**International Economics**

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**Lecture No. #13**

Good afternoon, today we are going to talk about expectations exchange rate, and capital account. At the very outset we will discuss the open interest parity condition, once we have discussed that then we will relook at the foreign exchange markets. So, that is the plan for today, and then once we relook at the foreign exchange markets, we will also see the impact of expectations, and interest rates on the exchange rates.

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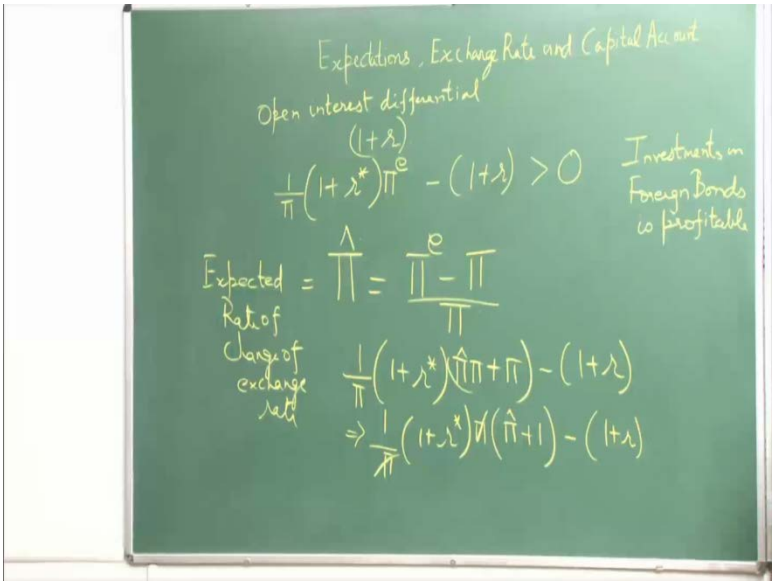


So, let me come back to the open interest differential. (No audio from 00:57 to 01:05) So, if you have one rupee today at the end of the year, the return that you would get would be one plus r, but if there is a possibility to take this one rupee outside, and invest it in foreign country. And then earn the the foreign interest rates, and then bring back the money from the foreign country. One needs to work out the open interest differential. So, if this one rupee, if it is converted into says US dollars, it will be 1 by pi the rate of interest that it will get will be r star. So, one rupee converted into US dollar. So, it is

worth 1 by pi, the interest rate that it gets is r star. So, this is the amount of money in US dollars at the end of the year.

Now, if we want to bring this money back to India, we need to convert it back into Indian rupee. So, we do that by using an exchange rate this is called the expected exchange rate after an year. So, then if we compare this with the return that we get in India and if this is greater than 0 then your investments in foreign bonds is profitable. If it is less than 0 then it is worthwhile for the foreigners to invest it in the domestic bonds.

So, then you define pi hat, which is the expected rate of change of exchange rate equal to pi e minus pi by pi, pi you know is the unit of domestic units for a unit of the foreign currency this is pi, pi expected is the expected exchange rate after an years time. So, then from here 1 by pi 1 plus r star pi hat pi plus pi.

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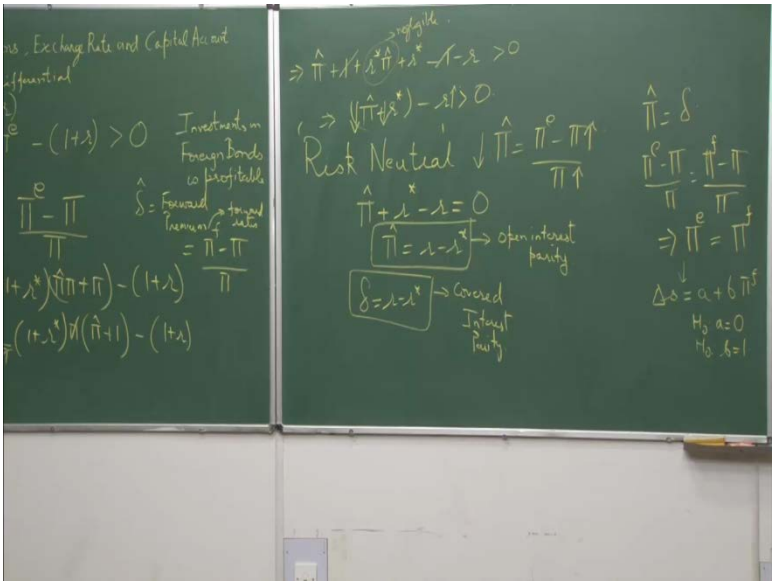


So, the open interest differential works out to be pi hat plus r star minus r, if it is greater than 0, then your investments are profitable. What it means is that in the foreign country you may have lower interest rates as compared to your own country. But, still it may be profitable to invest in the foreign country, if the expectations are that the foreign currency will appreciate. So, even though it is giving lower interest rates r star is lower than r.

