying. So, the effectiveness in effectiveness mode by fiscal policy is again coming up. This balance budget multiplier, with an I S L m model in an I S L m model without any assumption becomes less than 1, such a sad news. I do not know whether the textbooks talk about it. And it becomes 1 only if you have this restricted thing investment is not sensitive toward, which is hardly case. Just now somebody told me so difficult to open a company because it increases cost etcetera can keep on increasing without any notice, Somebody was saying that in the break.

So, it is difficult. So, investment is sensitive interest rate, the loan you take from the bank is important to you as an investor as a company, what interest you pay. If it increases cost. So, high if it falls grate news costs are coming down as an investor from the investor point of view from a company's point of view. So, balance budget multiplier is very bad news. The best it can happen, under certain restriction it can become one [FL]. So, this course two types financing of government expenditure.

The one I discussed the whole morning yesterday is actually under the umbrella of bond financing bond government expenditure, which I never said, but just like textbooks, but now I am coming out of textbook mode and telling you what the stories are. The final multiplier that about I talk about, financing the government expenditure you suppose government, which it can do can go to the central bank and sell what they known as treasury bills.

Treasury bills are certificates approved and guaranteed by the government, say the central government, which they can give to the central bank and tells central bank give me cash. This treasury bills in India are have maturities like bonds, but they are not sold

to you and me, but today I have heard that the treasury bills have gone public also like bonds.

So, banks buy treasury bills people also buy treasury bills. Initially distribute only RBI in India things have changed. So, it is something like bond financing, but treasury bills going to the central bank is a something which is government of India avoiding these days a lot because this part of fiscal discipline that they want to maintain. These they can go sell treasury bills and tell the central bank any country can do that, but you and me cannot do, tells them even they do not have cash in their accounts their accounts are there with RBI often central bank [FL] print cash and give it to me.

See it is called printing of money and this is the famous language they used, if I am correct, the language they used is deficit financing. So, in case of deficit financing government expenditure government can go to the central bank and tells central bank here are the treasury bills some amounts are written. I would return the money to you depending upon the maturity of the treasury bills. It can be 91 treasury bill, it can be a 365 treasury bill, it can be 182 day treasury bill. So, which is roughly three month six month and a year maturity in India what have. We used also used to have a fourteen day treasury bill which is no longer day very short term.

So we are selling treasury bills like bonds, but what does RBI do the what does it do, why he has central bank even you paid money because they have a power to print. You and me cannot go to a commercial bank and say here are my treasury bills give me cash [FL] Either they may think you are mad or they think you are a crook or something trying to cheat the bank I do not know what how they would react, but as a government they have so much power. They can go to the central bank and tell central bank give me cash here are treasury bills treasury bills. [FL] pieces of paper except [FL] signature or stamp [FL] government of India [FL] if you go to the bank, amazing power.

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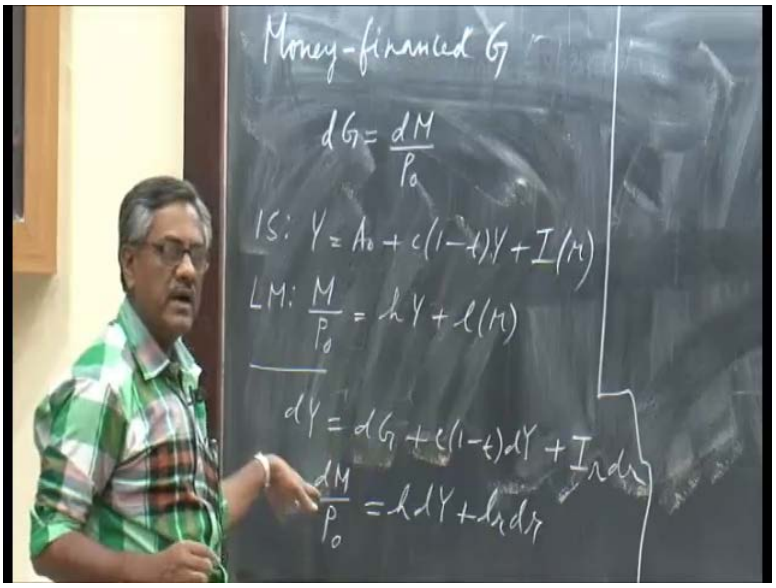

So, this is called deficit financing. So, they can money financed government expenditure. Now, what will happen if it is deficit financed this is the last case I want to talk about. So, money financed G. In case of money financed g what I am saying is d G will be equal to d M over P naught, real expenditure g is real expenditure. So, that should equal to real money supply d G will be d M over P naught.

