International Finance
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Lecture - 38
Characteristics of Indian Foreign Exchange Market

[FL] Today session number 38, we will be disusing about the characteristic of Indian foreign exchange market. Over the last 37 session we have discussed the various parameters of exchange rate markets, the Variables of exchange rate market, the theories of exchange rate market, how we can apply all these parameters theories in Indian foreign exchange market so as to understand the features of Indian foreign exchange market over the periods.

If you look at the liberalization of foreign exchange market it was started sometime during 1992 93 onwards. Over the period many committee has been appointed who have given different kind of liberalization measures to liberalize the Indian foreign exchange market. The Sodhani committee, the Tarapore committee, all these three two committees are very important for the development of Indian foreign exchange market. As per the recommendation of these committee we, the Government of India, the Reserve Bank of India have taken different policy measure to liberalize the Indian foreign exchange market.

We will be under, in the session 20 38 we will be discussing about the characteristic of the Indian foreign exchange market. And here we try to understand the features of Indian foreign exchange market, the various parameters of Indian foreign exchange market like the transaction cost, like the current account convertibility, the determinant of Indian spot market rate, how different rates like the spot rate, card rate, your merchant rate have been developed over the years and also you will understand the application of VaR modelling, the volatility of Indian foreign exchange market.

And also we will try to understand the various short term determinants of in, determinants or parameter which actually influence the spot exchange rate. Let us start with the characteristic of Indian foreign exchange market.

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If you see the characteristic in 92 onwards the Indian foreign exchange market started its liberalization measures, the after the Forex market liberalization direct and two way quotation prevails in India. Direct means the foreign exchange, the unit of Indian rupee variable INR is variable, but foreign exchange that is dollar remain constant, per unit of dollar or per unit of foreign currency how many rupees we suppose to pay that is the direct foreign, direct quotation started.

Prior to that it was indirect quotation, so direct quotation has become a normal features of a characteristic of Indian foreign exchange market after the liberalization. Two way quotation if you see the two way quotation, two way quotation means the buyers and sellers race started. Earlier it was a one way quotation was there, two way quotation the buyers rate and sellers rates will be there. So, the two way quotation remove the bad rate what is called somebody requires foreign exchange, if a put a ask for foreign exchange the buyers will, the sellers will give a high quotation for that person.

So, two way quotation remove what is called the bad rate and also create liquidity in the system. Two way quotation has become a norms or characteristic of Indian foreign exchange market. After that if you see who are the major players? The major players were now commercial banks, the they are the primary dealer in foreign exchange market. Along with the commercial bank some authorised dealer as authorised by the RBI they are also playing some leading role in Indian foreign exchange market.

The authorised dealer primarily money changer, the travel agents, travel agent and also, some extent local banks like a like the cooperative bank also in the part of the foreign exchange market. However, whether it is a commercial bank are the major players in Indian foreign exchange market. They are the authorised dealer now at present, they are deciding the rate because it was a prior to liberalization RBI was declaring the rate and around that rate trades were there. But here commercial banks are declaring the rates and the rates are variable since number of commercial bank, something around hundreds are there in India, 97 98 commercial banks are there in India. All these bank give different kind of rate and the rates vary over the different time periods.

In one hour we get, we will get different rate from different banks. So, commercial banks are playing the leading role in Indian foreign exchange market at present. Then we have spot rate, forward rate and the, these are the two rates which are predominant in Indian foreign exchange market. After the liberalization the forward market started and forward rates are available at present along with the spot rate and forward rate also are available in Indian foreign exchange market. These two rates are predominant in Indian foreign exchange market at present. However, very recently the currency futures market have started in India. Currencies options, currency futures are available for few currency in Indian foreign exchange market at present. Inter-bank, merchant and card rates these three rates are available at present in Indian foreign exchange market.

The inter-bank rate among the bank the rate, the exchange of foreign currency take place the rate called the inter-bank rate. The merchant rate the exporter, importer, big merchant they take their rate from the different commercial bank, they are the merchant rate. Small value transaction like individual transaction, personal transaction, small value transactions are there for tourism, for hospitality, some other businesses so that card rates are available and these card rates are also at present small value transaction rate has been developed over the year.

The three rate inter-bank rate, merchant rate and the card rate along with the spot and forward rate, these three rates are, four rates are available at present in Indian foreign exchange market. However, spot and forward market two different segments of Indian financial foreign exchange market along with the segment inter-bank; merchant and card rate different rates are available. Spot rate is a, spot market is a segments of Indian foreign exchange market, forward market is a segments of Indian foreign exchange

market, currency future another segments of Indian foreign exchange market, but inter-bank, merchant and card rate these are the rate available in Indian foreign exchange market.

We should understand that segments of foreign exchange market and the rates in foreign exchange market, rates are inter-bank rate, rates are merchant rate, rates are card rate. Segments are spot segment, forward segment and future segment. These are the three different segments of Indian foreign exchange market.

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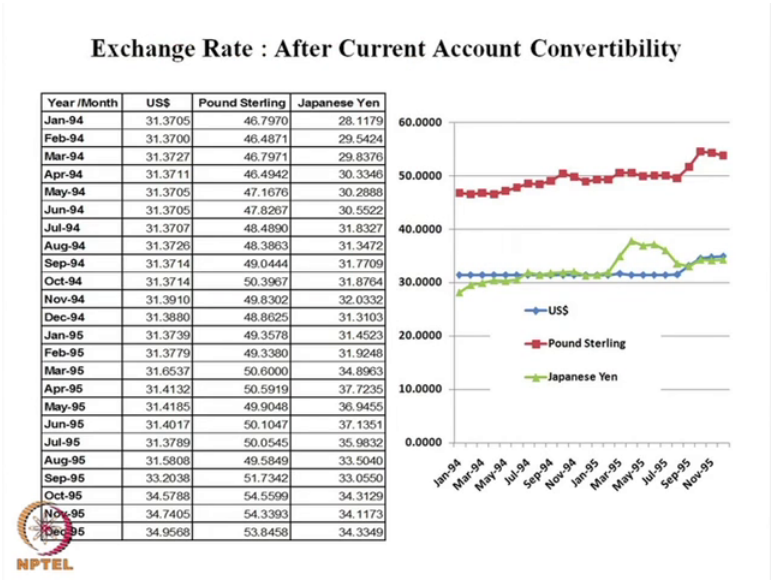

If you see after the current account convertibility in 93 94 Government of India and the RBI accepted the article 8 of the Indian international monetary funds and thus with with this article 8 they accepted the current account convertibility, are, all current account transaction like the export, import along with the invisible, individual in the forms of what is called transport, tourism, interest payment, dividend payment all these are family, family living expenses all these are current account convertibility, current account, all these items are there in current account and we have accepted the current account convertibility.

After accepting the current account convertibility Indian foreign exchange market one bigger biggest segments of Indian foreign exchange market has been liberalized, that segment is current account part and another segment is a capital account. Slowly we have been progressing toward the capital account convertibility. However, at present current

account is 100 percent market determinant, all current account activity like export, import, invisibles are market determinant rate and after the accepting the current account convertibility Indian foreign exchange market has been liberalized significantly. We can see after the liberalization of foreign exchange market how the US dollar, Pound Sterling and Japanese Yen moving over the year.

You see US dollar, there is a blue line is US dollar significantly there has been a depreciation of Indian rupee. Similarly, Pound Sterling also appreciating against the INR Pound Sterling is appreciating, same thing also Japanese Yen also appreciating. After the, accepting the current account convertibility Indian rupee tried to find its own rate, the rate is moving towards the depreciation that means fundamentals, fundamentals equilibrium exchange rate Indian rupee is moving towards some market rate.

The market determine the actual rate of Indian currency in INR and after the liberalization of current account the rupee is depreciating over the year.

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If you see the other characteristics of Indian foreign exchange market, if you analyse that except the spot market for a few currency Indian Forex market is not liquid in nature. Except the spot market, spot market will get spot market Pound Sterling, spot market Euro, spot market US dollar and also spot market you can get Japanese Yen. All this four currency, if you remove this four currency in the spot market, Indian foreign exchange market is not liquid in nature.