So, we are going beyond the Mundell Fleming, where we said capital is a function of the differential interest rates. So, here you can have a situation where the foreign interest rates are lower than the domestic interest rates, but it is still profitable to invest in the foreign country because, you expect the foreign currency to appreciate or domestic currency to depreciate.

So, then the real returns are pi hat plus r star minus r which is greater than zero. So, the investments become profitable now, further you assume that each investor or speculator is either risk neutral or he is risk averse. If he is risk neutral then he considers domestic and foreign bonds as perfectly substitutable. So, look at this differential in the wake of all investors and speculators like us being risk neutral in other words, it means that you consider domestic and foreign bonds as perfectly substitutable.

Now, if you assume that domestic and foreign bonds are perfectly substitutable. As soon as you find there are, that there are gains in investing in foreign bonds, you would if you are a risk neutral person you will completely switch out of domestic bonds into foreign bonds, completely switch. If you are risk averse you will not completely switch from domestic bonds to foreign bonds. But, because you are risk neutral which means that domestic and foreign bonds are perfectly substitutable you completely switch out of domestic bonds. And you put your money entirely into the foreign bonds.

So, please see what happens to this open interest differential it does not remain as differential because, the foreign interest rates go down because, you start demanding foreign bonds. The price of bonds, foreign bonds goes up the interest rates go down the foreign interest rates go down, the domestic interest rates go up because, the money flows out of India. And then pi hat which is pi e minus pi by pi, the foreign currency appreciates or your domestic currency depreciates because, you start demanding foreign bonds you start demanding you need foreign exchange.

When you need foreign exchange the demand for foreign exchange goes up, when the demand for foreign exchange goes up. And this being a flexible exchange rate regime pi goes up. So, this pi hat goes down eventually you see pi hat plus r star minus r to be equal to 0 or pi hat to be equal to r minus r star. This is the famous open interest parity, this is an equilibrium condition, there are no arbitrage opportunities available.

So, you have the expected rate of change of exchange rate to be equal to the differential interest rates. There is something like a covered interest differential or a covered interest parity, we will discuss that there is not much difference except that this pi e, that we have here you replace by hat with delta, which is the forward premium, which is pi f minus pi by pi this is the forward rates. If you work on similar lines you would get something like delta is equal to r minus r star this is the covered interest parity.

So, in case you in the economy you have both open interest and covered interest parity you would have pi hat to be equal to delta, which is pi e minus pi by pi is equal to pi forward minus pi by pi. This would mean that the best predictor for the expected exchange rate is the forward rates remember the forward rates those are rates, which are determined today for a transaction which is done say tomorrow or in future. So, the best predictor of the expected exchange rate is the forward rate.

Sir, what is the difference between this even pi is the expected rate to be a (( )).Yeah, but expected exchange rate you do not know, you do not have data for it. It is like, what will be the exchange rate India U S dollar exchange rate after an year pi expected, there are no proxies. So, the it says that if these two hold then the best predictor of pi I is the forward rates so.

But does not forward rate also kind of expected rate tomorrow. Yeah, but you have data for it because, you have markets for it. And we will see once we discuss the foreign exchange markets, we will go to the forward markets. Again you have a demand for it you have a supply for it and then it is determined the forward rates are determined. If the forward rate is greater than the spot rate, you say that the foreign currency is in premium is sold in premium.

If the forward rates are less than the spot rates you say that the foreign currency is sold in discount. So, we will come to the forward markets, but then if you have to do some empirical work on this, then what people do researchers do is they run a regression pi e they would say it is the rate of change of the spot rates.

So, they proxy this for the change in the spot rates, a plus b pi forward and then they test the hypothesis a is equal to 0 and b is equal to 1, joint hypothesis of that a is equal to 0 and b is equal to 1. So, this has change in the spot rates as a poor proxy, but this has a proxy for pi e these are available and is 0 this is joint hypothesis. If you know

econometrics, if you have a join hypothesis then you can apply the f test, there is an f test which says restricted residual sum of squares minus unrestricted residual sum of squares divided by number of restrictions. Divided by unrestricted residual, sum of squares n minus k, where k is the number of parameters.

