International Finance

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Lecture - 27
International Financial Integration

In session 27, we will be discussing about international financial integration. Here you have to understand that, what is the meaning of international financial integration? How over the year the liberalisation in domestic financial market including the foreign exchange market has helped the economy in integrating with the world's financial system, what are the benefits of financial integration, what are the difficult part of the financial integration and also we will be discussing about the features of financial integration, the variables or the parameters upon which the financial integration depends and also we will discuss how the Indian financial system over the year has integrated or about to integrate with the world financial system; that is what is the extent of integration of Indian financial market with the world financial system.

So, what is the meaning of the financial integration? When I mention financial integration we should understand that the financial integration means integration of various parts and subparts of financial system. In economy like India we have different financial markets, the different markets are like money market, capital market and foreign exchange market. Within the money market we have commercial call money market, commercial papers market, certificate deposit market and also we have government debt market, that is the short term government debt market that is treasury bill market.

Similarly, when I mention about capital market we have long term debt market which is nothing but corporate debt market and also government debt market. Similarly, we have equity market like the NSE and BSE equity market, all equities are being traded in different stock exchanges. When I mention foreign exchange market we have foreign exchange spot market, foreign exchange forward market and also we have foreign exchange futures market. These are the different segments of market and their subparts are there. How, within the money market how different segments are integrated and across the market how money market linked to capital market, how capital market linked

to forex market and the vice versa over the and the all three market how they are integrated with among each other. And when I mention international integration how the domestic financial market that is the money market, capital market and foreign exchange market of India integrated with the world financial system. That is the, that is called international integration of financial system.

You have to understand the segment type of integration at the same time we have to understand that how the entire market, the financial system is integrated with the another financial system or the world level financial system, what is called international integration.

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Financial Integration: Meaning

- Integration is a process by which segmented markets become open and unified so that participant enjoys the same unimpeded access.
- It can occur through the removal of domestic and international controls on trade in assets, goods or services.
- Financial integration leads to rapid flows of funds from 'less returns markets' to 'high returns markets' and, in this process, it brings about equality in returns.
- Return differentials across markets could cause arbitraged shifts in portfolios of investors, ultimately, bringing about an overall equality of returns across markets.

So, the integration is a process by which segmented markets become open and unified. So, that participant enjoy same unimpeded access, that is different parts and subparts of the financial market are integrated and the investor from one market to another market, they migrate themselves so as to enjoy the integration process, so as to get the benefit of financial product and financial arbitrage.

How the financial market will be integrated? The financial market integration process will start once the economy removed the domestic international controls on trade in asset, goods and services. By removing the barriers of trade, barriers of financial flow then only integration will possible, possibilities are there. Financial integration leads to a rapid flow of funds from less return market to high return market and in this process it

brings equality in returns. That is when the market, one market provide higher return the financial flow will be to, will be there to that particular market because there is no barriers in moving assets or investors from one market to another market.

So, financial integration provide, leads to rapid flow of funds from one market to another market towards to get the arbitrage opportunity and when the market become integrated the arbitrage opportunity will be almost 0, return differential across the market could cause arbitrage opportunity and arbitrage opportunity leads to flow of funds and once flow of fund takes place there will be arbitrage opportunity will be 0 and the law of one price will prevail in the integrated financial system. When law of one price prevails then financial market is integrated, to understand there, the integrated financial market arbitrage opportunity is almost nil.

In a segmented market arbitrage opportunity is very high. However in a segmented market the arbitrage opportunities prevail because investors and product cannot or the fund cannot migrate from one market to another market in a segmented market because of the barriers of, barriers are there which prevent which prevent them to migrate. So, in a segmented market arbitrage opportunities are there, in a integrated market arbitrage opportunities are not there.

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Financial Integration: Meaning

- There are mainly three traceable aspects of the growth of financial markets, which have led to financial integration.
- They are (i) significant expansion and deepening of the existing markets, (ii) emergence of new financial markets and (iii) development of secondary markets for many instruments.
- Financial markets around the world are rapidly integrating into a single global marketplace, and developing countries are increasingly becoming a part of this process.
- The process of co-integration is being driven by advances in communications and information technology, deregulation of financial markets, and the increasing importance of institutional investors who are able and willing to invest internationally.

So, when I, when I mention the financial integration on the on the basis of arbitrage opportunity we have to understand that there are three traceable area of growth of

financial, financial market over the year. The basic requirements of financial integration is removal of, removals of barriers or what is called (( )) of different kind of artificial barrier in which prevailed, which prevent in the movements of capital. The renewal is nothing but reforming the financial market. Over the year there are three traceable aspect of growth of financial market all over the world. That is what is called segment significant expansion and deepening of the existing market, markets are significantly expanding and deepening that is going for more innovation in product, emergence of new financial market, the emergence of derivative market, insurance market, different kind of what is called risk management system procedure, commodity market is the new markets evolving over the year and what is in second aspect more important is that development of secondary market for many instrument.

Earlier secondary market were not there. Now, secondary markets are there and over the counter market are not happening, exchange traded funds are there, exchange traded instruments are there and many instruments are designed for developing the secondary market for liquidity purpose, for buying and selling, for creation of liquidity and creation of what is called risk management practices. So, funds are being, funds are being used in such market where there is more liquidity, where there is risk is less and where there is, where there is possibilities of getting more return.