So now, go back to the I S equation Y is equal to A naught plus c into 1 minus t y plus I r L m equation, M I am going to write naught M naught P naught is equal to h y plus into r. Now, when you totally differentiate this system you have d y is equal to d G plus c into 1 minus t d y plus I r d r and you have d M over P naught. Now, as I have variable I do not put it equal to 0 d M over P naught. I do not put them equal to 0 is equal to h d y plus l r d r [FL]. Now, we have to eliminate d r. So, d r is equal to d m over P I divided by l r.

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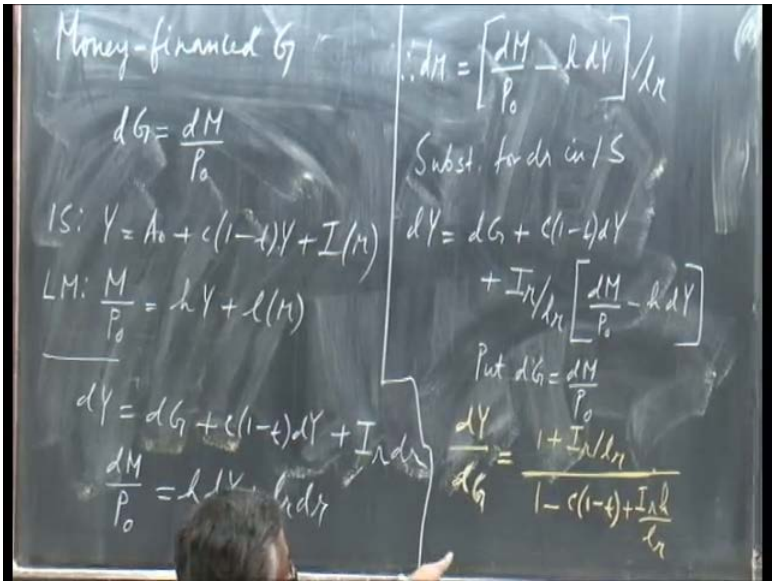

So, what you have from the second equation we have d r therefore, d r is equal to d M over P naught minus h d y divided by l r. Am I correct are you following me is it [FL] substitute this in the other equation, substitute for d r in I S what you get. You get d y is equal to d G plus c into 1 minus t d y plus. Now, I r divided by l r into d M over P naught minus h d y.

Now, put the condition d M over P naught is equal to d G, put the condition here equal to d m over P naught and then solve for d y d G how much it will be, please do the arithmetic for me. Now, I have done entire thing. Now, just get the arithmetic done complete it I am going to move a little bit if you then see it d y d G what it will be.

Student: 1 plus I r over l r.

1 plus I r over l r. So, this famous multiplier d y over d G is equal to 1 plus I r over l r divided by 1 minus c into 1 minus t, then I r h over l r. Now, you have another multiplier my goodness if it money financed or deficit financed it is called often in the literature. Then you have another multiplier coming in. Now, what is the value of this multiplier is this bigger or smaller than other two multipliers, definitely bigger than the balance budget multiplier is a bigger than the bond financed multiplier. Is it larger or greater than

the bond financed multiplier. Compare that you tell me, is it lager than the financed multiplier please compares that and let me know.

Student: Yes.

Yes very good she said yes absolutely correct because denominator is same as the bond financed multiplier, numerator your 1 plus a positive term. The bond financed multiplier was 1 divided by that same denominator, but here in the numerator you have 1 plus something else. So, there is a positive term here. So, the multiplier value is bigger. So, again going back to the issue of effectiveness of fiscal policy, if it is a money financed then the multiplier government expenditure multiplier seems to be the largest, the highest number it has. Question is this is the last part I will tell you, this is algebra they into it is to why is it so.

Why the multiplier has certainly becomes stronger, if government does this business of going to the central bank get additional cash and then used that cash to financed the expenditure the simple reason is. You have now two policies at work. You not only have G increase, you have M increase also because you are getting new cash from the central bank which you wants spend, when you spend as a government. It gets pumping the economy as extra money.

