International Finance
Prof. A. K. Misra
Department of Management
Indian Institute of Technology, Kharagpur

Lecture - 36
Money and Forex Market Interaction: Indian Experience

[FL] In session number 36 we will be discussing about money and forex market interaction. As I mentioned earlier money and forex markets are highly related to each other. Money market is high liquid, that takes into account the call money market, certificate deposit market, the commercial paper, market government, treasury bill market and forex market also as we discussed earlier session high liquid market the both the market. Since they are highly liquid they interact each other and transfer the what is called Spillovers. Spillovers means in the area of information, spillover from one market to another market, the volatility which created in one market that is in money market get transferred to the forex market and vice versa.

So, the interaction process you should understand because this interaction process give rise to volatility in the spot market and also volatility in the money market. It may happen that the volatility transfer from one market to another market may be, can be checked, if you understand the nature of the volatility, the nature of, nature. Why the volatility is occurring because of the shortage of money in call market or may be highly volatile forex market with the, for which the call money market or the near term money market are highly volatile. So, to understand the interactive process of money and forex market, let us do a exercise. How this two markets are related to each other. In this area we will be discussing about the covered interest parity, uncovered interest parity and also we will discuss how the forex, how the forex market the FI investment and the stock market related to each other.

Whether the volatility in the stock market because of fluctuation of FII investment may lead to any instability money market. We will also discuss about the same thing. Let us start, what actually the composition of money market. As I mentioned the earlier session if you see the money market. Money market it is a market, having maturity over night to 15 days, may be less than one year also less than one year in some other segments of money market.

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However, in case of call money market it is less than 14 days market. So, the money market having a maturity overnight, that is call money market overnight to a less than one year market that is treasury bill, commercial papers, certificate deposits these are the less than one year market. So, in the money market we have call money market this call money market is a purely inter-bank market because it was earlier non bank financial intermediary, that is the insurance sector, investment banking sector they were the part of the money call money market, which is not now at present. Call money market purely inter-bank market only commercial bank participate in the call money market.

The volatility the call money market indicates the parameter of the parameter of financial sector. So, because why because call money markets is the high liquid market, reflects the market liquidity in in market liquidity in a economy. So, the volatility the high interest rate call money market indicates instability in the near money market or instability in the money supply process. So, call money market is a highly liquid market, it is the highly active market in money market. Similarly, we have certificate deposit market.

Certificate deposit market, generally 7 days to, 7 days maturity to one year maturity. Generally financial sector, financial institution they raise money through certificate deposits and financial other financial institution, may be trust, may be municipality corporation they participate as a as a investor in certificate deposit market. Similarly,

institution also big financial institution, big government companies and private sector company they also participate in in certificate deposit market. They invest in certificate deposit market. Similarly, we have commercial paper market. Commercial paper as you know that it is a working capital requirement of financial your working capital requirement of manufacturing side company non financial company.

So, they non financial company to meet their working capital requirement, they raise money through commercial paper, trust, financial institution they participate as a investor in stock investor in commercial paper. Commercial paper though it is a highly rated instrument, without rating commercial paper cannot be raised cannot be sold in Indian financial system. Say another segments of money market, it is the treasury bill. Treasury bill generally attracts a working capital requirement of government institution, government bodies, central government, private your central government and also municipality corporation. May be treasury bill also issued by financial institution that is your government body, government corporation.

So, treasury bill that generally banks in financial institution they invest in treasury bill and it is the government bodies, government institution they raise treasury bill. In the treasury bill market also has a secondary market for treasury bill and it is a liquid market also. So, if you see the money market. The money market instruments are commercial call money market, overnight to 14 days market. May be a certificate deposit market, it is a 7 days to one year market. Commercial paper market generally one year market and treasury bill 14 days to 365, 364 days treasury bills are available, it is also 14 days market to one year market.

However in call money market, we have a secondary market. Certificate deposit market, there is no secondary market. Commercial paper market also rarely having secondary market, only treasury bill have a secondary market. If you invest the government body financial institution invest in treasury bill or this bills are traded in financial in our sector bill, as a secondary market in RBI windows of negotiated dealing system. So, only in treasury bill market in India we have a secondary market activity. If you see the money market, the active segments of Indian exchange market.

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If you see the fund exchange market though it is highly active. It is highly liquid market, but there are some segments of forex market, they are not liquid. The highly liquid in foreign exchange market segments are foreign exchange spot market and some extent foreign exchange forward market. Now, a day's foreign currency options market also little bit liquid. However, however foreign currency spot market is highly liquid market. Then question arise here, which are the factor affecting foreign exchange market in India? So, if you see some as I mentioned earlier that money market and forex market interact with each other.

However, the money market rate the FII inflow, FII outflow, the current account deficit of deficit and surplus of government of India, the export imports. Then industrial production GDP growth, inflation, equity market return these are the these are the factors which actually influence the foreign exchange market. However, among these the FII inflow outflow, the equity market return, and the current account deficit and surplus generally influence the forex markets significantly. So, we have to understand the, nature of the alignment of this factor along with the foreign exchange market fluctuation.

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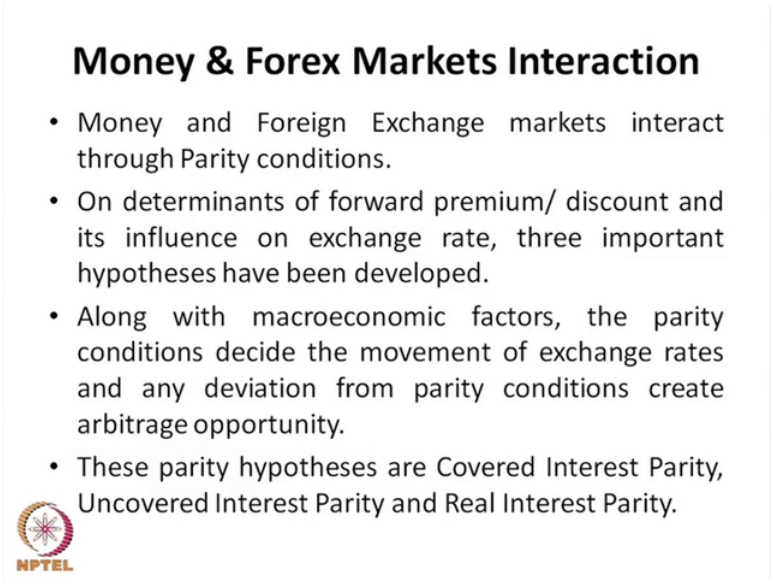

So, when you go to when you discuss about the money market and forex market interaction process, we should understand that the both markets are buyers and sellers are same, almost same. If you see, since in the buyers and seller in money market also having a exposure in forex market and vice versa. So, the since the buyers and seller the participant in both the marketer are same, they take position in each other market to take the to take the arbitrage opportunity. So, why the arbitrage opportunity occurs, it is because of the parity condition. So, money and foreign exchange market are interactive through the parity condition.

So, one determinant on, determinant of forward premium and discount it is influenced on exchange rate. Three important hypothesis has been developed because the forward premium, the forward discount of a particular exchange rate between INR or USA along with USD Why the USD, USD is a premium currency against INR? Why the INR is a discount currency against USD, is different. On that basis we have a three different kind of hypothesis. Here, as we know we have discussed earlier, we have interest rate parity hypothesis. The hypothesis mention, first hypothesis here the covered interest hypothesis because the interest rate differential, it is interest rate differential between India and US it is is a, is related to the forward rate forward rate or the forward premium.

The forward premium is a function of interest rate differential. In other word the forward the interest rate differential the amount, should reflect in the forward premium itself. The

forward premium should bridge the gap of interest rate differential, if the currency though, if the if the currency is a premium currency, forward premium should reduce. If the currency is a discount currency the forward premium should increase. So, forward, if the forward premium reflects the interest rate differential then there cannot be any arbitrage opportunity. The question arise here, the interest rate differential come from the money market segments of India and money market segments of US.

Since you are discussing about India and US the currency exchange rate. So, if there is a money market differential interest rate between India and US then forward premium should bridge the gap. By bridging the gap, you understand that that cannot be arbitrage opportunity between Indian INR and INR and USD or there cannot be arbitrage arbitrage opportunity, if you travel through money market to forex market. So, along with the macroeconomic factor, the parity conditions decides the movement of exchange rate. If the interest rate differential error is there, then between Indian rupee interest rate differential between Indian interest rate and money market of US interest rate then Indian rupee will depreciate against depreciate against USD.