So, there are emergence of new financial system, new financial market and also there are emergence of what is called secondary market for new instrument or also many other instrument which are earlier present. The financial market around the world at present are rapidly integrating into a single global market place and developing countries are increasingly becoming a part to this process.

So, financial market all over the world are rapidly integrating and developing country they realise that they cannot have a OPEC financial system, they have to integrate with the world financial system so that that world financial system only provide them cheap fund and also help in their growth of their financial system and real sector of their economy. The process of co-integration is being driven by advances in communication technology, deregulation of financial market and the increasing importance of institutional investor who are able and willing to invest internationally.

The financial market all over the world, all over the world converting into a global market place and the prime investor in global market place is, are the institutional investor or the FII foreign institutional investor and they are, they have able, they are inclined to invest and they are able to invest in international market. The migration of FII from one market to another market by investing their in surplus investment they are integrating the domestic market of all over the world into a global market place where the investors, investors are able to get the benefit of the market, global market return and it is the available development of technology, communication technology and helping the world market to become a global market place and financial integration some extent is possible only because, only because removal of constraints the movement of capital, at the same time development of financial communication technology over the years.

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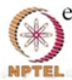
Financial Integration: Financial Liberalisation

- Progress of technical, institutional and financial innovations and the recycling of OPEC surpluses to developing countries have helped the process of financial integration.
- The integration of capital markets followed the policy initiatives, which were aimed at liberalisation and deregulation of the domestic markets in all the major industrialised economies.
- Several Latin American and Asian Countries have implemented financial reform policies in terms of elimination of government control over (i) domestic interest rates, (ii) credit allocation and (iii) exchange rate etc., in order to enhance financial integration. Countries like Korea, Malaysia, Chile, Argentina, Uruguay, Japan Hong kong, India and China are immediate examples in this regard.



And if you understand, if you see the financial liberalisation, liberalisation over the year the progress of technical, institutional and financial innovation and the recycling of OPEC surplus the oil exporting country they have surplus money, they are, they are recycling their OPEC surplus in developing country and bring them and bringing them to the world market place.

The integration of capital market is more prolonged now a days because of FII’s are investing in equity markets and the liberalisation and deregulation of domestic economy particularly the, particularly developing country economy are also providing opportunity

for investor to invest in domestic developing country equity market. Several Latin American country, Asian country have invested or or implemented what is called financial sector reform measure either forcefully or they understand that it is necessary for their economy and they have they, try to integrate with the world financial system by reforming their domestic capital market and domestic money market.

There have been reform, there had been reform in global domestic economy particular developing country economy by deregulating their interest rate, by allowing the credit and exchange rate as per the market determination process, they also enhance the integration with the world financial system or reforming their exchange, foreign exchange market. Country like Korea, Malaysia, China, Argentina, Uruguay, Japan, Hong Kong including India are the some example where they have undertaken very recently reform measure so as to so as to integrate the domestic economy, domestic financial system with the world financial system.

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Financial Liberalisation in India

- The process of financial sector reform has been continuing in India since 1991. Banking sector reforms and reforms in money market and capital market have been undertaken.
- Deregulation of interest rates and market-based allocation of resources have infused competition in the financial markets.
- Opening of current account and partial liberalisation of capital account has increased capital flow to the country.
- The deregulation of interest rates, the convergence of interest rates among the short term markets—Money, Credit, and Gilt markets-has led to integration of these markets.
- Co-movement of various interest rates in uniform direction is an encouraging sign for the growing maturity of financial markets in India.
- The process of financial integration has led to high volatility and equity market and also in exchange rate.

If these are the, these are the financial reform over the different countries have undertaking to integrate their integrate their economy into the world financial system. In the Indian context if you have to understand financial liberalisation in Indian context. India up, in 1990s they realised that the country is at the blink of a collapse because of a control, foreign control, exchange rate regime, control financial system and now time has come for them for India to liberalise the economy and the Narasimha committee

recommendation were implemented to reform their reform the financial sector of the economy and in 1991, government of India liberalised the financial market, liberalised the banking sector, liberalised the money market, capital market and for foreign for more efficiency, more productivity and more integration purpose.

The regulation or deregulation of interest rate and market based allocation of resources have infused competition in financial system of the, our, of India. The opening of current account, the partial liberalisation of capital account has increased capital flow to the, to the country. Similarly, the deregulation of interest rate and convergence of interest rate among short term market that is a money market, credit market, gilt market has led to integration of this market.

The co-movement of various interest rate in uniform direction is a encouraging sign for the growing maturity of financial market in India. The process of financial integration has led to high volatility in stock market and also in foreign exchange market. These are the some opportunity and challenges which financial integration has thrown upon us to understand and mitigate the risk. So, integration has provide some kind of opportunity, at the same time some kind of challenges to domestic economy. Domestic policy makers have to absorb this, have to abide by the integration process at the same time divide the policy measure to absorb the risk of the financial sector integration.

So, Indian context the deregulation of financial market, deregulation of interest rate, deregulation of foreign exchange market and development of secondary market for many instrument and a developed, developed the financial sector integration process and the process has been continuing since 91 92 and it has been carried out through the significant policy changes over the year. The policy changes are in the form of financial sector deregulation, banking sector reform measure and development of money market, capital market and equity market.