What does it mean? It means that you may not get direct quote for other currency, other currency transactions are not taking place in spot market except these four currency. Somebody, want the Hong Kong dollar or the Pound, Australian Dollar or the Canadian Dollar or you can found one of the, one or French franc, they have to earn, you have to go to other market to get a get a proper rate and since the Indian foreign exchange market accept the spot market for few currency it is illiquid in nature at present also. And if you see the forward market, the spot market like INR, you are getting US dollar and INR, Japanese Yen and INR, Euro and INR and some extent we may get the Pound Sterling also. There are direct codes are available, all other currency we are not getting direct quote; you have to go for a cross currency quote cross currency quote.

A cross currency you have to purchase dollar, from dollar to other currency you have to go to get a rate and this actually increase the transaction cost for purchasing over the currency and because of this reason the transaction cost in India is very high. For other currency the exchange rate against INR is not directly available. You have to purchase dollar and from dollar you have to purchase other currency like Canadian Dollar, from US dollar you can purchase Japanese Yen, your French Franc or Australian Dollar and this is cross currency option. Cross currency increase the transaction cost in Indian foreign exchange market.

If you see Indian foreign exchange market the biggest players are the not the inter-bank nor it is the merchant. The merchants are the biggest player with their volume of transaction, high volume of transaction merchant are primarily the corporate houses, the exporter, importer they are the prime players in the foreign exchange market and actually they decide the exchange rate in Indian context. Though merchant rates are lowest, but if you see the merchant rate because of their high volume the lowest rate quote they get from the bank. But they, the quote of merchant rate, merchant quote and the inter-bank quote are quite high.

A difference between merchant quote and inter-bank quote is quite high. Similarly, merchant quote and card quote is very high. Similarly, card and inter-bank quote also very high. This indicate that Indian foreign exchange market is, this indicate the merchant rates are lowest in Indian foreign exchange market because of their high volume and the difference between merchant and inter-bank is quite high.

Similarly, difference between difference between your card rate and merchant rate also quite high. The card rate is highest in Indian foreign exchange market because the small volume transaction, the transaction cost is very high.

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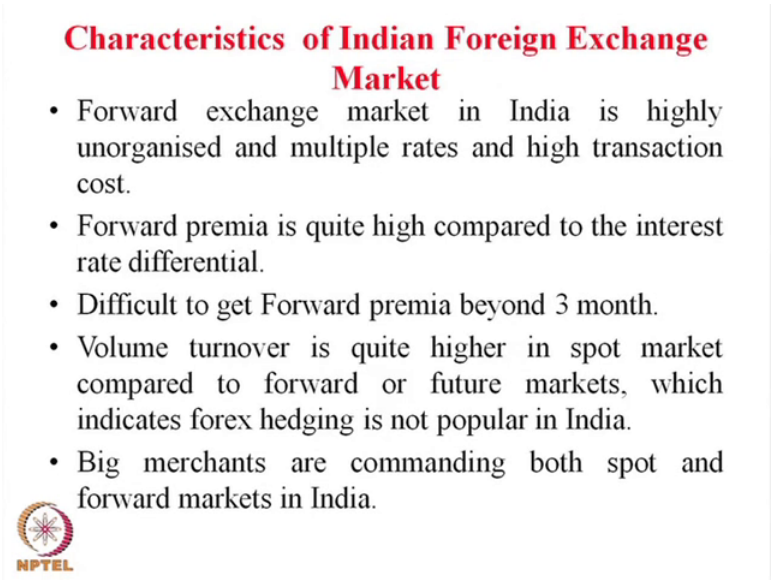

If you see other characteristic of Indian foreign exchange market it is the forward market. So, forward market is developed for the hedging purpose, after the current account convertibility rupee has been depreciating or volatile in recent year. To prevent the volatility the risk exposure, the forward market has been developed and forward market in India at present is quite unorganised. And the primarily the commercial bank major players in foreign exchange forward market and the forward premia that is called after one month you want a rate, how much premium or discount we have to pay.

The transaction cost for forward premia is high, very high and beyond the interest rate differential. If you, as we understood earlier session that the forward premia or discount should equal to the interest rate differential, but Indian context the forward premia is quite high compared to interest rate differential. This indicate that the feel, very few bank they are deciding the forward premium and the forward premia is not market determined and also if you have, if you want a forward premia or forward rate beyond 3 3 month there is, it is not available in Indian market.

At present also very few currency that is only three to four currency the Pound Sterling, the Indian the US dollar, Japanese Yen and some extent Euro you will get the forward

quotation. For other currency there is no forward quotation is not available and and indirectly or the cross currency side you have to get a forward quotation which increase the transaction cost for forward market also. Forward market is highly unorganised and it is the big bank, big commercial bank they are the major player, they are the they are the deciding banks in forward market and they influence the forward quotation and forward premium transaction cost and forward premium is unorganised market at present, the credit risk also very high in forward market and beyond 3 month a forward market rate is not available in India at present also.

These are the major drawback of Indian foreign exchange market. If you see the volume turnover in the turnover in forward market the volume turnover is not so high as compared to the turnover in spot market. This indicate that Indian financial system particularly the foreign exchange market the hedging as a concept is not developed, hedging as a concept, hedging as a instrument not being adopted by the merchant, not being adopted by the other players in the foreign exchange market.

This indicate that the volume transaction in spot market is quite high, volume transaction in forward market is quite low, this indicate the risk is risk is there in, very high risk is there in Indian foreign exchange market. Big merchant particularly the corporate, big corporate they are commanding both spot and forward market in India because of their high volume transaction.

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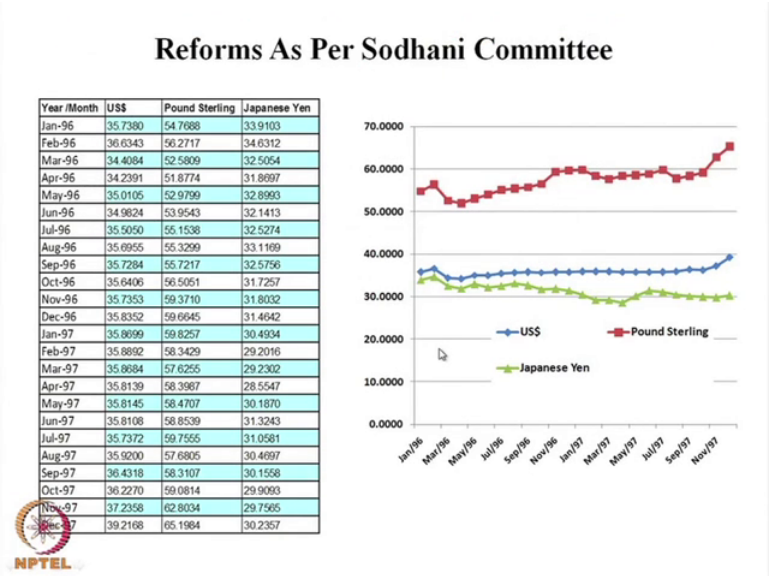

In other features of Indian foreign exchange market if you see after that Sodhani committee recommendation, Sodhani committee they recommended some liberalization in foreign exchange market, allowing merchant bank for development of forward market further. Then also they allow what is called the more participant in the foreign exchange market and after this Sodhani committee recommendation Government of India, the Reserve Bank of India they adopted some extent the Sodhani committee recommendation. And this recommendation leads to further development of Indian foreign exchange market. After the recommendation the exchange rate if you see how it has developed. The exchange rate if you see the Pound Sterling, Japanese Yen and US dollar, because of this the Japanese Yen depreciated, Indian foreign exchange foreign exchange market more dollar, more Japanese currency came to India.

Similarly, Pound Sterling also little bit remain stable over the year, same also in case of dollar because the liberalization leads to inflow of foreign currency in into India and because of this reason rupee gain some momentum in India and remain stable over the year.

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However, there are other problems are there in Indian foreign exchange market. Primarily the high transaction cost. The transaction cost in Indian foreign exchange market is quite high and because the players in foreign exchange market are very limited the authorised dealer is hardly seventy, eighties are there. Among them a free few banks

are actually handle the foreign exchange market and among the merchant very few corporate houses, big corporate houses because of their volume transaction in export import, they also command the foreign merchant rate and card rate which actually small value transactions are there is high cost because of the, because very few volume is very minimum, high cost is there in Indian foreign exchange market.