Similarly, if the interest rate differential is negative, that is Indian interest rate is less than US interest rate, Indian currency will appreciate. So, along with the macroeconomic factor like the inflation IIP the current account deficit, the growth parameter, parameter the interest rate differential or the parity condition also decide the movement of exchange rate. Any deviation from the parity create arbitrage opportunity and it will be reflected in the premium or discount in exchange rate. So, this parity hypothesis are covered interest parity.

As I discussed with you uncovered interest parity and real interest parity. Covered interest parity mention us that interest rate differential should equal to the forward premium. Uncovered interest parity mention us interest rate differential should reflect in the change in the spot rate and real interest difference parity mention us that the inflation adjusted covered interest parity. So, the really interest rate differential should reflect in forward exchange forward premium or discount.

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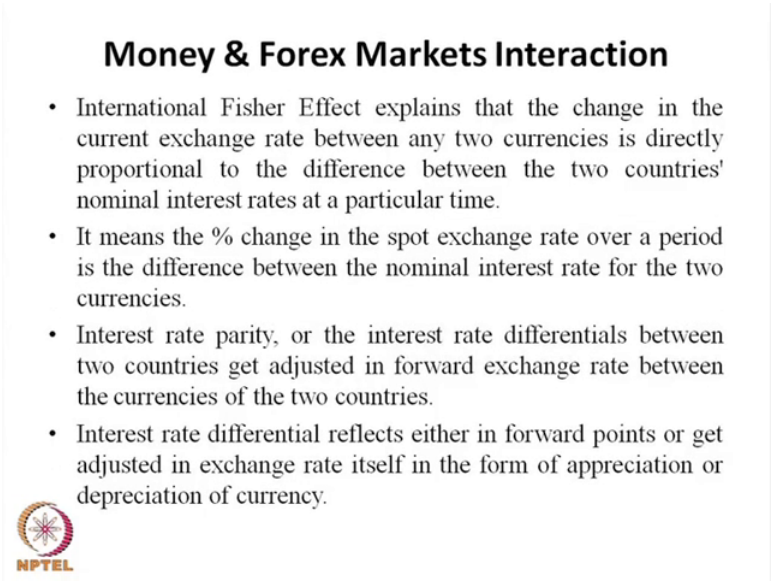

When you discuss about this money market and forex markets interaction, we should also discuss about the international Fisher's effect. As I mentioned earlier, the international Fisher's effect explain that change in the current exchange rate between any two currency is directly proportional to the difference between these two countries nominal interest rate. At a particular time period the Fisher effect explain that change in the exchange rate between two currency is a function of nominal interest rate differential between two currency, two country. Similarly, it means that percentage change in the spot exchange rate, over a period is the difference between nominal interest rate for the two currency.

So, whenever there is a real interest rate difference is there between two currency or the nominal interest rate difference between the two currency, it will be reflect in the exchange rate change. Interest rate parity or the interest rate differential between two countries get adjusted in forward rate between the currency of the two countries. If the interest rate differential reflect in forward discount or the forward premium and it will be equal, then there will be no arbitrage between money market and forex market.

Similarly, interest rate differential reflect either in forward points or get adjusted in exchange rate itself in the form of appreciation or depreciation of currency. If the interest rate differential reflect in forward premium, there cannot be a arbitrage between two countries. Similarly, if interest rate differential reflect in either change in the spot rate,

then there will be no difference in, no arbitrage between forward between money market and forex market. So, we have to discuss these two different hypothesis, that is the covered interest parity, uncovered interest parity in into, in detail so, as to understand the money market and forex market interaction process.

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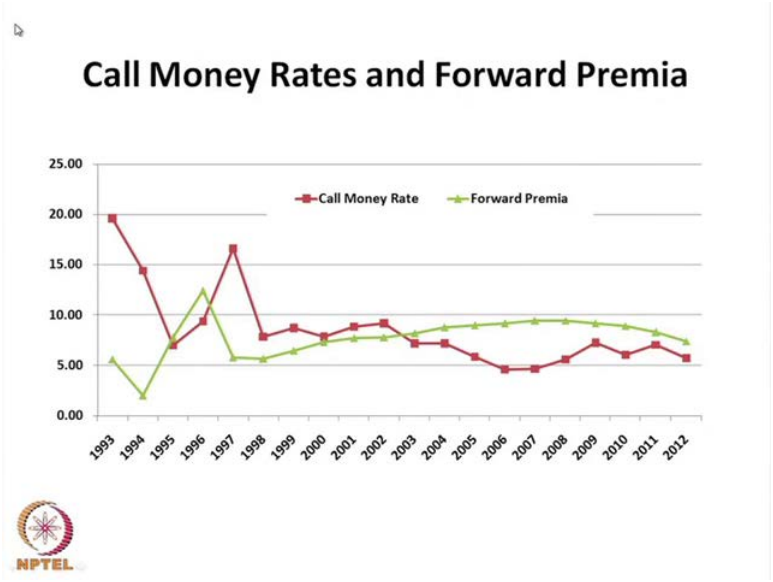

So, when I mention that call money market and forward call money market and forward premium should move to in a in a tandem to each other because whenever there is a call money increase the forward interest rate should also forward premium or discount, forward premium should also increase so, that that cannot be arbitrage between money market and forex market. If you see in Indian context, I have drawn a I have drawn a graph over the period 93 to 2012. Then what is the movement of movement of your call money rate? Call money rate is a red line, if you see and the movement of call money rate is the red line over the period.

The call money rate over the period declining and remaining at around 5 percent then the green line indicate the forward premium. So, the forward premium all up to 2000 up to 99, 2000 it was not moving in tandem after that it is significantly with the movement in tandem with the call money rate. However, since there is some kind of differential exist between forward premium un call money, call money rate. This differential indicates some kind of arbitrage available between forex market and money market.

However, however as compared to 93 94 to 2000 the arbitrage opportunity between call money market and and foreign exchange market decline and is significantly decline over the period and remain somewhere between 1 or 2 percent differential. This may differential may be, may exist. However there may not be the transaction cost will be so much the forward the differential may may not provide any kind of arbitrage opportunity in real term.

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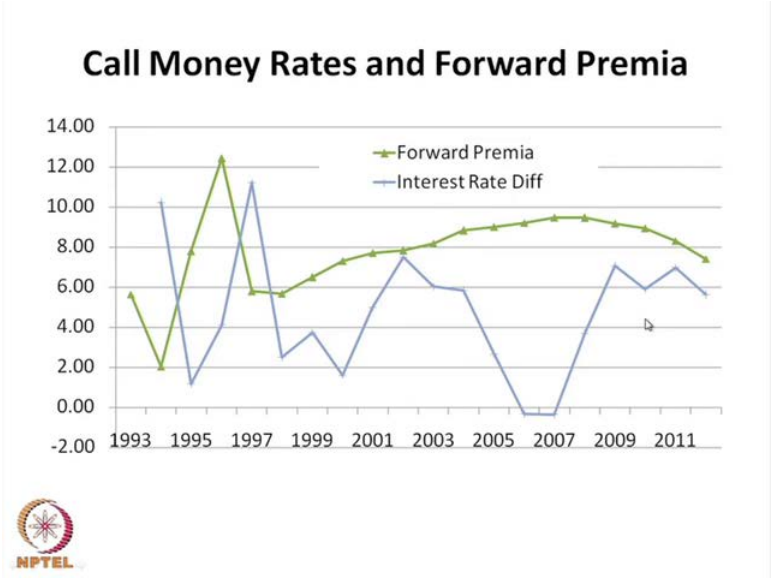

Similarly, if you see the call money rate and forward premium, forward premia and interest rate differential call here. Interest rate differential I mention here between call money rate and fed fund rate, that is fed fund is the US money market interest rate, fed fund rate. Then what is the difference between the fed fund rate and call money? Call money minus the fed fund rate I have put in one term call interest rate differential between India and US and here forward rate between INR and US dollar. The green line indicate the forward rate between INR and INR and Indian rupee Indian rupee and US dollar.

Then the blue line indicate, the interest rate differential, the money market interest rate differential between India and US and these two rate should be should almost remain same or almost have minute level difference should be there. So, as so, as to indicate no arbitrage between India, Indian market and the foreign exchange Indian market and the US market. However, if you see the arbitrage in 93 95 up to 2000, it was quite high after

that it reduce some extent however it is quite high in 2005, 6,7 and 9 and after 9 the arbitrage decline little, arbitrage decline. That is the differential difference between forward rate interest rate differential is bridged.

However, between 2003 to 2007, 2009 I can mention it was quite high differential and differential is exist because of the financial sector instability, where forward premium was quite high to quite high compared to the interest rate differential. So, this is because of uncertainty in the forex, foreign exchange market, which is the one another variable which may lead to may lead to high forward premium.