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Financial Sector Reforms: India

- Reforms in Money and Gilt Markets
- Deregulation of Interest Rate
- Reduction of CRR & SLR
- Opening up Current Account
- Partial liberalisation of Capital A/c
- Inflows and outflows of NRIs deregulated
- FII investment is allowed
- GDR & other forms of equity issues are allowed
- ECBs are further liberalised

Similarly, if you understand the financial sector reform measure in India in the form of a reforming the money market and gilt market. Earlier there was no secondary market for call money, secondary market for gilt, gilt traded funds. Now, it has been developed. Deregulation of interest rate, deregulation of interest rate particularly the banking sector, banking sector interest rate has been deregulated. So, very short term interest rate has developed in India, these are, these short term interest rate lead to co-movement of the different financial short term financial product and it is help in integrating the short term money market and short term foreign exchange market in India

There has been significant reduction of CRR SLR which allowed the banks to invest in invest in more productive way. Similarly, current account has been liberalised and capital account has been significant to reform over the years. The, similarly, inflow outflow of NRI has been deregulated, FII are invested in, are allowed to invest significantly in Indian stock market, Indian bond market, GDR other kind of domestic issue and the other kind of issued in the global market are being allowed for the for the domestic company and external commercial borrowing has been liberalised significantly and these are the measure where, these are the measures which provide some degree of integration, some degree of integration and maturity to Indian financial system.

Now, time has come to understand whether the integration is there or not, whether integration is in the process of development or not. To understand these we have to

identify different parameters of integration and all or we can mention that some observable data which provides some kind of information whether financial sector integration is taking place in India or not.

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Indicators of Integration

- Openness is neither directly observable nor is strictly defined.
- Openness of an economy relates to its cross-border movements of goods, services and factors of production, particularly capital and labour.
- The simplest measures is the use of the actual trade flows, such as, the share of trade (imports plus exports) in GDP or the growth rates of imports and exports.
- As regards indicators of openness to cross-border capital flows, the law of one price, which suggests that identical assets should yield same return everywhere, forms the basic measure.
- Besides (i)saving-investment correlation,(ii)cross-country consumption linkages, and (iii) deviations of actually held portfolio from optimally diversified portfolios represent the other standard measures of integration.

To understand that you have to first identify which are the indicators of integration? If you see financial some kind of literature that provides some kind of definition for or definition for integration and the definition provide some kind of some kind of indicator for integration. Generally, we mention that openness is neither directly observable nor strictly defined because nobody is defined what is openness. Openness in other way there should not be a OPEC financial system, OPEC and openness to extreme position, but in between many other thing may possibilities are there.

So, openness is neither directly observable nor strictly defined. Similarly, openness of a economy relate to cross border movement of goods, services, factor of production, particularly capital and labour. When tariff reduce over the year, tariff or the custom duty reduce there may be movements of goods and services, when you reduce the various for movement of productive resources in the form of capital and labour there may be also, some degree of openness will be there.

So, simplest measure of what is called openness or the integration is the trade flow, such as the flow of goods and services, import and export, adds a percentage to GDP. Generally, we mention that a country is relatively open if the trade as a percentage to

GDP is more than 15 percent. As regard to indicator openness, cross border capital flow, law of one price, identical asset should be priced similarly. So, the price differential, interest rate differential, return differential, these are the basic measure for or basic measure or indicators of integration.

Besides this saving investment correlation, cross country consumption linkages, deviation of portfolio return across the globe, these are the some kind of other measure which can be used for assessing the financial sector integration. To, using this measure whether it is possible for us to understand the extent of integration in Indian context also.

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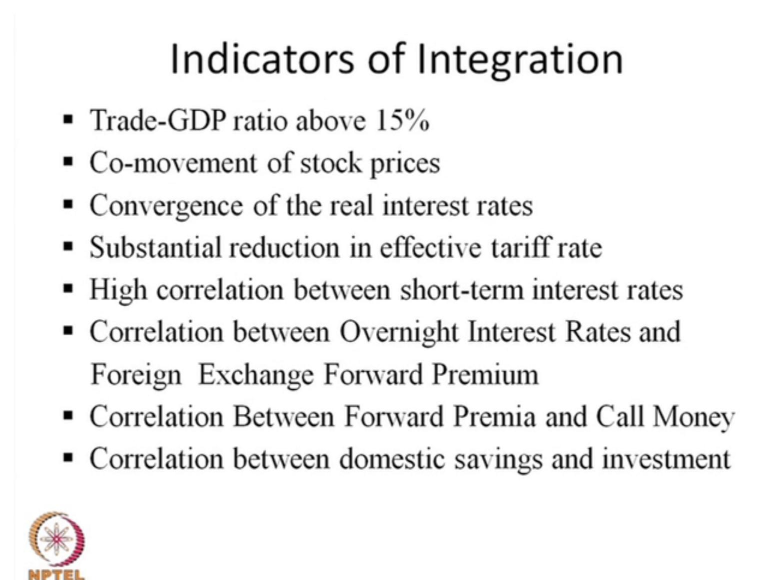

So, what we have discussed the the indicators of integration, the trade GDP ratio above 15 percent. The co-movement of stock prices, the convergence of real interest rate, reduction of effective tariff rate, high correlation of short term interest rates, the correlation between overnight interest rate and foreign exchange forward premium, correlation between forward premium and call money rate, correlation between domestic saving and investment, these are the some indirectly measures of integration or indicators of integration. When I mention trade GDP ratio we have to understand that trade is your export import. When I mention about co-movement of stock prices you have to understand the return of national stock exchange in India that is NSE, returns of returns of NYSE or NASDAQ in USA.