This indicate that transaction cost in India over the period of development of foreign exchange market has not reduced significantly and this indicate the another side of the foreign exchange market what is called the, what is called the depreciation of depreciation of the Indian rupee. Primarily, if you see the market rate and the actual rate where transaction take place there is huge difference, the huge difference arise because of the transaction cost.

The bid-ask spread, what is called the buyers and seller rate. The buyers and sellers their difference is quite high, this should be minimum, should be very least. However, the buyers and seller rate because of the high transaction rate plus the profit margin it is quite high and bid-ask spread has been increasing over the year. After that 97 93 94 Government of India after the Sodhani committee, they they appointed a Tarapore committee. Tarapore committee further liberalization of Indian foreign exchange market.

Tarapore committee primarily advised how to liberalize over the year the capital account. The capital account deals with the high inflow, outflow and foreign asset purchase and purchase and sale in foreign currency, foreign asset and foreign asset primarily in foreign currency primarily in foreign currency how we can develop the capital account convertibility over the year. There Tarapore committee also recommended that the phase manner phase manner transaction, the transaction means primarily the phase manner migration of Indian foreign exchange market towards the fuller capital account convertibility.

The Tarapore committee recommendation if you see the committee has given some kind of good suggestions to the Government of India, to the RBI, the committee recommended that banks and financial institution should be given more freedom in foreign exchange transaction. So, particularly in the borrowing side and deployment of fund outside India, the foreign, the bank should be given more freedom in in borrowing foreign currency, also deploying the foreign currency abroad. The foreign institutional

investment, investor should be allowed more freedom, should be allowed more sector of the economy so that they can, there will be more flow of FII into India.

The portfolio investment particularity the foreign currency portfolio investment repatriation without prior RBI scrutiny because how that they will (( )) when they get the dividend, they get the interest, this should be allowed to take out this fund from India without any foreign, without any RBI permission. Similarly, the FII, non-resident India, non-resident Indians and along with that foreign bank should have access for the forward transaction particularly for their Indian asset with the FII generally invest in India. Non-resident Indian they also invest in India and also foreign bank they also purchase foreign asset and with the fluctuation of a rupee dollar, rupee other foreign currency their value of their asset fluctuate.

This should be allowed to go for forward cover of their asset. So, FII non-resident Indian and foreign bank should be allowed to access the forward market to cover their position. That is the RBI; that is the recommendation of the Tarapore committee, after that also they also advised the banks should be permitted to participate in gold market abroad for particularly gold purchase, gold buy and sell in abroad bank should be allowed to participate.

Similarly, the merchant banker particularly withdrawing the Reserve bank from playing the role of Government's merchant banker. Generally, buying RBI played a leading role in foreign currency provider or buyers or seller for Government of India and they recommended that RBI should be removed from the as selecting as a agent for the Government because they actually influence the exchange rate system. As a controller of exchange rate market as a RBI should not should not be a buyers and seller in foreign exchange market. That is the recommendation of the Tarapore committee.

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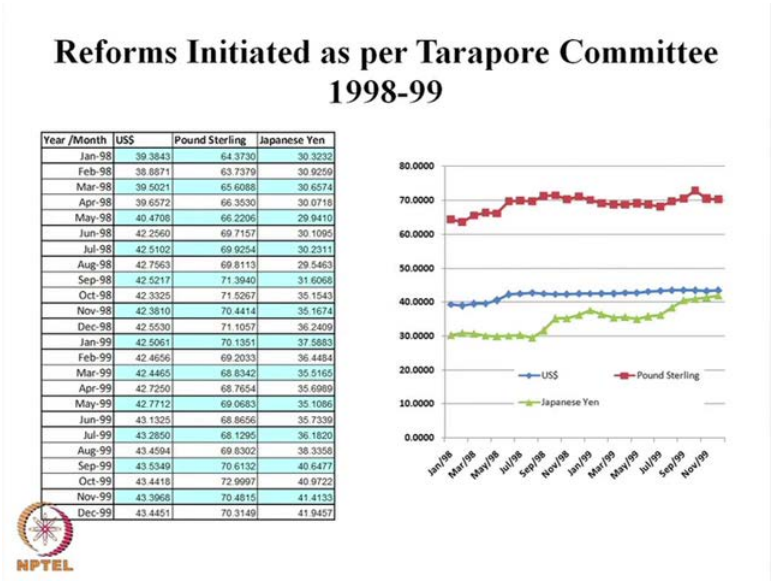

After the Tarapore committee recommendation the particularly after 18 1998 99 the foreign exchange market further developed because here the Government of India that your FII and the banks, particularly commercial bank they get more freedom in foreign exchange market. And because of this reason if you see the FII inflow increase after 89 1999 1999 onwards and this lead to the some extent stability of Indian rupee which was which was depreciating over the year.

If you see the Pound Sterling remain stable over the year. Similarly, Indian rupee against US dollar also remain stable over the year and some extent Japanese Yen fluctuate however not so much as compared to earlier. This indicate that after the recommendation of Tarapore committee and implementation of some of the measures of Tarapore committee recommendation rupee against the major players of foreign currency remain stable over the year.

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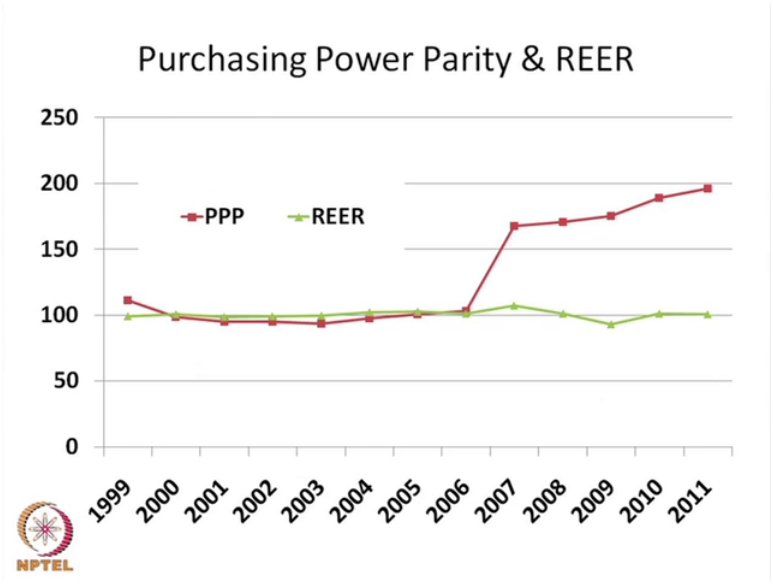

Here I have tried to find the purchasing power parity rate as I mentioned earlier session that purchasing power parity determine the fundamental value of the Indian rupee or any other foreign currency. What is the purchasing power? A basket of currency, a basket of asset particularly consumable asset having equals, equal having same quality what is the cost in different countries that decide the purchasing power of the currency.

The basket of basket of basket of consumable asset, if it cost less in India more in US then Indian rupee have high value. Similarly, basket of asset or the consumable asset cost less in Bangladesh more in India, then Indian rupee is depreciating against the Bangladesh currency. So, the purchasing power parity reveals the fundamental equilibrium value of the Indian rupee or any other foreign currency. And similarly, the real effect of exchange rate on the tradable goods and services against tradable goods and services also indicate the purchasing power of the currency.

If I draw the PPP purchasing power parity along with the REER from 99 to 2011, 10 years data and I found that if you see the purchasing power parity that is the red line and the green line is the REER remain almost same from 99 to 2006 6 after that the purchasing power parity is depreciating, red line is purchasing power parity is depreciating. There is more cost because more cost therefore, to purchase one basket of commodity, Indian Indian Indians are paying more compared to compared to the US because and similarly, that tradable items link to REER, tradable like assets say tradable

item willing to REER also depreciating because of this reason remain constant or remain almost remain constant or slightly fluctuating. But the red line PPP is depreciating over the year, the tradable, what is the basket of commodity which costing more in India compared to US and this indicate rupee is depreciating over the year. And this primarily because of inflation, high taxation and also may be because of after 6 7 inflation in India started increasing, 6 7 to 11 12, it reach up to 12 to 14 percent because of this may be that the purchasing power parity in India declined, decline in India compared to US.