So, you can have a restricted model, restrictions been a is equal to 0 b is equal to 1 you will have a restricted model. So, the residual sum of squares from the restricted model restricted residual sum of squares minus u r s s divided by the number of restrictions. Divided by u r s s, divide by n minus k, where k is the number of parameters you can check whether this holds of course, after estimating the equation you can do the hypothesis testing.

So, this you can simply I you can take this up in your research study the paper that I may asking you to do, you can get data on the spot rates, you can work out the changes in the spot rates you can get data on the forward rates. Just run a simple regression, if you do not want to burden yourself much with this type of research work, just get this data run a regression and check for these two hypothesis.

Now, as I said, we will relook at the foreign exchange markets through something which are called the excess demand, and the excess supply curves.

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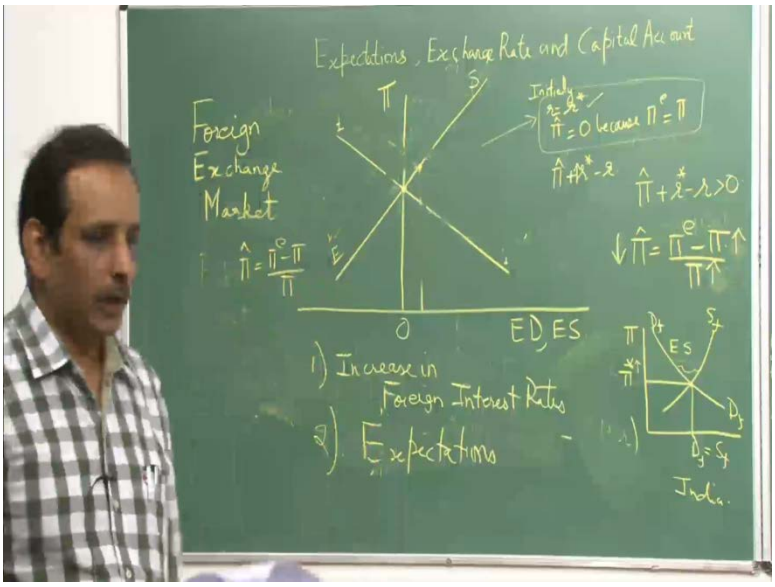

We are now relooking at the foreign exchange market. Earlier when we looked at the foreign exchange market, we had the demand for foreign exchange which was the usual a downwards sloping demand curve and we had the upward sloping. Supply curve of foreign exchange, which came from the demand of our own currency in the foreign markets.

So, when the foreign currency appreciated or our domestic currency depreciated and you had assumed that foreign demand curve is elastic. In that case you got an upward sloping supply curve. Please recall that this supply of foreign exchange is coming from while this is India, this is the foreign country. So, you have one rupee in terms of foreign currency and you have a downward sloping demand curve there in the foreign country.

So, think of a scenario where the foreign currency appreciates or in other words your currency depreciates, when your currency depreciates the demand for the Indian rupee goes up. Remember depreciation the price of your own good in terms of foreign currency it comes down.

So, the demand for your goods would go up and because you assumed this to be an elastic curve the revenues would go up because, of the decline in the prices this is elasticity, I use the concept of elasticity's. So, if the value goes up this is equivalent to saying that with an increase in pi you tend to supply more of foreign currency. Because, only when you when the foreigners demand more of your currency, then only they will supply more of foreign currency.

So, this upward sloping curve is coming from this, downward sloping demand curve for our own Indian rupee in the foreign country. So, then the equilibrium exchange rate was wherever the demand would intersect supply, that was the market exchange rates and this was the equilibrium demand and supply of foreign exchange.

Now, what is excess supply is that if pi goes up if pi goes beyond pi star then you can see what happens, you have a disequilibrium situation, where the supply of foreign exchange is greater than the demand for foreign exchange you call this excess supply. And the reason that this is happening is because, if pi goes up there is appreciation of the currency, appreciation of the foreign currency or depreciation of the local currency. There is an excess supply of foreign exchange because, something happens in the economy, that something is that Marshall Lerner condition gets satisfied.

Remember Marshall Lerner condition a depreciation or a devaluation will improve the current account balance. If the sum of the home and foreign import demand elasticities is greater than 1.