When I mention the convergence of real interest rate you have to understand the short term interest rate that is call money rate in India and fed fund rate in US, when I mention the high correlation short term interest rate you have to understand that in India short term interest rate should, the call money rate should move along with the fed fund rate of US. Similarly, when I mention about overnight interest rate and forward premium, foreign exchange forward premium and understand that the interest rate differential in India and abroad should reflect the forward premium. So, that there will may not be any kind of arbitrage opportunity available in the, in converting domestic, domestic currency to abroad currency and abroad currency in domestic currency. When there is no arbitrage opportunity there will be market integration.

So similarly, correlation between forward premium call money rate. Since, call money rate is a, call money rate is the shortest short term interest rate, very short term interest rate, the forward premia should move along with the call money rate. So, that there will be integration of financial market. Correlation domestic saving investment because when the correlation is high between domestic saving and domestic investment that means the country is not depend upon foreign investment and foreign resources. The country is, what is called what is called the OPEC in nature. When foreign investment provide some degree of saving to the domestic economy, domestic investment there will be integration in financial system. So, these are the some kind of indicators of integration and using this indicator we have to understand the extent of integration in Indian financial market.

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FII, FDI and Trade-GDP Ratio

First 10 Year of Reforms (US$ Million)

Year	FDI	FII	Trade-GDP
Mar-93	315	244	15.11%
Mar-94	586	3567	16.03%
Mar-95	1314	3824	16.51%
Mar-96	2144	2748	18.67%
Mar-97	2821	3312	18.16%
Mar-98	3557	1828	18.08%
Mar-99	2462	-61	17.64%
Mar-00	2155	3026	18.63%
Mar-01	4029	2760	20.03%
Mar-02	6130	2021	19.34%

Next 10 Year of Reforms (US$ Million)

Year	FDI	FII	Trade-GDP
Mar-03	5035	979	21.83%
Mar-04	4322	11377	22.99%
Mar-05	6051	9315	27.03%
Mar-06	8961	12492	30.24%
Mar-07	22826	7003	32.88%
Mar-08	34843	27271	33.45%
Mar-09	41873	-13855	39.35%
Mar-10	37745	32376	34.21%
Mar-11	34847	31471	36.83%
Mar-12	46553	17410	42.97%

If you see the FII foreign institutional investment, foreign direct investment, trade GDP ratio in Indian context I try to try to find the, all these thing in two different phases. In India we have liberalised their economy in 92 93 and till 92 93, till from 92 93 to 2002, 10 years of integration and 2003 to 2012 another 10 years of integration.

So, Indian economy since 93 has passed through 20 years, the 20 years of integration, 20 years of development has provide some degree of integration to the Indian financial system. So, I has define it two different phases 10 years each and try to understand the the movement of integration or the process of integration or the extent of integration in two different phases of the financial sector reform. If you see the first 10 years of reform that is 93 March to 2002 march the FII, the FDI and trade GDP ratio. The trade GDP ratio if you see that increase significantly. Significantly from 15.11 in 93 94 93 March to 19.34 there has been, there may be jump of 4 4 percentage over the 10 years.

Similarly, FII and FDI has increased significantly in US dollar million, I have mention here so when 93 India got the investment of foreign direct investment 315 million has increased to 6130 million. Similarly, FDI investment FDI investment 315 million to 600 6130 million, significant jump in FDI. Similarly, FII investment that is portfolio investment in bond and equity market, this also significantly increased over the year. There may be some fluctuation because of the because of some inherent problem in domestic economy and during that phase.

However world recessions were there during this period also. However, there has been significant increase since 93, 93, 94, 92, 93 to 2001 2, trade GDP ratio increase significantly during the 10 years. However, if you compare this first 10 year to the next 10 year, next 10 year start from 2003 to 2012. So, this ten year that has been significant, very large differences these two phases of reform.

The first phase is was the, what is called, what is called reform process, then second phase is the is the result or fruits of this reform. These fruits of this reform are consolidation of these reform measures, the consolidation phase has given rise to significant job in FII investment, FDI investment and also significant increase in foreign trade GDP ratio. The first you let us understand the trade GDP ratio. Trade GDP ratio increase almost double from 21.83 to 42.97, the almost nearly 50 percent of our GDP trade is in the, as percentage GDP.

So, trade is export import both together, so 50 percent of our trade is in the, as a percentage of GDP is significant measures, significant increase. Similarly, FDI investment nearly 5035 million to increase to 46553 million; so significant jump in FDI over the FDI investment in India. The FII investment also fluctuating however significant jump is there nearly 17410 million 10 million of US dollar invested in 2002 2012 march, up to 2012 march. These are significant jump in FII investment over the year.

So, the two period the period of reform and period of consolidation, 10 years each I have put, there was a significant change in the trade GDP ratio, FII investment and FDI investment which indicate Indian economy is on the on the process of financial sector reform or may be in the I can tell, I can mention here Indian economy is progressing, has been progressing towards more integration, integration way and try to, has been integrating with the world system progressively.

So, trade GDP ratio, FII investment, FDI investment, some degree of these are the indicator which provide some, provide some kind of information about the integration of Indian economy or the progressive, progressive integration of Indian economy with the world financial system.