The purchasing power reflect actually the fundamental value of the Indian rupee compared to other currency and this purchasing power parity. And the real exchange rate particularly the real exchange rate of, should move in tandem to each other so as to so as to find rupee should find equilibrium value over the year. Since, purchasing power parity is declining rupee also depreciating over the year after 2006 7 and it has reached up to in 2012 13 minimum around 55 to 60, 55 to 57, if 2006 7 rupee if you see around 45 46 and because of the purchasing power parity decline for Indian currency the rupee reached something around, depreciated more than 10 rupees 10 rupees. And this purchasing power parity indicate that what is, what would what would be the movement of Indian rupee, the fundamental value of the Indian rupee over the year.

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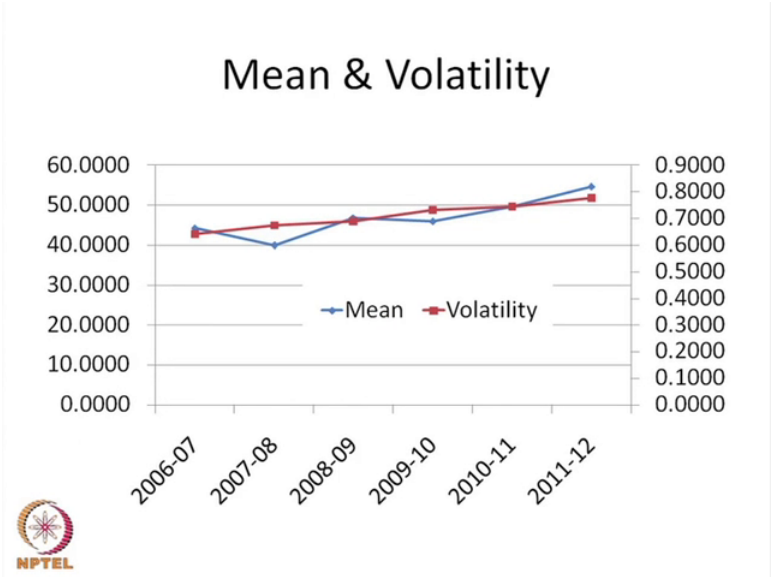

If you see, try to find the mean and volatility of the Indian rupee. I have done a a, I have I have tried to find last 7 years last 7 years data what is the mean value of Indian rupee,

what is the volatility of Indian rupee against the US dollar. And see I have found that mean of the Indian rupee is somewhere that blue line indicate the mean of Indian rupee different in different financial year and if you see in 2006 7 the mean of the Indian rupee is how much trend around 45, 45 which has little bit depreciate 7 8 and increase over the period that trend is trend is the mean value is depreciating to something around 54 53 54 in 2011 12.

So, in 7 years rupee value depreciated by more than 10 rupees more than 10 rupees, this also indicate the your purchasing power parity rupee value depreciated some nearly after 6 7 depreciation may nearly 50 percent 40 percent. Similarly, if you see the volatility of Indian rupee, the secondary axis indicate the volatility, this axis indicate the volatility. The volatility red line you see the volatility of Indian rupee against the US dollar is fluctuating and increasing over the year, the trend is increasing over the year.

The volatility is somewhere nearly 7 nearly 0.7 it is increased to 0.9 say in 7 years. This is also indicate the volatility of Indian foreign exchange market, particularly the spot market against the US dollar is increasing over the year. The mean value of the mean value of the Indian rupee against the US dollar also depreciating by nearly 10 rupees last 7 years. If you use the volatility and try to find what is the VaR the value at risk?

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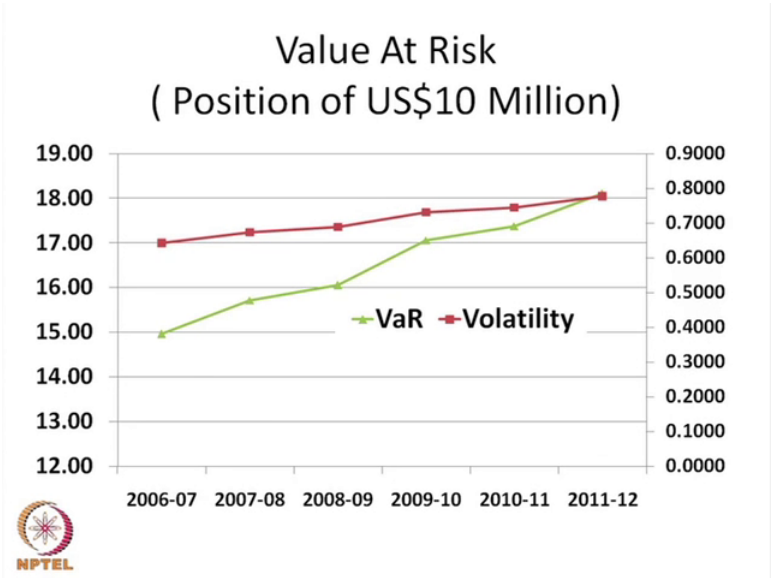

The value at risk I try to find the value at risk of Indian foreign Indian rupee and I found that value at risk for 10 10 million dollar value at risk as I mention in in our earlier

session discussion that value at risk indicate what is the maximum value, the potential you will be losing with the, you will be losing if you take a position in Indian foreign exchange market.

Why you will lose the money or dollar or any position? Because volatility. The volatility indicate volatility indicate how much you loss if you have a position, the maximum loss for a given risk. The risk is here volatility, the value is here 10 million dollar, if you have a 10 million dollar how much you will loss, lose? If you try, if you continue to have that same position for 1 year. I tried to find the value at risk for from 2006 7 to 2011 12 and value at risk calculation as I mention earlier as I mention earlier the value at risk value at risk is where VaR is nothing but the 99 position volatility, volatility at present.

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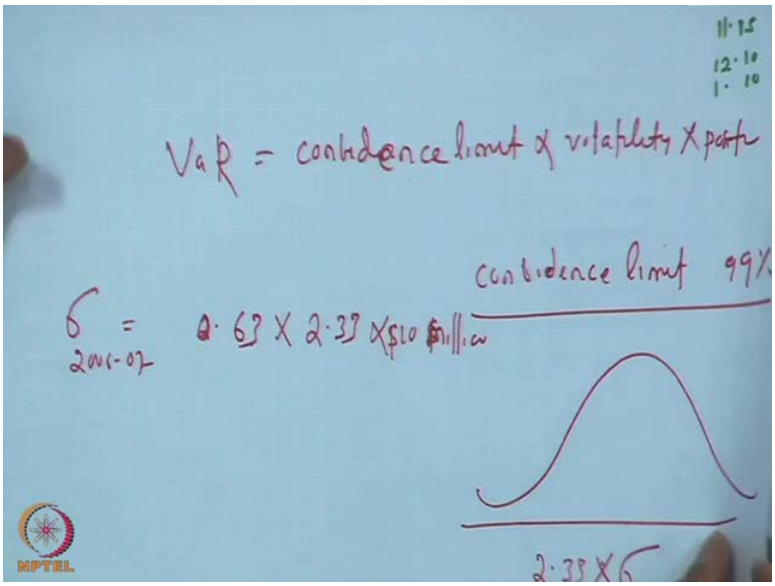

You have a confidence limit for VaR confidence, confidence limit, I, my confidence limit is 99 percent. I am 99 percent sure that, 99 percent sure if you take a normal curve, I am 99 percent sure the volatility will be, volatility of Indian rupee, the spot exchange rate against US dollar will remain at the same pattern, so same pattern. So, in 2006 the 99 percent the normal curve the value is 2 point something 33, 2.33. However, the volatility is sigma here.

The volatility in 2006 7, if you see the volatility is 2006 7, 6 7, the volatility is the red line something around if you see secondary axis 0.63, something around 0.63. So, volatility in the in 2006, 2006 7 the volatility 0.63 and with the confidence limit of 99

percent that value will be 2.33 if you multiply and what is the position for me. So, position for me is 10 million dollar 10 million dollar, 10 million dollar. So, the value at risk if you see the calculation will be there, the value at risk here, the value at risk is confidence limit confidence limit, the volatility into the confidence limit into the volatility into the position. So, position is here you have to describe that. How to calculate the volatility?