So, we are assuming this upward sloping excess supply curve, with a upward sloping E S curve assuming that the Marshall Lerner condition holds. And if pi increases beyond pi star you the excess supply increases because, as the foreign currency appreciates or your currency depreciates you see an improvement in the current account balance. So, this E S curve is drawn under that.

So, it is like the supply curve higher the price, higher the supply we only think that you are assuming is that the Marshall Lerner condition holds. So, depreciation leads to an improvement in the current account balance or you have a balance of payments surplus. Then you have a downward sloping E D curve now, this while excess supply was the supply by the other market participants, this E D curve is the demand put by the investors and speculators. And it is downward sloping because, these investors speculators they are interested in profitable investments.

So, think of a situation where the pi is this where E D is equal to E S is equal to 0 this full equilibrium. If pi goes below this point, see what happens initially you had r is equal to r star pi hat to be equal to 0 because, pi is equal to pi. This was the point which would show that the differential was 0 because, r was equal to r star pi hat was 0 because, pi e was equal to pi. Now, let us assume that pi goes down. So, when pi goes down this pi hat increases. So, you see a positive open interest differential.

So, when you see a positive interest differential the investors speculators, expecting depreciation of the currency, would like to depreciation of your own currency or appreciation of the foreign currency, would like to now demand more of foreign currency. So, as you come down you see a positive excess demand because, pi hat goes up, open interest differential is greater than 0. So, you would like to invest it in foreign bonds because, you expect your currency to depreciate or foreign currency to appreciate you are a speculator, you are a investor. So, you would like to invest in the foreign bonds.

So, that is the reason that you have a downward sloping E D curve, but there is another reason. Another reason is that it is downwards sloping. Because, you are not risk neutral

in this case, you are a risk averse person. When there is an open interest differential in favor of you, you do not completely switch out of your domestic bonds into foreign bonds. What would have happened, if you had completely switched out of your from domestic to foreign bonds? What would have been the shape of the E D curve?

Straight line, it would have been a horizontal line. But, because you are risk averse, you do not consider domestic and foreign bonds as perfectly substitutable, you do not completely switch into the foreign bonds. So, this E D curve is downward sloping because, you are risk averse. And when the open interest differential is greater than 0, then as a speculator investor you would like to invest in the foreign bonds. So, you are rational in that sense, you want to have more profits. What would have happened if pi would have gone up? If pi would have gone up from this situation, where r was equal to r star pi hat was 0 and then pi instead of going down goes up.

So, pi hat would have been gone down, then it would have been the foreign investors who would have like to invest in our bonds. So, the excess demand would have come to be negative in that case. Because, it is the foreigners who are putting up the money, supply is greater than our demand. So, then you see negative E D if pi goes beyond this point all right. So, you have the E D curve, you have the E C curve, this is the initial situation. It is an equilibrium condition, open interest differential.

And so, E S, E D is 0, E S is 0 it is equilibrium. Now, let us see two things happening the impact of an increase in. (No audio from 27:15 to 27:27) There is an increase in foreign interest rates. If there is an increase in foreign interest rates, this was the situation in equilibrium now this goes up, r star goes up.

So, if r star goes up, there is open interest differential the E D curve will shift because, it is like a shift factor. (No audio from 28:11 to 28:23) There is an excess demand for the foreign currency and that is matched up by the increase in excess supply because, if the pi goes up. And if the Marshall Lerner condition holds then that excess demand for foreign currency is met by the other market participants they supply the necessary foreign exchange.

So, you come to an equilibrium from this you reach to another equilibrium, which is point b, where the increase in excess demand is matched by an increase (( )) at point b, you can see that the open interest differential holds because, pi hat is pi e minus pi by pi.

(No audio from 29:23 to 29:30) If you had reached a point like c here open interest differential would have been 0. But, at point b there is an open interest differential, which means that there is an excess demand for foreign currency, which is met by the other market participants who supply the necessary foreign exchange.

So, this is quite simple you have increase in interest rates foreign interest rates t E D curve shifts. Second is a more interesting case, where you bring in expectations. So, I am going to redraw this curve.

(No audio from 30:19 to 31:23)

So, if you look at the hand out I think it is better that we look at the figure 16.3, here in the hand out. This is the affects of change in expectations and I am talking of figure 16.3. Now, see what happens you are expecting that in future the imports will go up.