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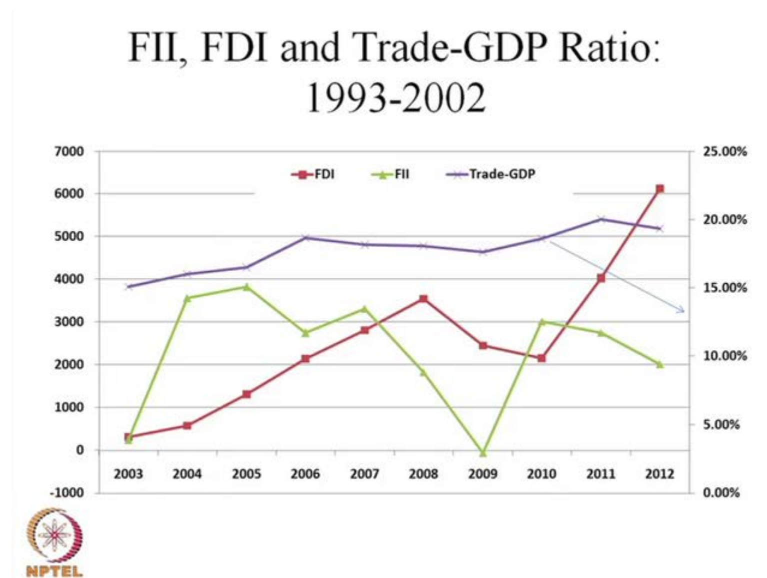

If you see the graph here I have put the FII, FDI, trade GDP ratio 93 to 94, 2002 the first phase of reform, the reform phase, reform phase there has been significant increase in

FDI the rate rate per rate, this is the they indicate the FDI increase significantly. The significant increase from 2003 to 2009 2008 after that there will be recession in world economy and there is significant decline after that.

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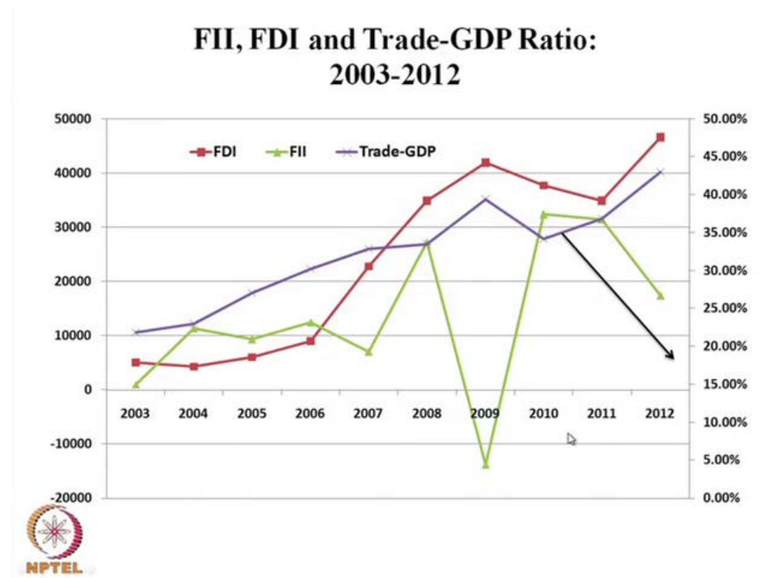

If you see otherwise 2003 to 2009 12 there is significant improve in FDI, FII and also fluctuation is there in FII investment because of the world recession phase and however trade GDP ratio significantly increase over the year over the year and trade GDP ratio somewhat nearly 40, more than 40 percent, 40 percent GDP. So, this is a clear path that world Indian economy in, on the verge of high integration with the world financial system.

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Stocks Price Return: BSE & NASDAQ

First 10 Year of Reforms

Year	BSE Return	NASDAQ Return
1993	2.58%	14.75%
1994	3.93%	-3.20%
1995	38.35%	39.92%
1996	-19.67%	22.71%
1997	1.88%	21.64%
1998	6.14%	39.63%
1999	-11.70%	85.59%
2000	56.35%	-39.29%
2001	-4.73%	-21.05%
2002	-26.85%	-31.53%

Next 10 Year of Reforms

Year	BSE Return	NASDAQ Return
2003	0.61%	50.01%
2004	44.97%	8.59%
2005	33.15%	1.37%
2006	42.08%	9.52%
2007	42.50%	9.81%
2008	39.23%	-40.54%
2009	-25.97%	43.89%
2010	27.24%	16.91%
2011	20.19%	-1.80%
2012	-7.53%	15.91%

If you see otherwise, if you analyse the stock market side, stock market price return. I have taken into account the BSE return and the NASDAQ return and the 93 same two phases of, two phases of financial sector reform, one phase is called from 93 to 2002 is the phase of reform measure and second phase is 2003 to 2012 is a consolidation phase of reform. These two phases have deferent scenario for us, if you see the BSE return is fluctuating over the year same thing also NASDAQ return.

And at the same time BSE return here and BSE return, NASDAQ return is here, those are, those, these two indicate that whenever there is a movements of a NASDAQ there also a movement of, movement of the Indian equity market.