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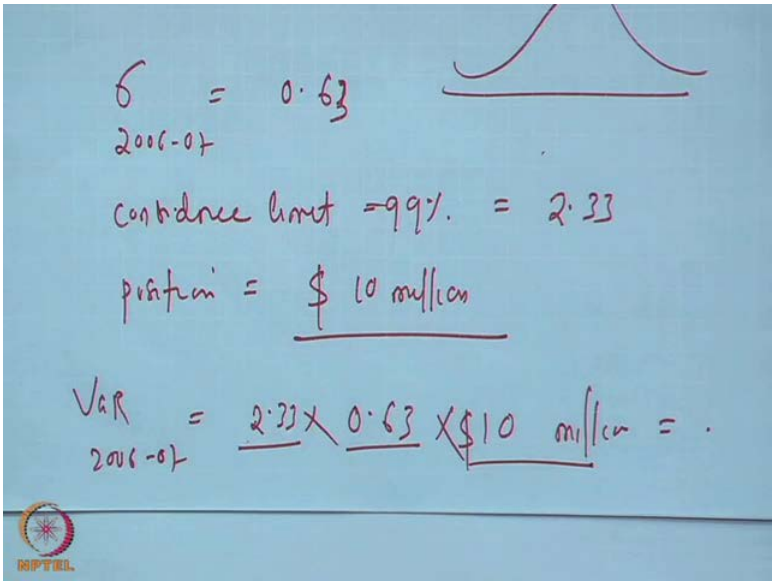

I told you the VaR of limit is VaR of limit is confidence limit into the sigma of volatility into the position. How much position, how much foreign exchange you have purchased. So, in 2006 7, 2006 7 the volatility is 0.63 and confidence limit confidence limit is however is 99 percent confidence limit whose value is something around 2.33 and my position my position in the market is 10 million dollar 10 million dollar. So, you want to find the value at risk for in 2006 7, the first is confidence limit 2.33 into the volatility 0.63 and the position is 10 million dollar.

This will be the, this will give me the, so, this will give me the position VaR where my VaR in 2006 7 my confidence limit is, I am assuming that I am confident that the same pattern of risk, the normal curve having same pattern of risk. So, normal curve will have same pattern of risk so I assume that my risk the period or what I can tell volatility remain constant over the in 2006 7. So, I put 2006 7 my volatility is 0.63 and confident

level I got from normal table 99 percent confidence 2.33 and my position in the market is 10 million.

This will give me the value. What is the maximum loss I can have if I have a position of 10 million. So, I have calculated these for 2006 7, 7 8 and up to 12, 2011 12. Where I got the volatility? Volatility I got is from here, the red line indicate the volatility of spot rate. How I got volatility? I have taken 2006 7 data of daily exchange rate daily exchange rate I calculate the volatility.

Similarly, 2007 8 in Indian rupee and US dollar I got daily exchange rate, I calculate the volatility like that I got the volatility every year, I plotted here and the for for value at risk my position is 10 million. 10 million I am 99 percent confident. So, normal table 99 percent confidence limit will give you 2.3 33 value. I multiply 2.33, if you see I multiply the 2.33 here with the volatility of 2006 7 for the 10 million, I got the, what is the risk position for me.

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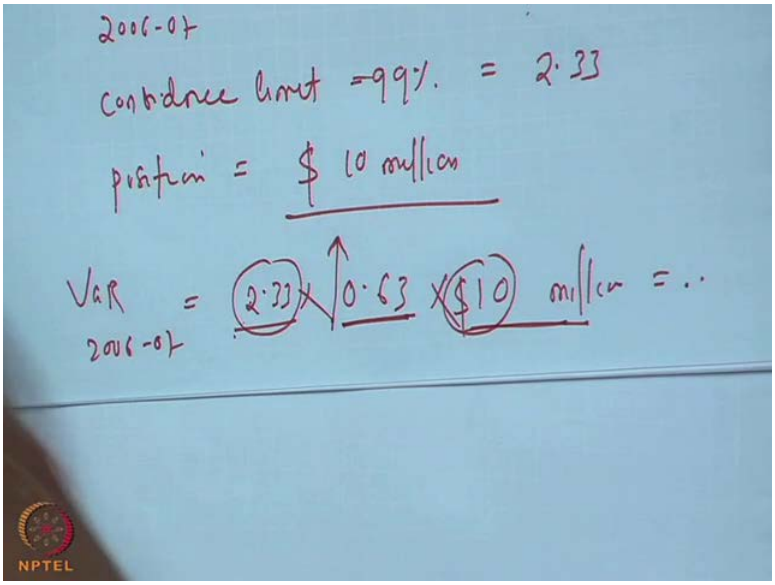

If the risk position increases, how the risk position these thing remain constant. So, only this thing also remain constant, what is the my loss will be increases if the volatility is more if the volatility is more since over the year if you see the data, see the earlier data volatility is increasing over the year and my last position, positional loss for 10 million dollar position my loss also goes on increasing. And as I see 2006 7 data 6 7 that VaR

model volatility VaR is volatility this axis, this is the red line volatility, this is the red line volatility is the secondary axis and the loss will be in million loss loss data is here.

So, 2006 7 my loss position is increasing 2006 7, if you see 2006 7 VaR is something around this 2007 8 my VaR is like that my everything my VaR is increasing over the year this indicate the VaR position over the year and this volatility indicate that how much I am loosing over the year, the loss is increasing. This is one of the, another characteristic of Indian foreign exchange market the VaR position, the positional VaR is increasing, the loss is increasing, this indicate the Indian foreign exchange market is highly volatile.

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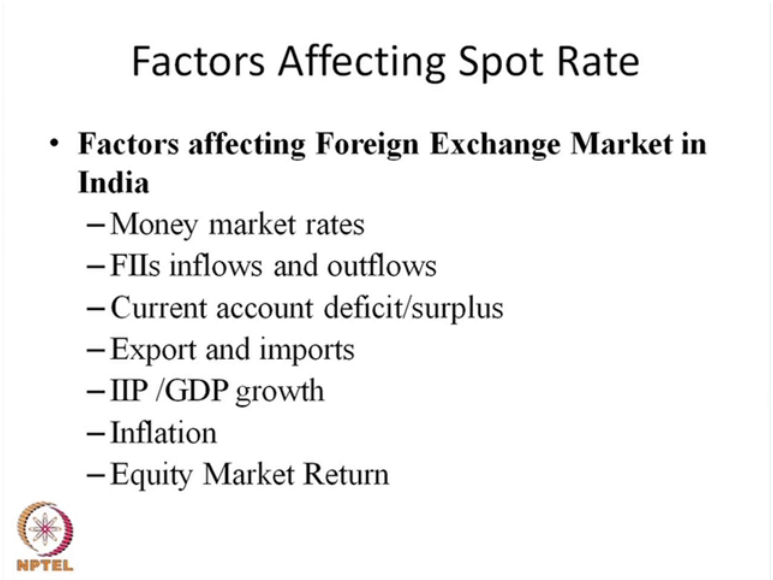

Some other thing I have done what are the factor which actually decide the spot exchange rate in Indian foreign exchange market. We have discussed all these thing in our earlier initial classes, initial session that money market rate the FII inflow, outflow, the current account deficit and surplus, export, import, that is the trade deficit, the growth of GDP, IIP, inflation, the equity market return all these variable they indicate they influence the Indian foreign exchange market.

Among these variable which are the prime variable because we cannot say all variable has a own importance, to find out the which one of the major variable which actually influence the spot exchange rate or the major determinant of spot exchange rate in Indian context. I have taken here a rupee dollar exchange rate and try to find, I try to find which

are the main primary variable which influence the rupee dollar exchange rate in the spot market.