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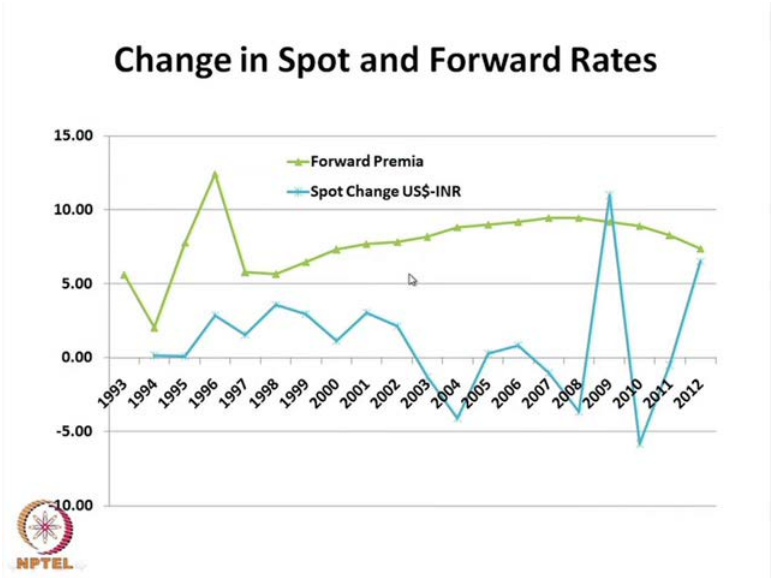

If you see if you see the change in the spot rate and forward rate, I have taken here 2000 1993 to 2012. The forward premium and the spot INR and USD exchange rates change. So, if you see the green line indicate the forward premium and the some that blue line indicate what is called the change in the spot rate between USD and INR. The INR USD spot rate change indicate the volatility, the volatility spot rate spot rate between India and USD and this volatility should be observed by the forward premium. If you see, the volatility though volatility is declining in, volatility is remain some extent constant in the 95 to 2002 and forward premium also remain highly volatile during that premium.

After to 98 remain constant and after 97 to 2002 it increase significantly and also also the volatility also increase significantly. The volatility of foreign exchange INR and USD

increase forward premium also increase and this because of the instability in in the foreign exchange market in India.

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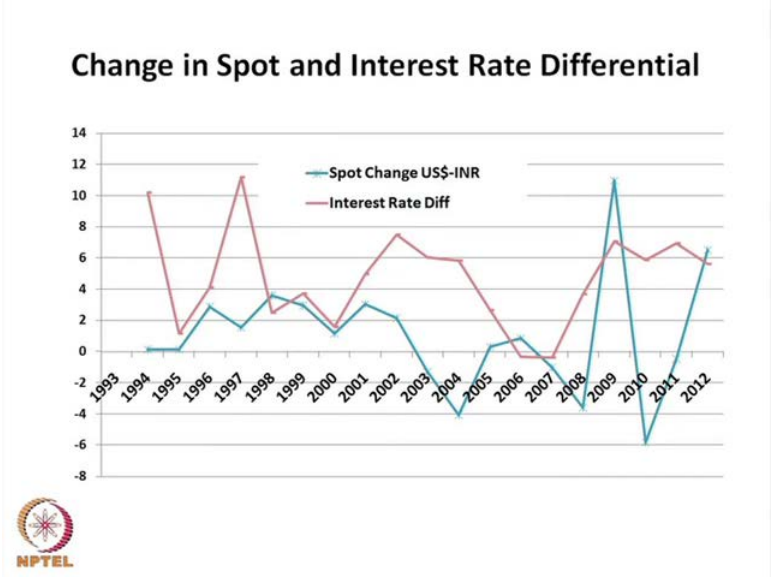

If you see other change in the spot interest rate differential. So, as I mentioned earlier the change in spot rate should be equal to the interest rate differential, if there is no arbitrage opportunity between money market and forex market. If differential exist, then there will be there will be arbitrage between two market. If I have mention here spot exchange rate change, spot exchange rate change is the blue line and how it is volatile over the year? If you see some extent less volatile from 94 to 2002, after that the 2003 onwards the volatility is quite increase significantly between the financial sector crisis time 2007 and 8,9,10 it is highly volatile when between Indian rupee and USD.

However, the interest rate differential that is a call money rate, minus the fed fund rate that is the interest rate. Differential between the two money markets of India and US. The money market differential, that is the interest rate differential also fluctuating along with the fluctuation of the spot and foreign exchange spot market, spot rate between Indian rupee and foreign, Indian rupee and USD. Though they are though they are not almost same, but the volatility is same between the two market. They indicate that interest rate the spot exchange rate volatility has transferred to the interest rate differential all money market. The whenever there is a volatility in the spot market, this reflect in the in the interest rate and further it reflect in the forward premium. So, there is

a transfer of volatility of exchange rate volatility exchange rate to money market rate money market side. So, these two markets are highly volatile as the graph indicates.

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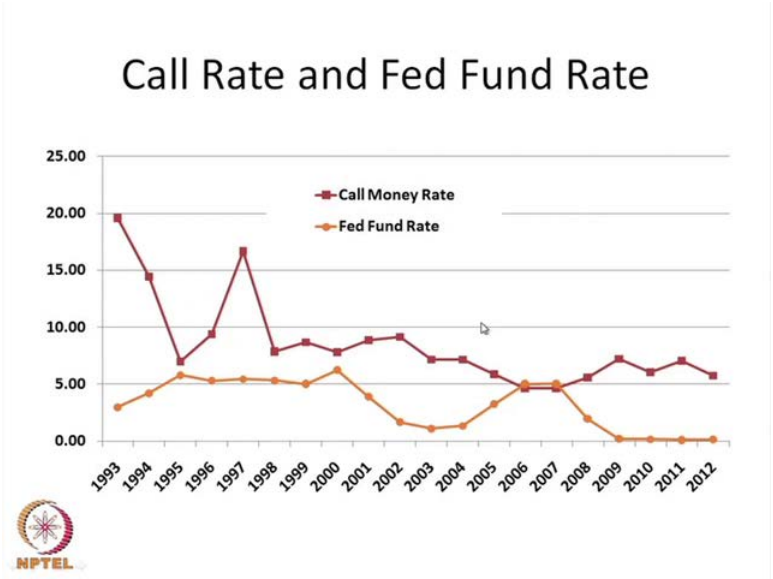

Similarly, if you see the call rate and fed fund rate. Though if the call rate and fed fund rate move in the same direction, same direction the volatility the arbitrage opportunity may be less over the year. If you see, in 93 to to 93 to 24 the rate differential is quite high, after that after that there is a they are moving in tandem to each other. Call money rate and fed fund rate, this red line indicate call money rate and the light pink line indicate that fed fund rate. These are also moving in tandem. However, there is some year the differential is quite high and this may this may reflect in spot either in exchange rate volatility between INR and USD or in the spot rate or in the forward rate.

So, that also part of the volatility transfer between the call rate and forward fed fund rate to the money other segments of money market or to the forex market. However, the Indian rupee, Indian call money rate and the fed fund rate of US moving in tandem to each other. So, when you understand that the fed fund rate call rate interest rate differential spot INR and spot rate all are linked with to each other and the volatility among them the movement among them reflect the relationship or interaction among them then question let us find a correlation matrix among them.

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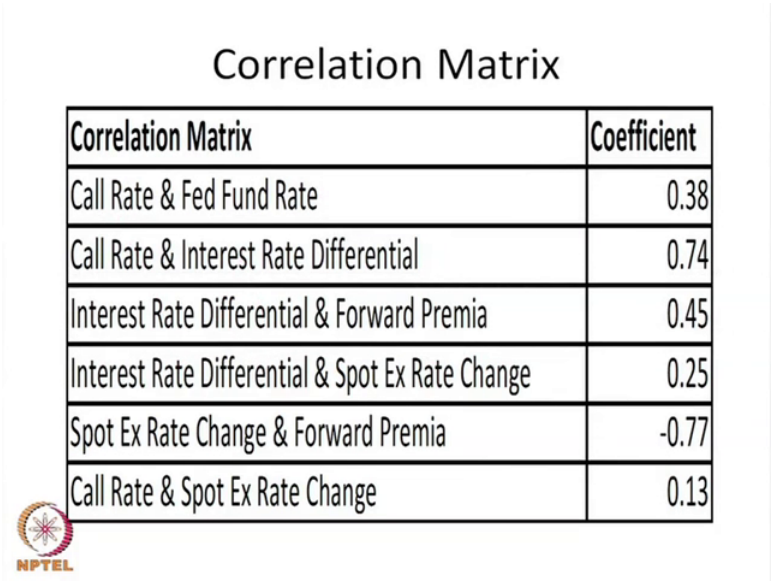

So, correlation matrix I put here. I have taken the data from 93 to 2012 monthly data and try to find the correlation of various segments are segments or parameters of money market along with the along with the exchange rate market so, as to understand the interaction of these two market and how these two market variables are correlate to each other. In this case, I have taken the call rate and fed point rate correlation. I have found the call rate, the Indian call money market rate and fed fund rate of US these are the two money market interest rate of India and US. They are some extent significantly, significant correlation of 0.38, though it is low some extent both are correlated to each other.