So, the crowding out becoming less because as demand for increases rate of interest will try to go up, but with supply of money also increasing rate of interest will not go up to so much. So, the crowding out effective is countered with rate of interest not increasing so much. So, you have monetary policy also at work while the basic policy is the fundamental the original policy has been a fiscal policy because government increase his financed through money supply increase also.

So, you have two multiplier at work in some sense. In common sense terms that the upward pressure on rate of interest which reach to crowding out is not happening so much because as demand for money increases rate of interest trying to go up. The supply of money also increases with new money coming into the economy. So, the rate of interest increase does not go up so much as supply increases. So, it gets down fall in fact you can have a situation where rate of interest may be fall, so much money is pump in because a supply of money, net increase in supply of money more than the net increase in demand for money. You can have a situation like that.

So, what is happening here in diagrammatical term. In diagrammatical terms I will tell you what is happening, but in terms of intuition what is happening is, there are two multipliers at work fiscal policy [FL] G increase, but also d M increases. So, monetary policy is also at work together very strong policy, but there are negative issues associated with it, I will let you know later.

This dual impact on demand people say these are all demand side equations we are doing, supply [FL]. Dual impact on demand sudden dual impact on demand can create upward pressure in per fund price in economy, so often this kind of policies inflationary, but I did not discuss that yet I will come to that in the next topic. For the time being remember, that best multiplier is the strongest without any assumption.

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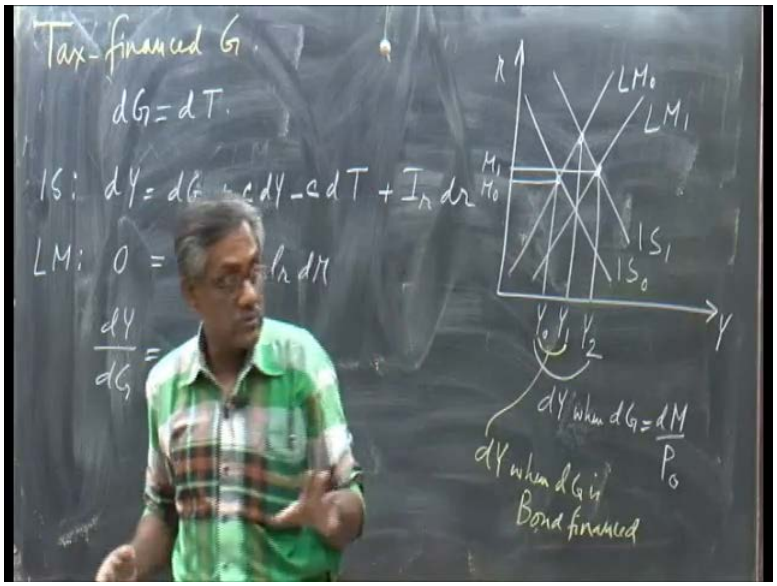

It is just if government wants to financed his expenditure through the deficit financing method. So, diagrammatically what is happening in the last thing. You just note one diagram and then we are off. Y r I S l m, I s naught L m naught. Now, I S shifts, but L m also shifts because money supply increases. So, output increase is not from y naught to y 1 which was the case on bond financing, but output increases through an increase in L m also, it y 2. So, this is d y over d G is equal to d M over P naught.

This increase is d y when d G is equal to d M over P naught. Earlier case y naught to y 1 this yellow 1, this is the case when you have d y, when d G is bond financed. When d G is bond financed y naught to y 1, you have been following all of you. That is why the

multiply is bigger because just note I S shifts, but L m also shifts there are two shifts. So, output increases more.

You can see the rate of interest may not go up rate of interest was here. Now, the rate of interest is here, so very little rate of interest, very little crowding out. You can see if L m shifts more rate of interest may not even go up may go down. So, there is no crowding out no crowding at all, if L m shifts more to finance the G. Then you can see the rate of interest may not increase at all, r 1 value if L m goes here for instants r 1 value is below or not diagrammatically. So, there is no crowding out effect.

It is quite possible this no crowding out what is, in the money financed government expenditure case you see that. This bond financed tax financed [FL] this is not tax financed. I am sorry I should have, this is money financed going on. Money financed government expenditure going on this is all money financed. So, today I tell you and I started telling you two week back three days back. We are going through the most important section. A macro models that we usually used for discussion purposes, for learning, for understanding what is going on in economy by I S L m model. We have gone through that nearly it is over.