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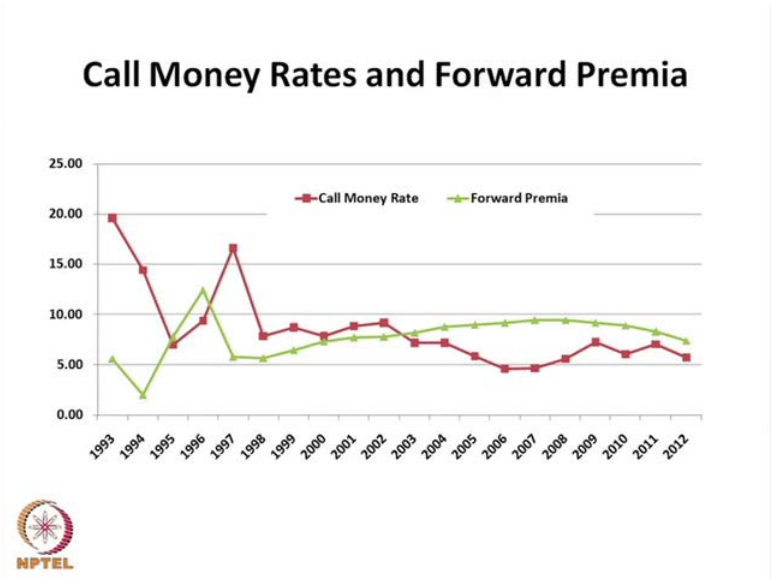

Before that I try to wrong this, whether the forward premia, the forward, earlier classes you have discussed the call rates and the forward premia move the same direction. I have found the call rate is increasing, the interest rate differential in money market rates are increasing; so forward premia increasing. Forward premia in other ways is influence the future spot.

So, if the call rate increasing the forward premia increase and spot future spot also increases, a rupee may depreciate. Similarly, if spot rate declining forward premia decline and future spot also appreciate which rupee will appreciate.

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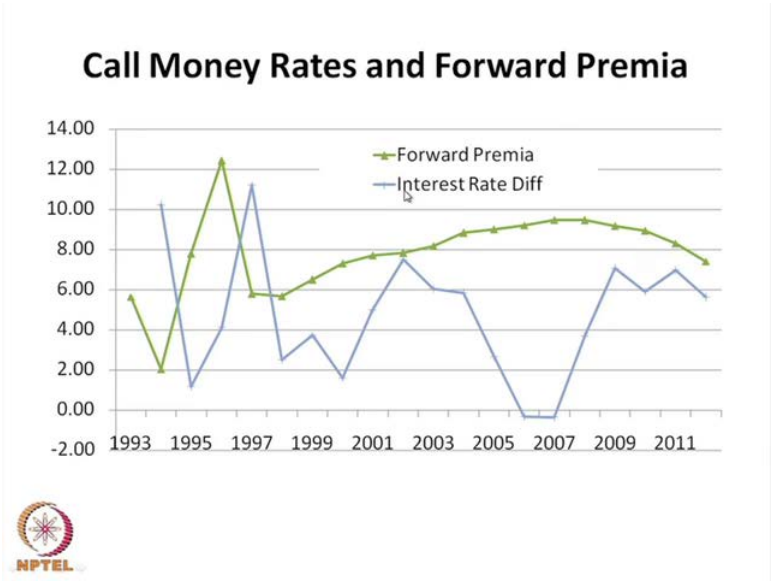

Similarly, I have found the forward premia interest rate differential, interest rate differential I have taken here call rate and fed fund rate of US and try to find what is the relationship among these two, some extent these two are also related because when forward premia is volatile the interest rate also interest rate differential is volatile the forward premia also volatile and when the forward premia in in interest rate differential is increasing the forward premia also increasing.

So, interest rate differential between Indian call money market and foreign exchange market, your fed fund rate is increasing, the forward premia increases because there will be more potential potentially more dollar will come to India to get advantage of arbitrage opportunity of high interest rate and this will fluctuate the Indian rupee and Indian rupee may depreciate in recent further.

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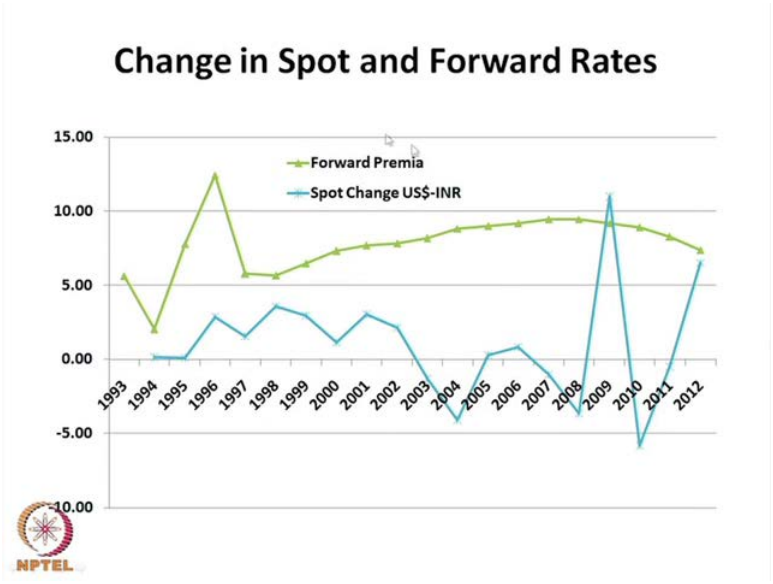

Similarly, I try to find whether the increasing forward premia have anything to do with the spot exchange rate change between US dollar Indian rupee. So, all that, this also this also have a significant impact. So, when the spot rate the forward premia is increasing the rupee dollar spot change, the volatility of rupee dollar also fluctuating so, some extent these two also influence to each other.

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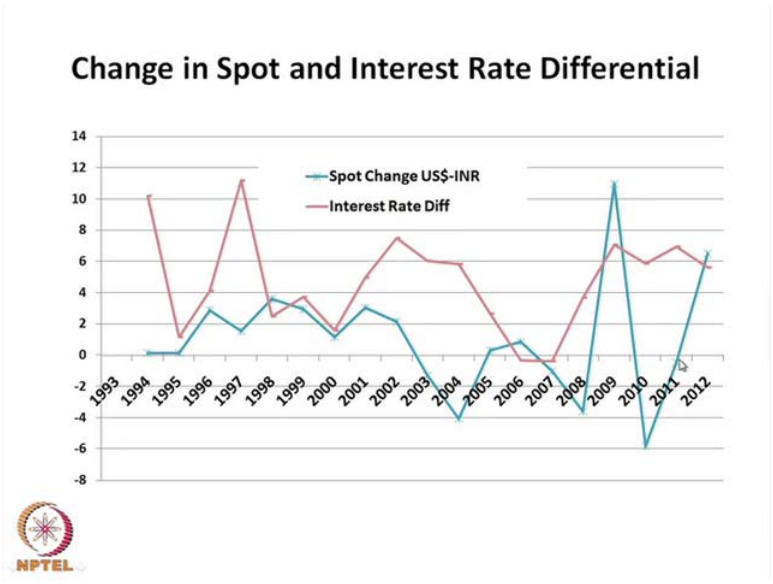

Similarly, I have found the interest rate differential and spot change. When the interest rate differential is increasing rupee dollar is fluctuating this also, some extent they are

flowing in, they are also moving in same direction. When rupee dollar is increasing interest rate differential is the red line which fluctuating the rupee dollar exchange rate also fluctuating and they have also moving in almost same direction. These are some variables I have found and how they actually influence the exchange rate spot particularly the spot exchange rate between dollar, INR and US dollar.

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Factors Affecting Spot Rate

OLS :1994-2012

Dependent variable: US_INR

	Coefficient	t-ratio	P-Value
Constant	46.7039	14.6322	0.0000
Int Rate Diff.	0.59579	15.1275	0.0000
BSE Return	-7.4035	-1.2239	0.2459
FII Flow Change	-3.7460	-1.8400	0.0870
Current A/c Deficit	-0.0025	-2.4318	0.0291

Adjusted R-Square	0.5592
Durbin-Watson	1.8434

Then I try to run what is called a OLS regression line where my dependant variables, where my dependant variable is US dollar INR, my dependant variable.