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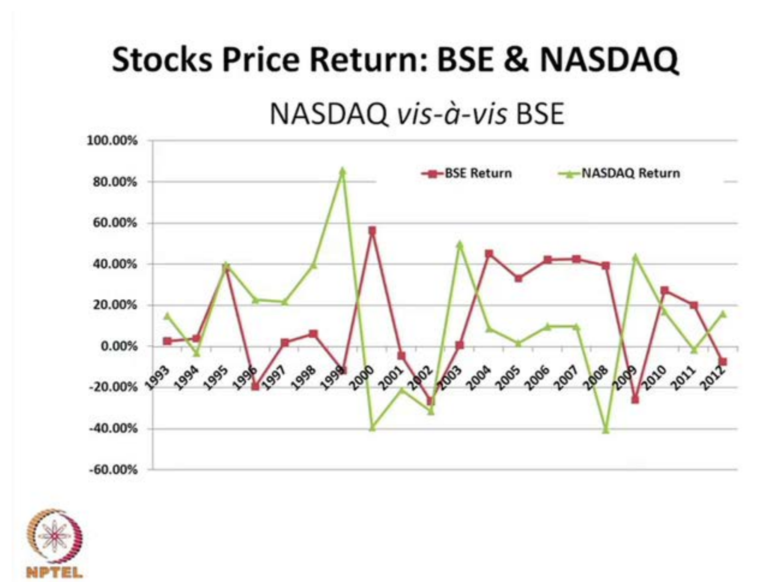

Because FII's are FII's are there in both market and both investors are same if you see compare in FII side. So, FII's are pulling the Indian stock market and similarly, FII's are also pulling the Indian, the NASDAQ market. Two markets are almost moving in a same tandem, same way, this indicate that stock market in India, some extent of moving with the world financial system, that is the NASDAQ stock exchange as a representative of the world financial, world stock market. So, I have, these two markets are moving, the returns of the two markets are moving in a same tandem which indicate that Indian equity market some extent integrated with the NASDAQ market or the world financial market.

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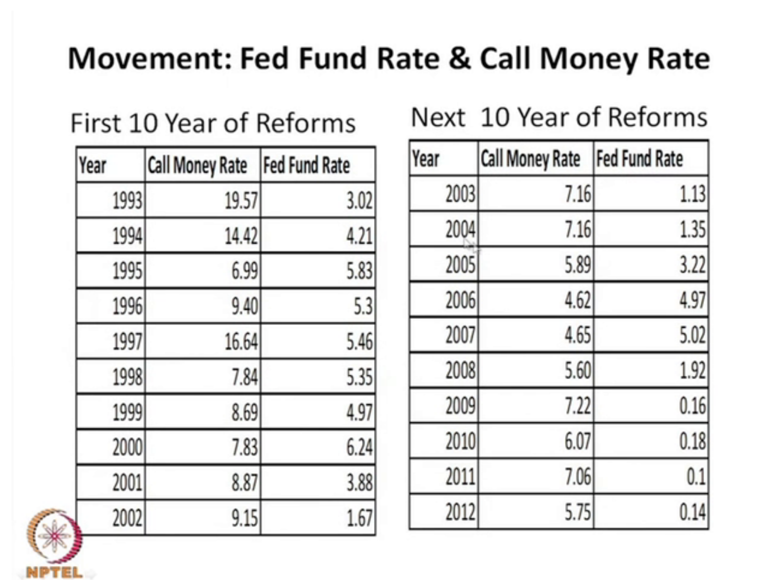
Movement: Fed Fund Rate & Call Money Rate

First 10 Year of Reforms

Year	Call Money Rate	Fed Fund Rate
1993	19.57	3.02
1994	14.42	4.21
1995	6.99	5.83
1996	9.40	5.3
1997	16.64	5.46
1998	7.84	5.35
1999	8.69	4.97
2000	7.83	6.24
2001	8.87	3.88
2002	9.15	1.67

Next 10 Year of Reforms

Year	Call Money Rate	Fed Fund Rate
2003	7.16	1.13
2004	7.16	1.35
2005	5.89	3.22
2006	4.62	4.97
2007	4.65	5.02
2008	5.60	1.92
2009	7.22	0.16
2010	6.07	0.18
2011	7.06	0.1
2012	5.75	0.14

If you see the movement of fed fund rate and call money rate, the fed fund rate and call money rate also moving in a same manner. I have compared the reform measures that is 93 to 2002 and the consolidation phases 2003 to 2012 both are there with the, with you. We can see that when the both markets are moving in tandem the fed fund rate and call money rates are moving in together which indicate that there is there is some degree of integration of short term interest rate in India, with that is Indian side it is a called money rate and the abroad side it is a fed fund rate of US. These two short term interest rates are moving in together which indicate that some degree of integration is there.

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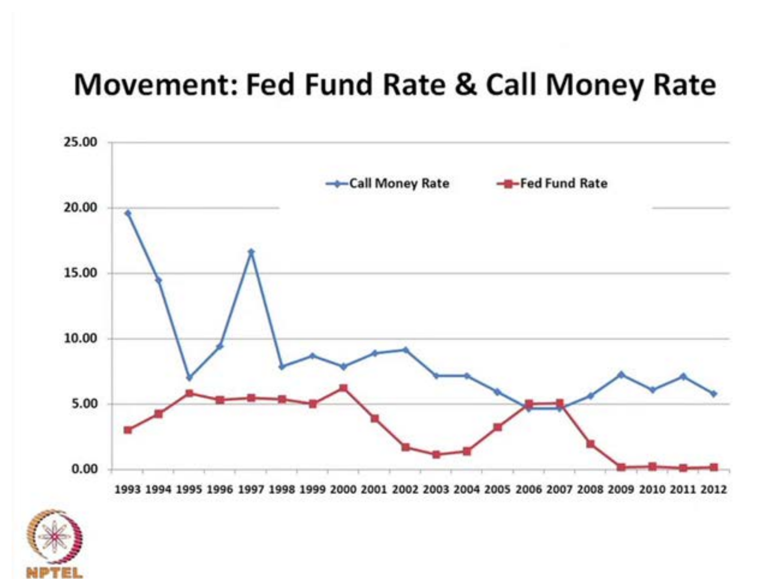

If you see the graph 93 to 2012 I have taken the call money movement and the fed fund movement, both are moving together almost together and indicate that some degree of relationship is there between fed fund rate and the call money rate. The relationship indicate the integration of two markets, integration of these two markets the short term markets of US and short term markets of India, these two markets are moving together which indicate some degree of integration.