Similarly, I have taken the call rate and interest rate differential. Here interest rate differential mean interest rate differential mean call rate minus the fed fund rate. Whether the two rates are related to each other so, I have found some extent 0.74 interest correlation, which is highly significant. The interest rate differential pull the call rate. So, call rate and positive correlation indicate whenever the interest rate differential is high the call rate also high. Similarly, if you see the graph, the call rate and interest rate differential. I have drawn a graph the call rate and interest rate differential.

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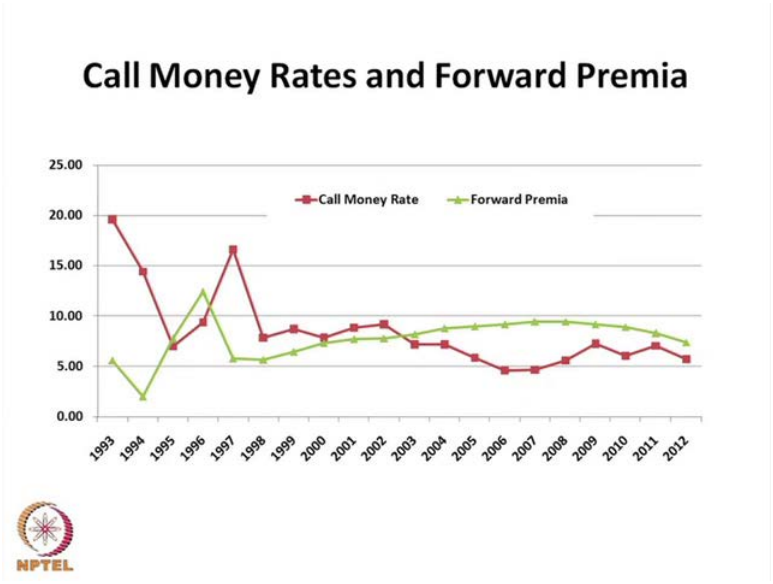

So, if you see interest rate differential indicate the forward premium and then call rate. Whenever the call rate is high they are moving in tandem in positive correlations are available among them. So, similarly I found the correlation among these two also moving quite high 0.74. Similarly, third correlation I have taken here, interest rate differential and forward premium. So, whenever interest rate differential is high, the forward premium should also high because interest rate differential is here call money rate minus the fed fund rate and forward premium should bridge the interest rate differential so, as to not having so, as to not to have any kind of arbitrage between money market and forex market.

I found some extent what is call positive correlation of 0.45 between this call money interest rate differential and forward premium. When the contested differential is high, forward premium is also high, this indicate positive correlation 0.45. Similarly, I have taken interest rate differential in spot exchange rate. So, when interest rate differential and spot exchange rates are if you have found, if you want to find that correlation I found it 0.25 over the year last 15 years data. So, it indicate that indicate that the positive correlation indicate the, when the spot rate is high interest rate differential is high spot rate is also high.

But however, the correlation is not so high. Here 0.25 though it is significant not so much. Similarly, I have found the spot exchange rate change and forward premium, the

exchange rate volatility and forward premium. Why I mention that when exchange rate volatility high the forward premium should also be high, but I found a negative correlation among them. What is a spot exchange rate? Change spot exchange rate change, the change is positive or negative, the forward premium they have a negative relation. So, in case of India the spot exchange rate is, exchange rate change is positive and forward premium is negative. So, this may be a spurious correlation because theoretically it is not sound. Why it is not sound?

When the volatility in spot exchange rate increase the forward premium should also increase. However, we are not finding any positive correlation among them, this may be a spurious correlation among these two. Similarly, call rate and spot exchange rate. When call spot call rate is high, there will be more flow of foreign exchange to India and there will be spot exchange rupee spot will decline so, I have found a positive correlation among them. But it is not so significant. So, 0.13 is not so high among the correlation among these two. So, correlation matrix indicate some extents of relationship between the spot exchange rate, forward premium, interest rate differential and also the forward, also the change in the spot rate.

So, this the interest rate this correlation matrix some extent indicates that there is a there is relationships are significant, some extent also we have found the valid correlation among these variable. Let us after going through this let us go to what is the interest rate parity hypotheses in case of India and US.

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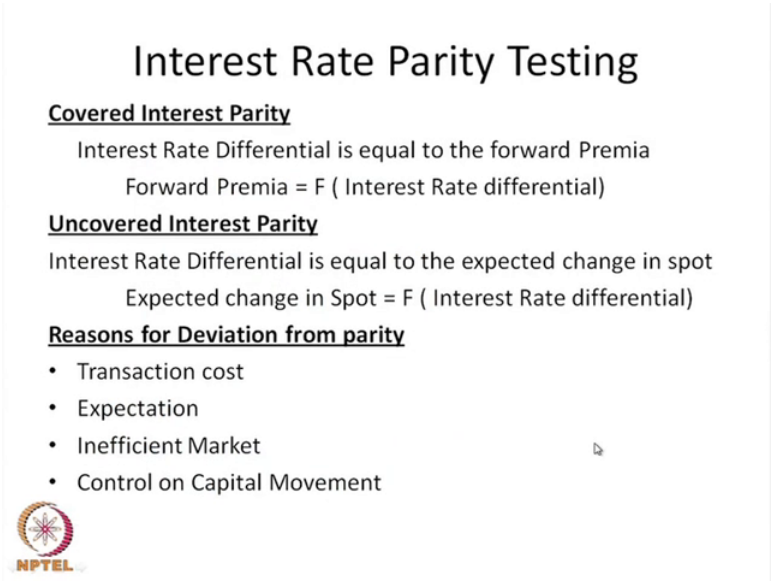

Whether the interest rate parity try to give some kind of information about the interaction of money market and foreign exchange market. So, here I have tested the covered interest parity, uncovered interest parity and try to find the deviation of spot deviation of this parity. Where the deviation occurs? The deviation may be because of high transaction cost, expectation of the participant, the inefficient market may be because of the control on money capital movement. If the both market are interactive to each other, both there is no such kind of barrier between these two money and forex market. Then or the movement of foreign currency, the arbitrage opportunity will least in this two market.

If the covered interest parity or the uncovered interest parity holds in India or the abide market are abide by these two interest rate parity, there cannot be arbitrage opportunity. If there is a arbitrage opportunity is there, then it may because of movement control in capital movement, the markets are inefficient, the transaction costs are very high or there are may be expectation on the part of the participant in the financial market. So, what actually covered interest parity reflect to us a reveals to us? The covered interest parity as I mentioned earlier the forward premium is a function of interest rate differential. The forward premium should decide its value decides its value as per the movement of interest rate differential between two money markets.

That is money market of India or and money market of US. In case of we are deciding about the forward premium between USD in India and US. Similarly, the uncovered

interest parity reveals us that expected change in spot rate after suppose, after one period what should be change in spot rate and how much spot rate should change it depends upon, how much interest rate differentials are there between money market of US and money market of India. If the covered interest parity, uncovered interest parity holds in India, then there are, may cannot be arbitrage opportunity between money market and forex market.

Let us go test this covered interest parity, uncovered interest parity in case of India and US and try to find whether the interest rate parity holds in case of India. If it there is, if the if they, if it is not there then question is what is the deviations? How much deviations are there between a interest rate parity?

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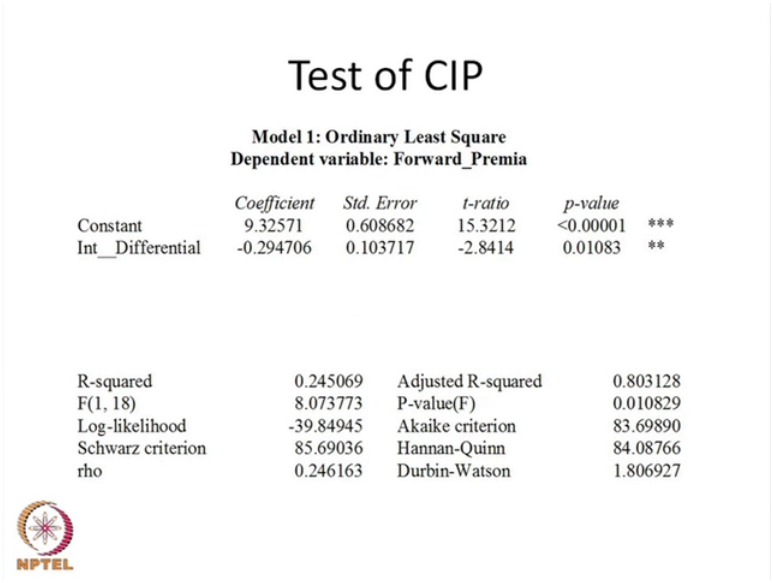

Let us, for this reason what I have done here I have taken into account the last 1993 to 2012 data monthly data of what is called that your forward premium as a dependant variable. Also I have taken the interest differential between call money market and fed fund rate and try to find as a correlation and what is called ordinary least square. I put the ordinary least square and try to find whether the forward premium which is a dependant variable is a function of interest rate differential. So, here the least square, ordinary least square reveals that, the here if you see the dependent variable is forward premium.