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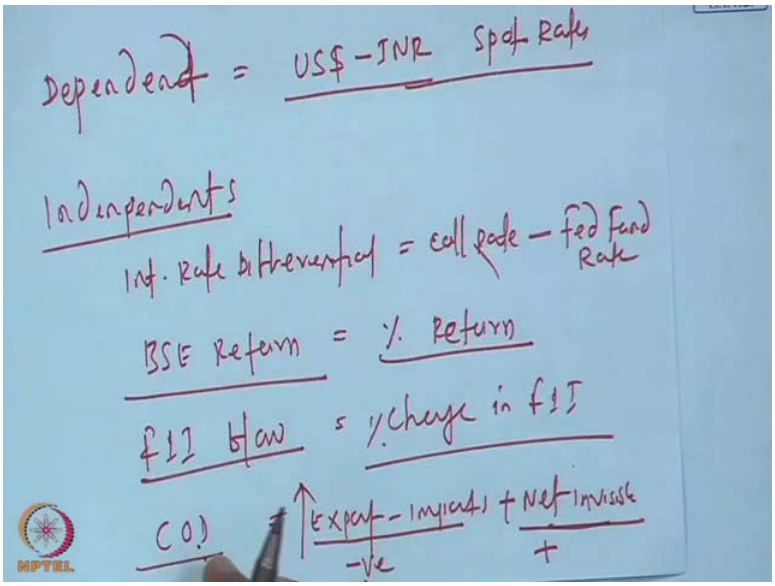

I run a regression line try to find dependant variable. My my dependant variable is US dollar INR that is Indian rupee and INR spot rate spot rate, I try to find which are the parameter try influence the US dollar INR spot rate and my independent variable, my independent variables are I have mentioned here, here independent Variable are interest rate differential interest rate differential that is that is your call rate minus fed fund rate US money market rate, fed fund rate.

Similarly, I have other variable also. Other variables are here, my other variables are here the n s BSE return BSE that is Bombay Stock Exchange Bombay Stock Exchange the return of the Bombay Stock Exchange return is percentage return. Percentage return means here the Bombay Stock Exchange, why Bombay Stock Exchange influence the foreign exchange market because when the return is high in Bombay Stock Exchange more FII will come to India.

They will invest in stock market to get good return and return also when more FII will come rupee will appreciate. This also influence the dependant variable or dependant variable is the spot rate. Similarly, I have another rate FII flow, change in FII flow change in FII flow FII may be, there may be, FII may come, FII may go, it depends upon the exchange rate, it depends upon the return. So, what are the net inflow, outflow? How it is changing in FII net change because FII inflow minus FII outflow that is the net inflow.

The net inflow how it is changing? Percentage change of net inflow may influence the spot rate that also I have taken into, percentage change on net inflow I have taken into account spot. Another rate is last one is current account deficit COD current account deficit means when our export minus import, export minus import plus net invisible net invisible net invisible means our other flow in current account, other flow in current account their dividend, interest rate, your family living expenses, some kind of transport cost all these are net invisible, India have a net invisible positive.

Similarly, our export minus import the trade deficit in India is negative, but our net invisible is positive so current account will be positive. When this will be more the, this will be more then current account may be deficit and current account deficit means India need more foreign currency rupee will depreciate rupee will depreciate. The current account deficit have a positive, current account deficit is more rupee will depreciate,

current account deficit is less that is rupee will appreciate. These all these variable primarily variables are there, how these variable have a linkage with the spot rate, how they determine the determine the exchange rate and the exchange rate in India are try to run what is called a OLS regression.

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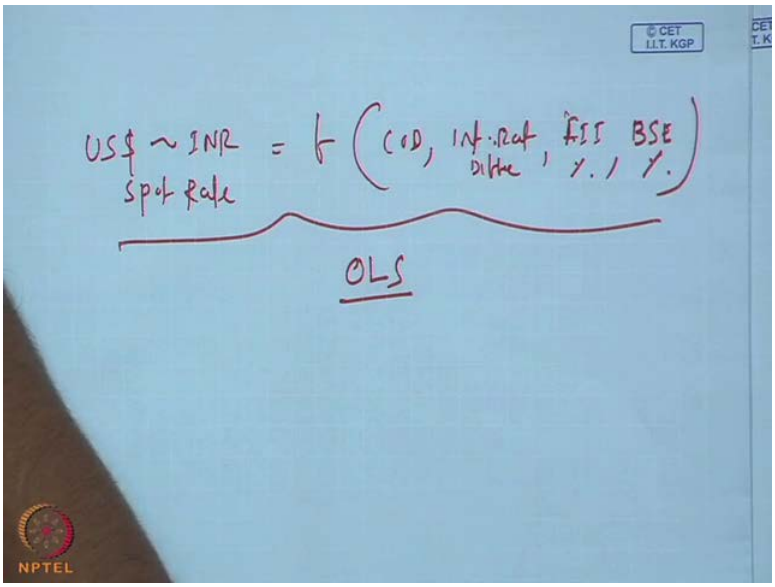

In my OLS regression as I mentioned to you that US dollar and INR spot rate is a function of current account deficit, interest rate deferential, then FII, FII, net FII percentage change, percentage change of net FII and also what is called what is called BSE returns return percentage, BSE return percentage. So, I have these are the four variable BSE return percentage, these are the four variable I try to find a equation among them through a ordinary least square OLS.

And the OLS I run using a, you can use a excel sheet, you can use excel and run the regression line also. In excel if you put all data and try to find a functional relation to issue regression line the regression will come out and it will show how these variables are linked to each other. In this context I run the regression line and you see that the coefficient, the you will see here you can see that.

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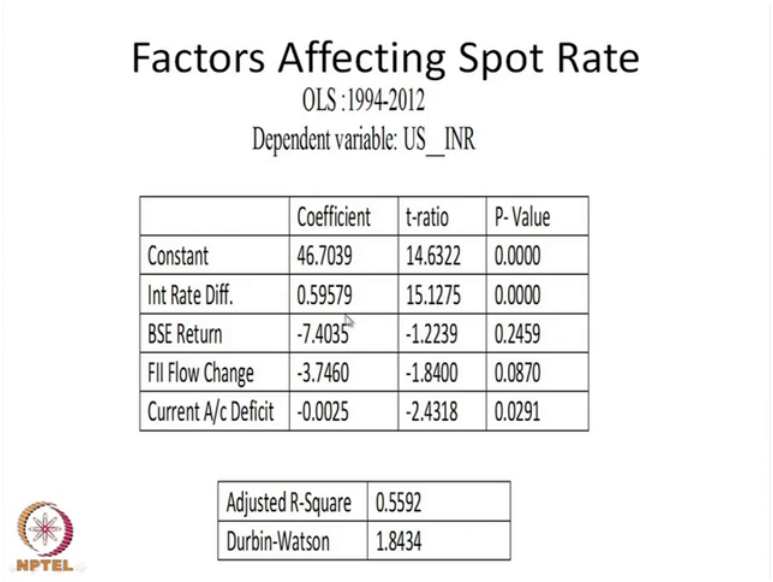

How that line, how the regression line has drawn, here the constant what is the mean value of a spot rate, mean value of the spot rate without anything over the period, I run the data 94 to 2012. The mean value of the Indian spot Indian INR and US dollar spot is something around 46.70 will other variables are remain 0 then mean value of the Indian rupee is 46.70 and interest rate differential interest rate differential has a 0.5959579 coefficient. The coefficient means if the interest rate differential is 2 percent if you multiply a 0.5959 with 2 percent you will get what is the contribution to the contribution to the spot rate by the interest rate differential.

Similarly, BSE exchange rate, BSE though it is not significant, it is not, P value indicate the significant, it is not significant BSE return is not influencing the spot rate, then FII net inflow changes it is also influencing the foreign exchange when more FIIs are coming to India the spot rate is declining. Spot rate rupee is appreciating, rupee value is appreciating negative change is more flow of FII, rupee value will appreciate. The current account deficit current account deficit also having negative also significant.

The current account deficit is more and then current account deficit is more there is current account we have taken deficit. So, minus sign is indicate the negative, the current account deficit is in less rupee value is appreciate, current account deficit is more so rupee value will be depreciating. These also influence the regression line, it is also significant if you see the P value. The adjusted R square, how much this dependant

variable describe about the independent variable, the 55 something around 50 adjusted R square 55 0.5592 55 or 56 percent of of the change in the INR it described by the, these four variable. 55 percent of our change in INR is described by the four Variable and Durbin-Watson indicate the error component, the Durbin-Watson also quite good.

It is something around 2 percent is a 1.48 percent 84 percent. So, this equation indicate that the interest rate differential, that FII, net FII's flow net, net FII flow and the current account deficit influence the spot exchange rate between Indian rupee and Indian rupee and US dollar.