If you go to the, if you observe the movement of forward premium and call money rate, the forward premium as I mentioned earlier to you is the when somebody convert the domestic currency into abroad currency or abroad currency into domestic currency, try to take the arbitrage opportunity. The arbitrage opportunity will be reduced because of the forward premium and the forward premium indicate that the fluctuation side of the exchange rate. If the forward premium and short term money market rates are moving together then you can say the two markets are integrated.

So here I have taken 10 years reform measure, 10 years each period and try to find out call money rate and forward premium. 3 month forward premium and try to see whether that two markets are moving together, two rates are moving together. If two rates are moving together then two the markets are integrated.

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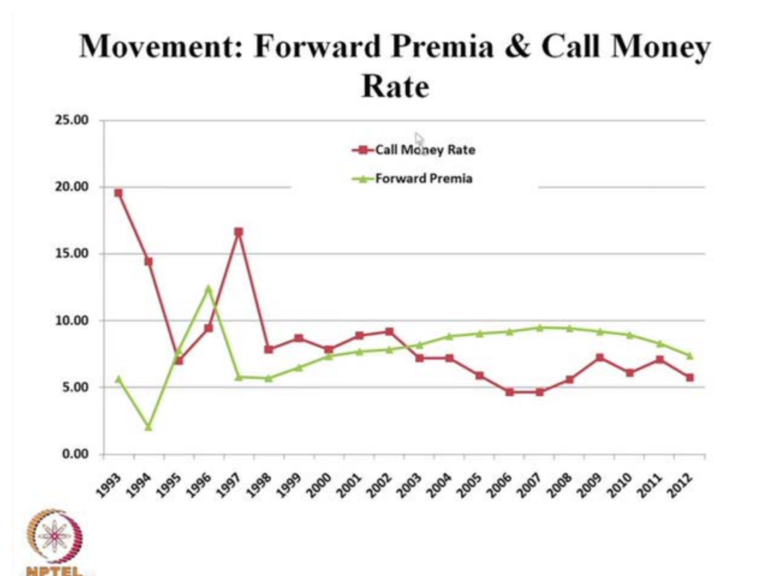

If you see the graph, if you see the graph the call money rate the call money rate and forward premium 3 month forward premium are moving almost similar phases, almost

similar because these two market provide opportunity for arbitrage. If the two markets move together there is no opportunity, upper arbitrage if there is no opportunity for arbitrage markets are integrated. So, law of one price prevail here. Since, the two market moving together there is no opportunity for arbitrage, if there is opportunity, suppose a rupee a rupee Indian INR and dollar the discrepancies are there then somebody will dollar interest rate and Indian interest rate are two different, differences are there. Then somebody might purchase take loan from US market in the form of dollar and convert the dollar into Indian rupee, take the advantage of high interest rate in India and this is arbitrage opportunity.

This arbitrage opportunity will not be there with a forward premium equivalent to interest rate differential. Since, interest rate differentials and forward premiums are same there is no arbitrage opportunity. So, arbitrage opportunity will be very less, there less part is only because of the transaction cost. Here the arbitrage opportunity possibilities are there if the call rate and the forward premium deviation is deviation is very, very large beyond the transaction cost there will be arbitrage opportunity.

So, I have say we, we have put the graph of forward premium and call money rate and these these forward premium call money rate discrepancy over the years is reducing and this indicate that progressive, progressive nature of financial sector integration.

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Correlation Matrix

	Correlation	
	First 10 Yr of Reforms	Nex 10 Yr of Reforms
Call Rate & Fed Fund Rate	-0.32	-0.78
Call Rate & Forward Premia	-0.45	-0.36
BSE & NASDAQ	-0.17	-0.65

So, similarly, if you see the correlation matrix the call money rate and fed fund rate whether they are highly, they highly correlated or the correlated correlation indicate the together movement, the co-movement. The co-movements are very high whether positive or negative, the co-movements are very high over the period co-movement increase.

If you see the first 10 years of reform the call rate and fed fund rate the correlation was minus 0.32 very less. However, next consolidation phase of reform that is 2003 to 2012 the co-movement has increased significantly, that is correlation is very high. So, they are moving together in a stringent way or moving together indicate that there is a integration of two markets.

Similarly, if you see a call rate and forward premium the forward premium call rate, these two together also moving, same almost same pattern. Similarly, if you see the BSE NASDAQ return and the Indian Bombay stock exchange return, the return is also moving. So, almost very high, very high correlations are there and the correlation increase significantly later part of the reform measure. So, this is also indicate, this also indicate the Indian market are, Indian market is moving as far as the world market and the progressive nature of integration is there.