It is a different variable is forward premia and independent variable is a constant and interest rate differential. So, after running the regression, ordinary least squares I run it

and I found that the equation is the forward the beta coefficient or the slope coefficient of is interest rate differential is a minus 0.294706, which is significant which is significant statistically significant and constant is also statistically significant and these two, this equation is best fit Durbin Watson. If you see almost 1.80 quite high, in some extent it is supposed to be two, but it is around moving towards two that is, the if you see adjusted R square is 0.80 is quite high and the model testing is also valid model testing is also valid.

If you see the F value the model testing is also valid. So, this equation is valid equation the coefficient is significant the interest rate differential coefficient is significant. So, this indicate the equation is significant model is valid. However, however the forward premium is a negative function of interest rate differential. It means that forward premium is declining with the rising interest rate differential. The interest differential increases forward premium is declining. So, that is the negative slope indicate however, if whether the CIP hypotheses is valid.

CIP hypotheses is valid,, when the interest rate if you see the plotted the actuals and the actuals of the forward premium along with the estimated of the forward premium. I estimate from this equation, every year I can estimate the forward premium and every year forward premium data also I have that is actual data and plot this to equation the red line indicate the actual forward premium.

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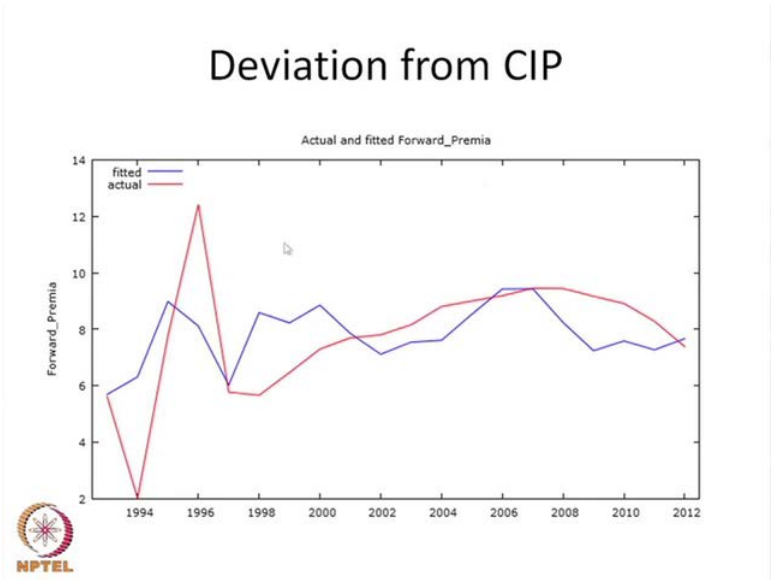

What I have data set I have with me and the blue line indicate as per the regression equation what is the predicted line the predicted line is here, fitted line is here. If you see 93 to 2000 98 99. Up to 2000, I can say 2002 the differential is quite high. That is means forward interest parity it does not hold in India, at the same time also the interest rate was interest rate is the differentially deviation from the parity also quite high. After 2002 the parity condition the deviation decline and after 2007, I can 2007 8 the parity deviation quite high because of the financial sector instability.

This indicate that though the deviation of from the parity is there, the deviation is declining over the year means Indian market and the US market moving in tandem to reduce the arbitrage opportunity between forex market and the money market. However, the interest rate differential or the covered interest parity does not hold in case of India and there is deviation is still there, the deviation though it is declining over the year. The question I mentioned earlier to you, the deviation is because of the capital control, we do not have complete capital account convertibility. We have a transaction cost is quite high.

If you move from money market to forex market and forex market to money market, you have to pay a transaction cost. The transaction cost also indicate, the deviation is there should be there between two market to remove the arbitrage opportunity. If the adjusted arbitrage opportunity you can calculate, that we adjusted through transaction cost a deviation may further reduce also.

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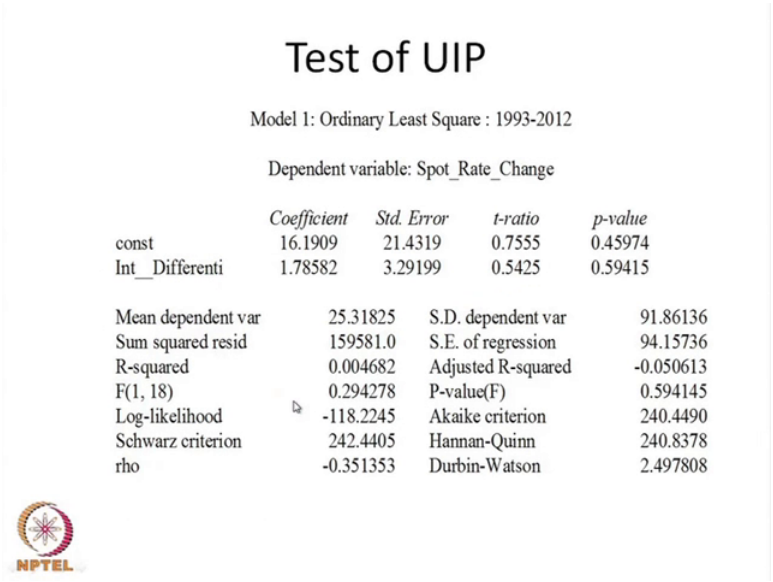

It is same thing I have tested uncovered interest parity. Here uncovered interest parity if you see, the in dependent variable is a spot change. Spot exchange rate change between Indian rupee and US dollar. It should be a function of interest rate, differential the interest rate. Differential how much spot should change how much interest rate differentials are available. If they two are same, there cannot be arbitrage opportunity between money market and spot money market and forex market. I run the regression from 93 to 2012 and I found the spot exchange rate change is a function of interest rate differential. So, the interest rate differential equation, if you see it is not a valid regression equation.

Though the model is though the model is not significant, the adjusted R square is quite low and the regression equation is not a valid regression equation. So, uncovered interest parity cannot be tested in case of India.

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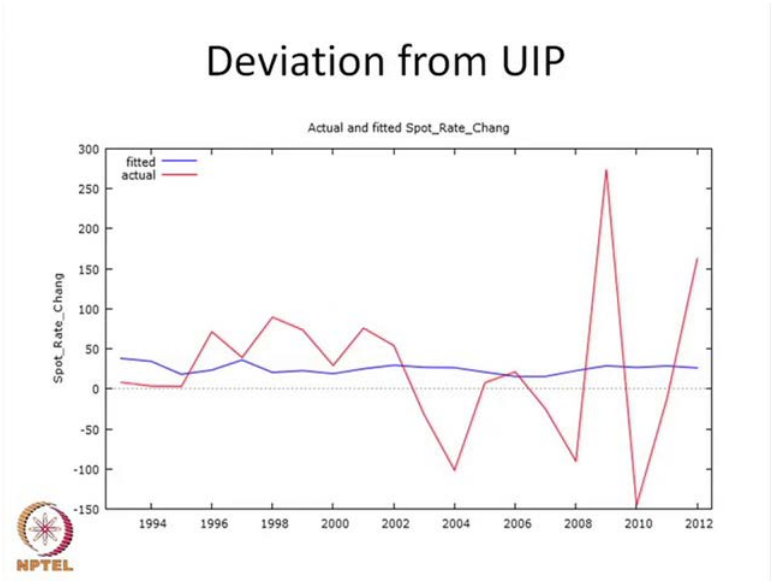

However, if you see the deviation between actual and fitted, they are also highly fluctuating. A green line the blue line is fitted line and the green, the red line is a actual line highly fluctuating. Then, the model is not describing anything about the interest rate differential and the spot exchange rate trend or the uncovered interest parity. So, this model is not a valid model. It may also you can also, go for some other kind of data adjustment to find a valid model for that. Then if you say that I what we have discussed so far. You have taken into account the money market and forex market interaction process.