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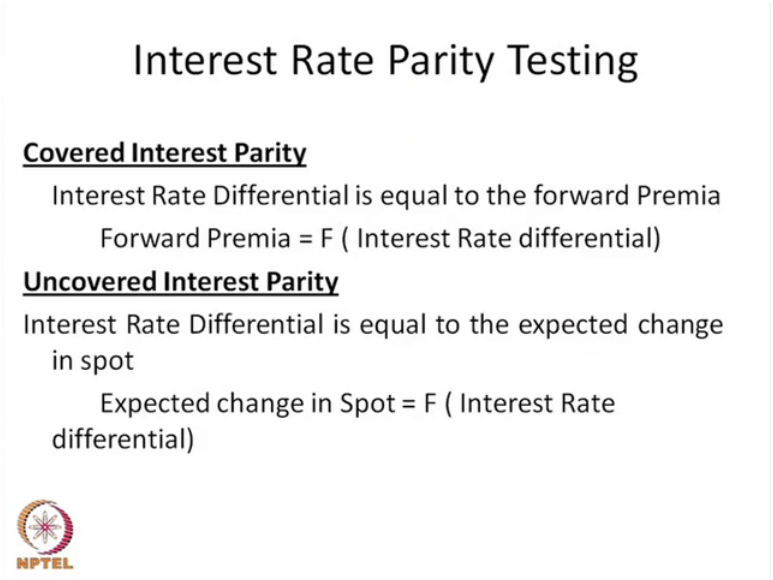

If you see what are the parity hypothesis. I told you the another major characteristic of Indian foreign exchange market is a parity. Parity here I have taken into account the covered interest parity and uncovered interest parity. Already you have discussed about that and these two parity hypothesis does not hold for India.

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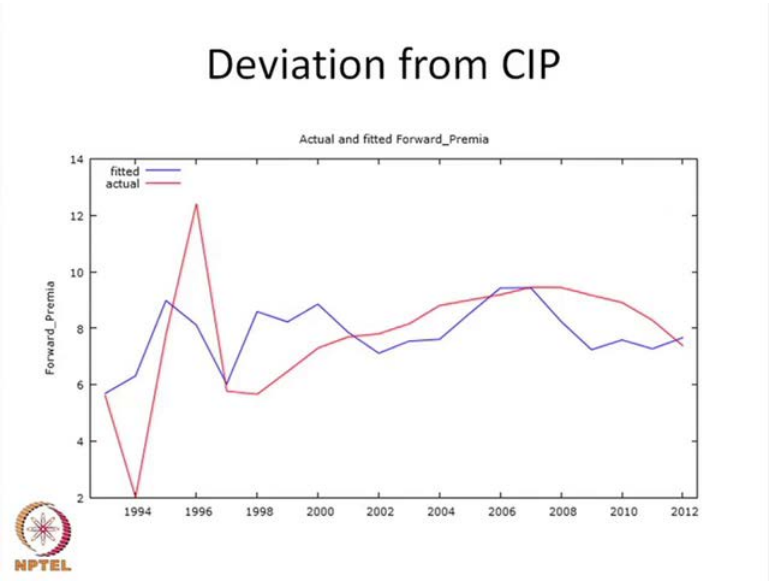

The covered interest parity is not holding for India, but however the discrepancy of covered interest parity is declining. This means Indian rupee is moving towards the parity, moving towards the interest rate parity. Similarly, however uncovered interest parity that is a spot exchange rate spot exchange rate is not reflected because of change in the forward rate or interest rate differential. This also uncovered interest rate parity is not holding, however, covered interest parity some extent moving towards the parity, deviation is declining. So, Indian rupee is moving towards the covered interest parity.

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These are the some discussion of the parity rate. However, what are the reason for not abiding by the parity. Why, Indian foreign exchange market not holding the parity interest rate parity hypothesis? What are the factors that contribute to this? If you see over the year the prime factor is high transaction cost, the transaction cost I mentioned earlier that if you look at the exchange rate Indian rupee and US dollar and go to the bank as per exchange rate. The dollar suppose around 55 rupees, the market rate is 55 25 if you purchase dollar from the bank it will be more than that at least 2 to 3 rupees extra you are paying this is nothing but transaction cost. Indian transaction cost is very high because of this reason, one of the reason the deviation of parity is occurring.

Similarly, market participant since Indian rupee is depreciating the market participant wait for further depreciation. This also lead to the non abiding by the parity hypothesis. Indian market is highly inefficient because the information is confined to few people, few authorised dealer and they are taking the advantage of market inefficiency. Inefficiencies of market also another parameter which contribute to deviation from the parity hypothesis.

Capital account convertibility, Indian at present also we do not have full capital account convertibility, control on the capital movement also influence the deviation from the interest rate parity. The high volatility of capital inflow because the FII inflow is the major major part of the capital capital inflow to India and because of their high volatility this, also effect the deviation from the parity hypothesis and another is a high inflation in India.

The real interest parity I have not I have not discussed with you this class. Earlier classes we have discussed about the high real interest parity, real interest parity is quite high in case of high inflation. The high inflation also contribute to the deviation of interest rate parity hypothesis, these are some of the characteristic of Indian foreign exchange market and this we have to understand how the characteristic have developed or evolved over the year with the liberalisation of foreign exchange market.

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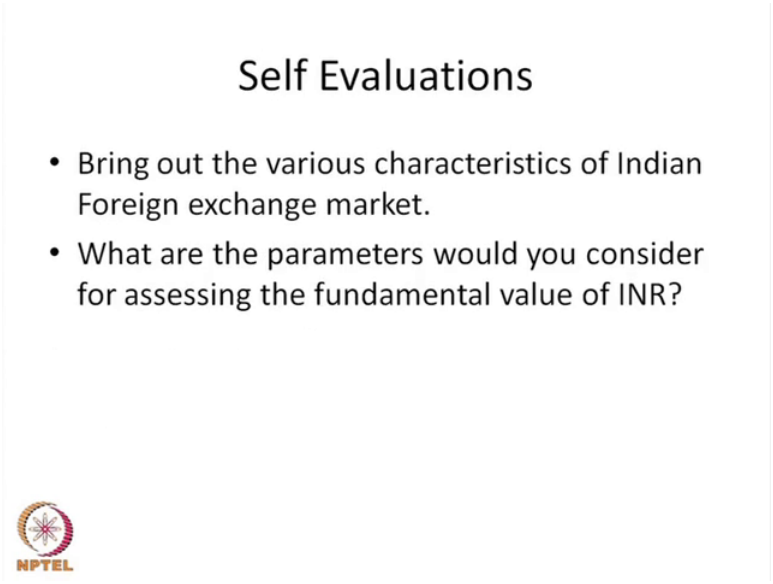

Let us discuss some of the questions, the self evaluation you can do and try to address, try to discuss the two question. The, bring out the various characteristic of Indian foreign exchange market. You have to link the characteristic with the liberalisation measure, try to address, try to discuss the characteristic like the transaction cost, like the volatility, interest rate parity, the factor affecting Indian foreign exchange market, the unorganised forward market, the participant in the foreign exchange market, who are the participant, how they are in they are influencing the foreign exchange market? How their rates are different, the spot rate difference, the merchant rate difference, how the rates are deviating from the market rate? Also, how the merchant are playing leading role in foreign exchange market? All these characteristics and discuss in this in the first question.

The second question is what are the parameter would you consider for assessing the fundamental value of INR. So, I told you the fundamental value of INR is reflected to the purchasing power parity, reflected to the real effective exchange rate. Their purchasing power parity theory primarily influenced by the what is called the inflation, the taxation, the control, the high cost of high cost of interest rate and also the arrear influenced by inflation, the trade basket, the trade relation and all this thing the fundamental value of INR.

The fundamental value of INR is derived from the our trade basket because our export and current account deficit should be less. So, our export should be more or current account deficit should be less so as to find the fundamental value of the INR. If you, India demands more foreign currency the fundamental value will decline because the, our supply of foreign currency depends upon the fundamental value. The fundamental value is more because purchasing power parity is more in India then our then our rupee will appreciate and it will get a good value in the market.

However, our export is less, imports are more or invisible are less the fundamental value also will be less. You have try to find the market value of Indian INR and try to have a link with the fundamental value of INR then you will understand that which are the parameters actually influence the fundamental value. With this let me complete the session and try to get, you can get the references for the characteristic of Indian foreign exchange market from the RBI publication, from the liberalisation measure over the year Government of India has taken, RBI has taken from the Sodhani committee report, from the from the Tarapore committee report and various issues of annual reports of RBI.

Thank you.