So, you are expecting this pi e to go up may be because, you expect that there are their is global recession all over our currency may depreciate in future, we are not going to get enough orders from the foreign country. So, you expect your currency may depreciate in future that is like saying that your E S curve, E S curve shifts up to e star s star. So, you anticipate you expect that the E S curve will shift up, that is in other words you expect this pi e to go up.

So, here I am bringing expectations, your expectations are that countries expectations are that your currency may depreciate in future. In this diagram it means an upwards you anticipate that the E S curve will shift up, you fully anticipate that your E S curve will shift up. So, that pi e goes up now, from this scenario as soon as the pi goes up you have pi hat going up when pi hat go up there is something which happens to the E D curve. Remember the speculators, investors as soon as they see a positive open interest differential they would like to put their money into foreign bonds.

So, their E D curve, the E D curve shifts to the right. Now, see what is happening if you think you expected underlined, you expected your currency to depreciate. But, then in reality your currency in fact, depreciated you only expected that may be after an years time your currency may will depreciate, what happens is the cell full filling type of prophecies.

If you think that there will be depreciation in the markets there you saw depreciation happening. So, that expectations that if you have that expectations that I will do good in my exam. And then you actually do it at that particular moment, you know that is something what one can, one what happens here.

So, you are expecting that currency will depreciate after a year's time, but then it did depreciate immediately, immediately because, the E D curve shifted to the right. This E S curve which comes with the dotted line is you had anticipated. It is not the real shift of the E S curve, you had thought that the your currency would depreciate in future. But, then what it does is because, there is an open interest differential pi hat goes up the E D curve shifts to the right.

And your currency moves your exchange rate moves from p to p dash, your currency depreciate or their currency appreciates. But then it does not reach a point like p star reason again because, you all investors speculators are risk averse people, they will not completely switch from domestic to foreign bonds. But at least speculators know that their currency has reached p s p dash. They are speculators investors they know that they can buy the currency at p dash and sell it may be at a future rate at p star.

Now, expectations can bring stability in the foreign exchange market this is a strong statement I am making. Expectations generally you say a speculators they have expectations it is bad for the foreign exchange market. But, let me bring in this point that here if in reality the E S curve indeed shifts to e star s star after an years time. Then it brings stability in the foreign exchange markets reason because, earlier your exchange rate was p dash it was expected to go further to p star.

That means, foreign currency would appreciate your currency would depreciate you had expected investors to buy currency at p dash and sell it at p star. And if indeed E S curve after an years time shifts to e star s star it brings stability in the in the foreign exchange markets. If in actual practice that E S curve would have remained E S in that case only it would bring instability in the system.

So, you have both, if E S curve indeed shifts to e star s star, then you it bring stability in the system. And if E S curve would have remained at E S, then it brings instability in the system. Then you may ask that if you are a speculator investor you would be in the business only for making profits.

So, in other words you would only expect that there would be only stability in the system due to this change in expectations. To answer that one needs to think that these decisions have to be made quickly it is not that you can just sit on these decisions. So, you may go wrong, if you are expecting that you are a rational person you would be in the business only for profit motives. And it would always bring stability that argument will not hold because, all these decisions are made you have to make it quickly. So, you may go wrong in that context.

So, this particular example shows that if you had fully anticipated the changes in the E S curve and if the actual E S curve did change to e star s star, it brings stability in the foreign exchange markets. Now, this indirectly leads to these the financial crisis that we saw in Europe. In these two countries say Sweden and United Kingdom, there the market participants felt that after the Maastricht treaty. When every country was fixed they fixed their currency to euro they expected that their currency will depreciate in future. And it did depreciate immediately, because if you start feeling that there is something wrong then really something wrong happened.

So, this is like the second model of financial crisis, it is like cell full filling prophecies if you expect that there will be depreciation. Then indeed there will be a depreciation taking place of your currency.

But through different mechanisms, through different mechanism it the trigger would be something different. For West Germans they were uneasy because, these east Germans were coming in the United Kingdom. Because, now it is currency was pegged to euro and remember the dilemma that we talked of. It had this uneasy feeling that we would lose our monetary independence and that too for a currency that we had owned the pound the big pound.

So, they felt that probably may be in future, they would see a depreciation of the currency. And that builds up here, in this open interest deferential the speculators start thinking, it means that in future our currency would depreciate, foreign currency would appreciate let us start putting the money in the foreign bonds today only. And that leads to the depreciation of the currency.

I will end up here, and we will move to some other aspects of the same spot, spot foreign exchange markets, and then we will move to the forward markets in the next lecture. Thank you so much.