However, we have found that some extent the both market are interacted to each other and some extent the deviation between the two market is declining and forex market and money market moving in tandem. There may be some extent integration also there, but still deviation is still there and deviation is because of the high transaction cost control in the capital movement and also the deviation over the year declining. Since, because of the financial sector reform measure. However, we have confined our self to interest rate, but foreign exchange market also influence because of the FII inflow. When the FIIs because after 93, 94 onwards we have implemented what is called financial sector reform measure.

We have reduced the, we have allowed the FII FII that is foreign institutional investor, to invest in our stock market invest. In our bond market and some extent the FII inflow to

foreign exchange the FII inflow to our equity market has lead to the some kind of some kind of adjustment in the spot exchange rate. Whether the spot exchange rate have any kind of relationship between the BSE sensitive index return, whether the index return influence, the index return influence the spot exchange rate whether there is a relationship between the BSE sensitive index and also with that of what is called the foreign exchange market because FII inflow lead to appreciation or depreciation of rupee which may also reflect in forward rate agreement, forward rate premium discount of forward rate.

So, the forward rate the FII inflow the in BSE index return and the spot exchange return rate may be some kind of relationship will be there. Let us find the relationship whether it is available in case of India the relation is valid in case of India. Whether you can modify the interest rate hypotheses that is in covered interest hypotheses, uncovered interest hypotheses through the BSE return index. Let us do a some kind of analysis in this area.

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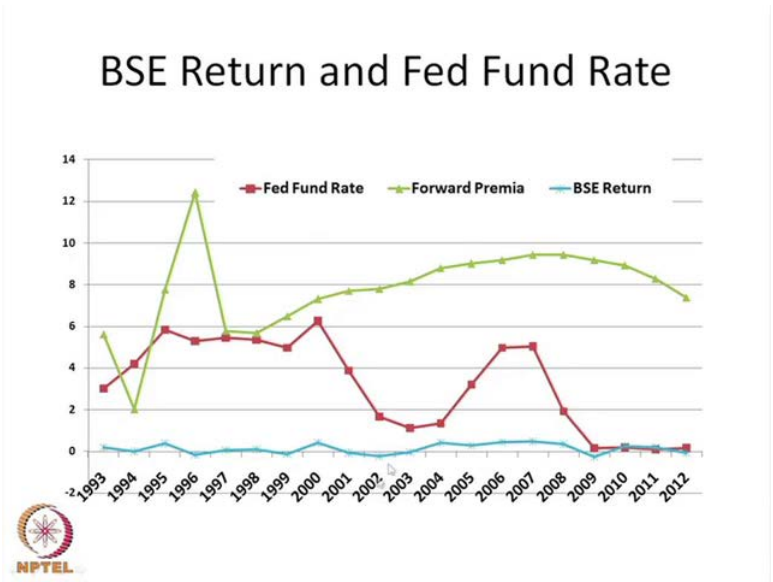

So, we I have drawn a graph here taking into account BSE return, BSE index return and fed fund rate. Whether there is a relation among this the BSE return BSE return is in in the blue line. The BSE return some extent 93 to 2012 some extent two three percent there. Over the year and whether the forward premium is green line, how it is fluctuating and the fed fund rate is the red line. So, fed fund rate and we looking at the graph we

cannot decide so, there is any kind any kind of relations among them. The graph long run tendency is there both are declining and tendency is that both are moving in long run with a declining trend. However, there is no such kind of pattern relationship pattern of change it does not reflect does not reflect here.

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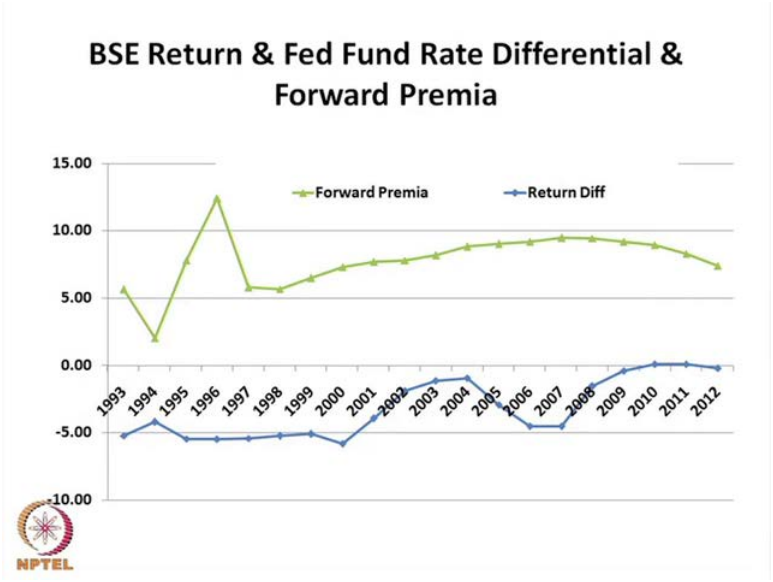

However, if you some extent go further, bifurcation whether the forward premium a return deferential. Here return differential I have taken so, the return differential and forward premium some extent relations is there. Because FIIs are coming to India they are investing in stock market and the movement of stock market, the return of the stock market influence the or pulls the FII to Indian market. Indian BSE or the NSE giving good return, FII will invest there and with the FII the foreign exchange will come to India. Rupee will depreciate or appreciate depends upon the flow. Appreciation or depreciation or volatility of rupee reflect in forward rate forward premium or discount.

So, whether this kind of relations are there, if you see the BSE return differential between the your fed fund rate and the BSE index it is fluctuating and some extent also forward premium also fluctuating. So, interest rate differential will highly fluctuate forward premium also moving outwards. So, whenever there is a decline in return forward premium is declining the when may be increased return forward premium is increasing. So, with the rising in return from the forex your BSE index, rising return in the equity market pulls forward pulls your FII to India. FII will come to India looking at

the high, in high return in the in the BSE index and when they bring more foreign exchange to India the rupee will appreciate or depreciate because of the movement of FII and the appreciation depreciation. Create some volatility in the spot market when the volatility is high forward rate will be forward premium or discount will be also high. So, that is a relationship among these two markets and these two markets are moving in tandem, the graph indicates two markets are moving in tandem.

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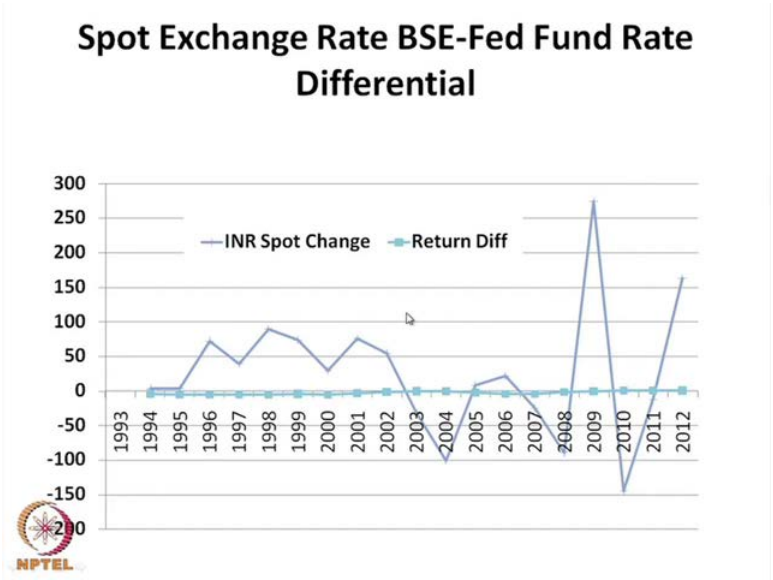

Similarly, I have drawn a INR spot change. A return differential when return differential that is equity market is giving more return, there will be more FII in in equity market and this FII when comes to India there will be fluctuation in INR and spot INR and rupee rate INR and USD rate and the INR rupee INR and USD fluctuation, may reflect in return differential. So, I have drawn a two graph between the INR and USD and return differential. I have found the return differential is highly remained stable over the year last 13 last 12 ,13 years, some extent 4 to 5 percent fifth percent. However, the return differential is fluctuating. This indicate that, the instability in the BSE market or the equity market leads to fluctuation of FII inflow. When the rupee when the fluctuations are there in the FII inflow it reflects in the spot exchange rate change and this change leads to the forward premium volatility.

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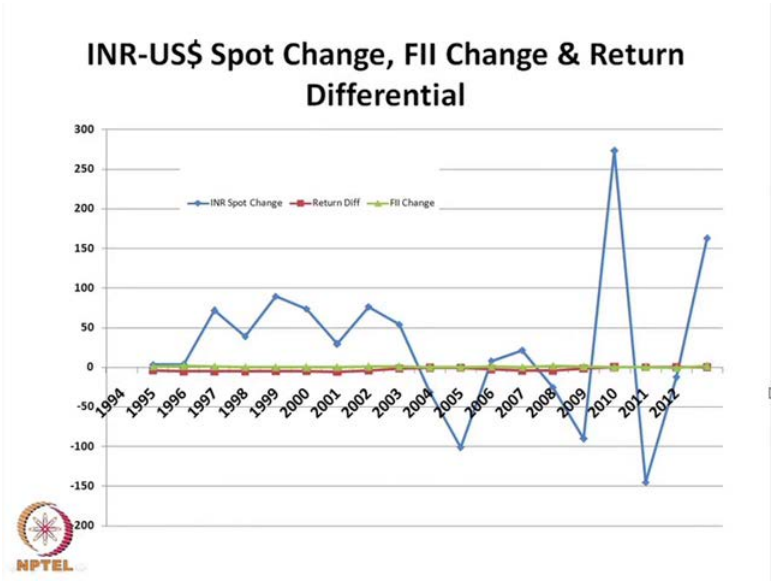

So, similarly, I have done another graph try to find the INR spot change return differential in FII change, FII inflow. So, if you see the green line indicate green line indicate FII change FII inflow changing, what is the percentage change FII inflow every year? The red line indicates return differential between a BSE and the forward your fed fund rate. These two are moving in tandem so, more when the return differential and FII are moving in tandem. They have highly correlated and the FII fluctuation of FII investment in in Indian stock market giving a volatility in Indian spot exchange rate between the USD and INR. This indicates that, these three are highly correlated and some extent they are moving in in a one direction. The direction is nothing but FII inflow, return differential in case of changing and changing in the spot rate this relationship among them.

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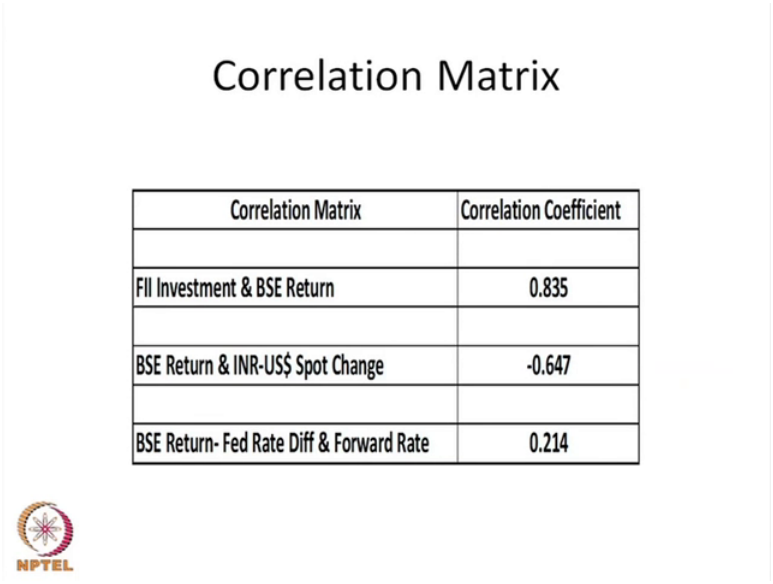

So, I try to find the correlation among these two, among this three and found that FII investment and BSE return they are highly correlated, 0.835. When FII investment in BSE return is increasing more FIIs are coming to India and they are highly correlated positive correlation 0.836 0.835 indicate the FII inflow and BSE is a BSE return are highly correlated. Similarly, I have found BSE return and INR USD change. So, BSE return is declining the fluctuation of INR and spot they INR and USD spot, the fluctuation and BSE index they are negatively correlated. The BSE return is declining, INR is highly fluctuate, BSE return is increasing INR is INR is spot is declining.

There also negative correlation 0.64 indicates that some extent a relationships are there, these two between these two variables . Similarly, I have found BSE return and fed fund rate differential and forward rate. The return differential between BSE return minus fed fund rate and the forward rate so, whether the forward premium or discount is because and the return differential are correlated. Though I found some extent correlation among these two, but the correlation is around 0.244 percent. So, both are positively correlated, but not so not so high so there are there is, there are some degree of relationship between FII inflow BSE return, spot exchange rate change and the return forward market forward rate or forward premium or forward discount. All these four variables are having some extent of correlation.

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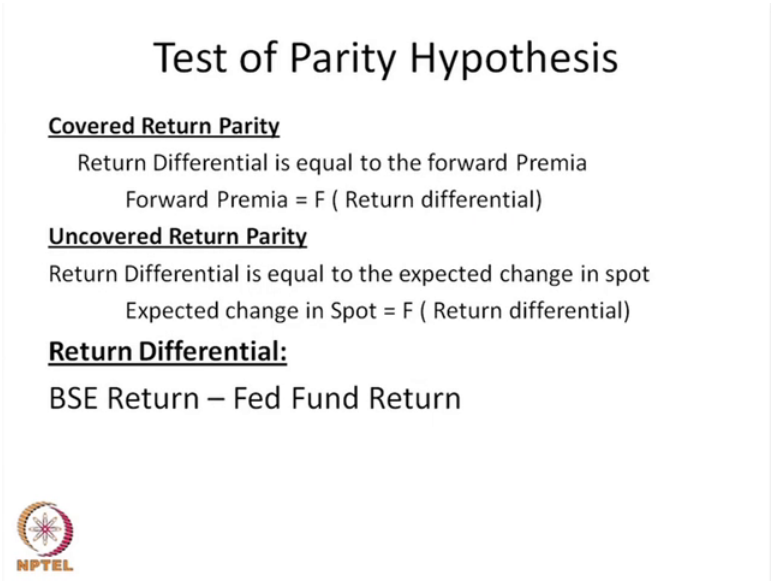

I tried to find the what is the interest rate parity hypotheses here. In place of interest rate I have taken BSE rate, BSE return. So, our return differential whether the covered return parity. Now, a days it a parity interest parity nobody is using, they are using because FIIs or foreign exchanges are coming to India primarily because of return in available in stock market. So, return differential is equal to forward premium. So, forward premia is reflected through return differential. Forward premia is reflected through the interest in return differential I found here a forward premia is a function rate in differential to try to find the covered interest covered interest parity. The return differential available between BSE return and the fed fund rate so will be reflected in the forward premia.

Similarly, uncovered interest parity the change in the spot rate between INR and USD should be a function of return differential. How much INR and USD should change in the spot market. How much interest rate differential are available if these two are abide by in abide in by the market in India then there cannot be arbitrage opportunity. However, however this may not be true in case of India since, the arbitrage opportunity definitely will be available. Let us test these two hypotheses.

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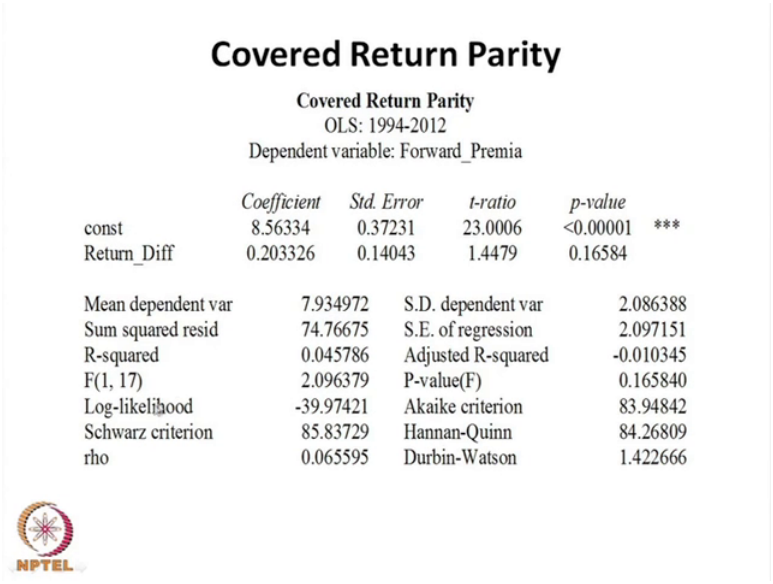

Similarly, I have done the OLS regression. I have found covered interest parity hypotheses covered rate return parity. Then I have taken forward premia as a dependent variable which is function of return differential. I have found it is not abide in India. So, return differential is not deciding return differential is not deciding the covered in forward premia in India.

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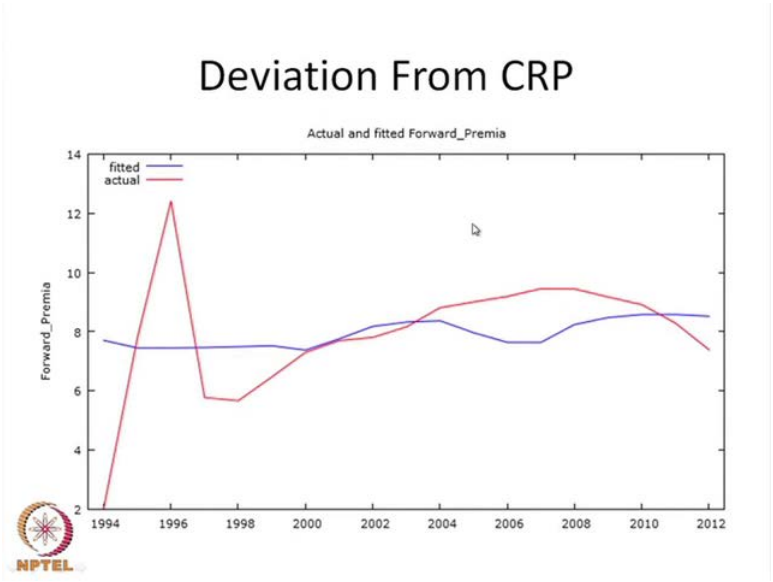

Similarly, uncovered interest parity deviation. If you see the deviation between the forward premia a interest rate from the covered rate parity, the green line indicate the

fitted line, a blue line indicate the fitted line and red line indicate the actual line. There is no such kind of relationship among these two so, forward premia is not decide decided by the BSE return differential between BSE and fed fund rate. So, they are to independent variables.

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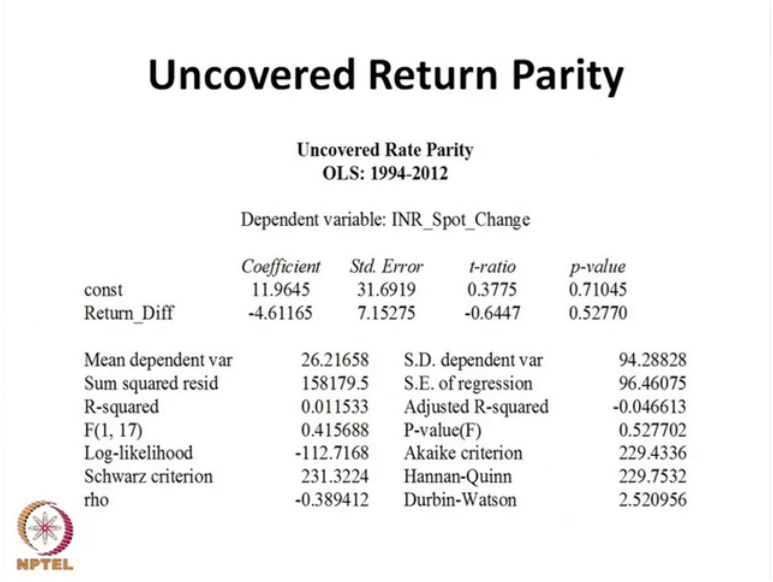

Similarly, I have run the uncovered rate parity. Here the dependent variable is INR spot change and independent variable is your return differential. So, the return differential deciding the INR spot change this also does not hold in case of India and there is no relationship these two variable.

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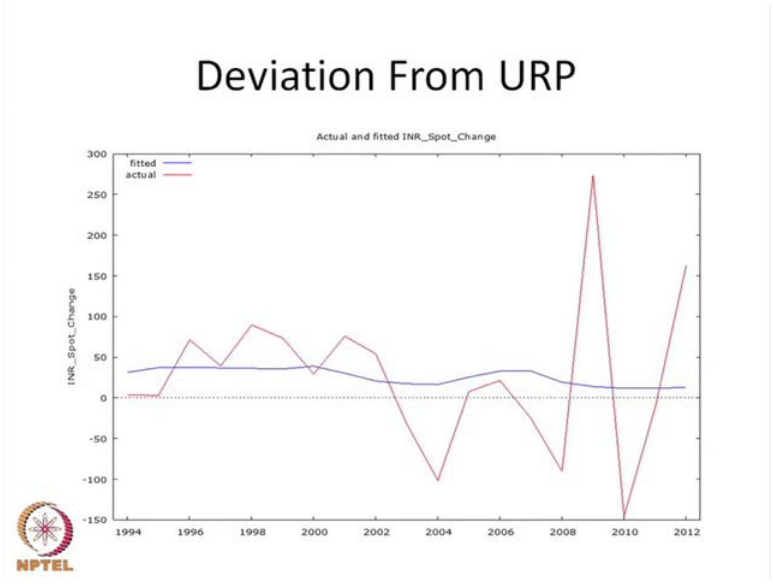

So and the graph also telling there is no relationship. The actually is fluctuating actual red line is highly fluctuating, blue line nowhere deciding the a red line. So, there is no difference, there is also here no the return differential, not reflecting the forward premium. So, that though FIIs are flowing coming to India, they are influencing the BSE return and NSE return they are also influencing the spot rate, but nowhere the forward premia or spot rate is highly dependent upon the return upon the return of the BSE or NSE in Indian cash. So, along these let me conclude that there are maybe there is some kind of relationship in Indian context between money market and forex market. Money market rate particularly the call money rate and the forward premium is highly highly dependent to each other.

They are interdependent and forex market, that is a spot market and forward market forex market, have some kind of relationship with the call money rate. However, the FIi inflow which influencing the BSE or NSE return equity market return, not deciding the forward premium and not deciding the spot market also spot market of INR and USD. So, though interest rate parity some extent available in India, it does not hold however over the year covered their interest rate the deviation from interest rate parity is declining. However, it is not so in case of return parity, where return is the BSE or NSE NSE equity market. So, with this let me conclude this. Some model question I have designed for you.

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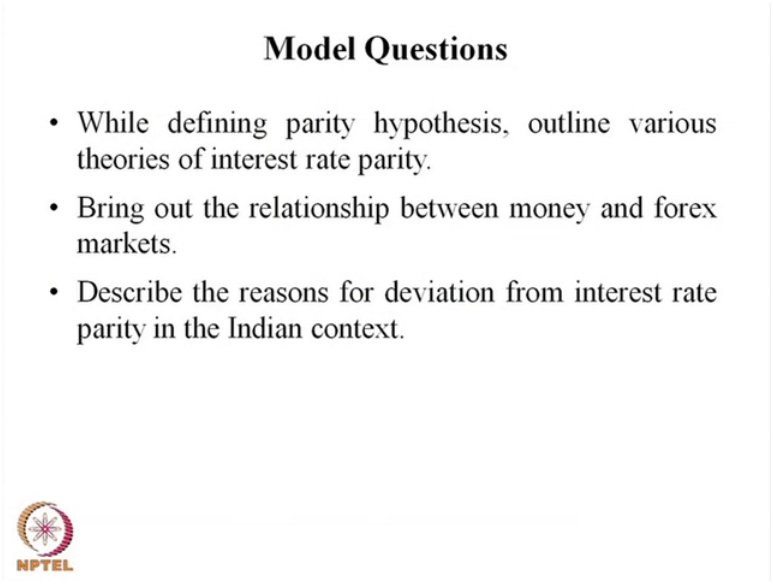

So, it is like that while defining the parity hypothesis outline various theories of interest rate parity. So, you have to mention what is parity hypothesis here and try to differentiate the covered interest parity uncovered interest parity and real interest parity. How they are different from each other and here you have to mention that in in a parity hypothesis. Try to address the relationship between interest rate differential and the forward premium or discount and try to at reflect the relationship between the money market and forex market. Covered interest parity reflect the forward premium should be equal to the interest rate differential, uncovered interest parity reflect that the forward premium should decide the fluctuation of the spot market. Real interest parity try to address the issue of inflation or the nominal and real interest rate, how they are linked to forward premium and discount.

Second question is here, bring out the relationship between money and forex market? You will have to find out the various instrument of money market. You have to find out the various instrument of forex market. How these two markets are related to each other? How what is the movement of these parameters two markets parameters variable and how they reflect the relationship among them we have discussed in detail these two cases. Similarly third question is, describe the reason of deviation from interest rate parity in the Indian context. You have to discuss here, why are the deviation occurs between interest rate parity? Because interest the arbitrage available between two market, the arbitrage available why the arbitrage are there.

The arbitrage may be because of in lack of information, the arbitrage may be because of transaction cost, the arbitrage may be because of the control of capital movement, you have to address all these issue and try to find out if there is an other reasons of not holding of interest rate parity hypothesis in case of India because it may be because of expectation of participant in the foreign exchange market, it may be lack of information. So, all these thing you discuss in the third question and find try to find the reason, why a deviation interest rate parity does not hold in case of India.

Thank you.