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Interest Rates Parity Hypothesis

- International Parity conditions provide criteria for measuring the degree of integration between different world markets.
- The Covered Interest Parity (CIP) theory postulates that spot and forward exchange rates quoted at the same instance in time, tend, in general, to diverge exactly in line with the short-term interest rate differential on identical assets across countries.
- The equilibrium condition implied by the hypothesis is expressed as:

Domestic interest rate(I) - Foreign interest rate(I*) = Forward Premia (FD)

But if you compare, these are some indicative part of the integration. We have discussed here the integration part of the integration is that the co-movement of what is called high

trade GDP ratio, the co-movement of call rate and fed fund rate, co-movement of NSE and NASDAQ, BSE and NASDAQ, co-movement of forward premium and call rate, the correlation of all these parameters, the high correlation indicate the movements are taking place in a similar way. So, movements are co-movements are there a very high amount, this indicate that the integration is taking place in Indian context also.

Though however, if you analyse the economic theory the interest rate parity hypothesis which we have discussed earlier session that interest rate parity hypothesis provide the ideal measure for the integration of financial market. There are two different kind of interest rate parity, as I mentioned earlier discussion that interest rate parity hypothesis covered interest parity and uncovered interest parity. Covered interest parity reveals us that or postulate that the spot interest rate differential between two different currency should equal to the forward premium.

If the interest rate differential is equivalent to the forward premium, there cannot be arbitrage opportunity. However, if you compare the Indian interest rate and US interest rate, if you see the covered interest parity of two country.

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Here US interest rate, Indian interest rate i I put minus the US interest rate I put i this is equal to forward premium. This equivalent to the forward premium so Indian interest rate suppose at present, short term interest rate is going around 6 percent and minus US interest rate at present is going around short term interest rate is going around 2 percent.

This is a the, there is a difference of 4 percent. The 4, the 4 percent difference is supposed to be equivalent to forward premium. Then there may not be any kind of arbitrage opportunity and two markets are integrated, but here you have to look at the forward premium and the interest rate differential. This interest rate differential should be equal to the forward premium, this is nothing but what is called covered interest parity hypothesis, covered CIP covered interest parity hypothesis, covered interest parity hypothesis. But question is here why these two will move together, if there is no movement what will happen? If the two are not moving together and the difference are not equivalent to the forward premium then what will happen to the domestic arbitrage opportunity.

Here the Indian investor, Indian investor we have to borrow from US dollar and at at the rate of at the rate of 4 2 percent and convert into Indian rupee INR and in a and get at the at the interest rate, at the rate of 6 percent and this 6 percent and repay after 1 year 1 year convert the Indian rupee again to US dollar and repay the loan to the US company. So, here they will get the arbitrage opportunity of 4 percent. The arbitrage opportunity will not be available after suppose, after 1 year rupee depreciate by a 4 percent that is today the forward premium, forward premium equivalent to 4 percent there will be no arbitrage opportunity available to us.

So, this covered interest parity hypothesis mention here the interest rate differential should equal to the forward premium, if the these two happen the market will integrated.

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Interest Rates Parity Hypothesis

- The Uncovered Interest Parity (UIP) hypothesis equates interest rates differential with expected change in spot rate.
- In other words, if the market is efficient then current forward rate, which reflects the interest rate differential, should be equal to the future spot rate.
- The equilibrium condition for UIP can be expressed as;

Interest rates differential = expected change in spot rate

Similarly, uncovered interest parity you have to understand the uncovered interest parity.

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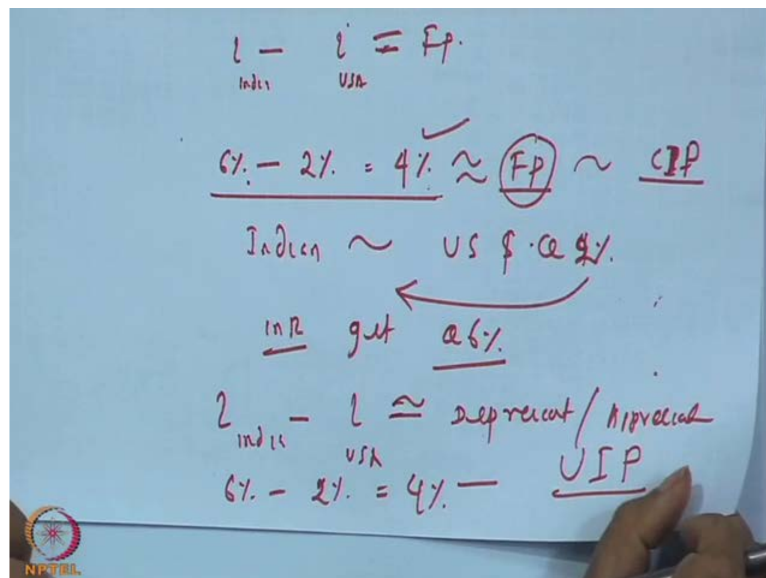

The uncovered interest parity is mentioning us the interest rate differential that is Indian interest rate minus the US interest rate should be equal to, should equal to the depreciation or appreciation of rupee as per the as per the nature, depreciation or appreciation of rupee.

So, what is mean? If if US interest rate is this, this example, same example 6 percent minus 2 percent is equal to 4 percent the rupee will depreciate by a 4 percent. Then there

will not be any arbitrage opportunity. Similarly, similarly, is a depreciation appreciation should be reflected by the interest rate differential in case of UIP uncovered interest rate parity hypothesis, the depreciation or appreciation should be equal to the interest rate differential.

In case of CIP hypothesis covered interest parity hypothesis depreciation appreciation should be equal to the interest rate, interest rate differential should equal to the forward premium. These two you have to understand and these two provide a indirect way of assessing financial integration.

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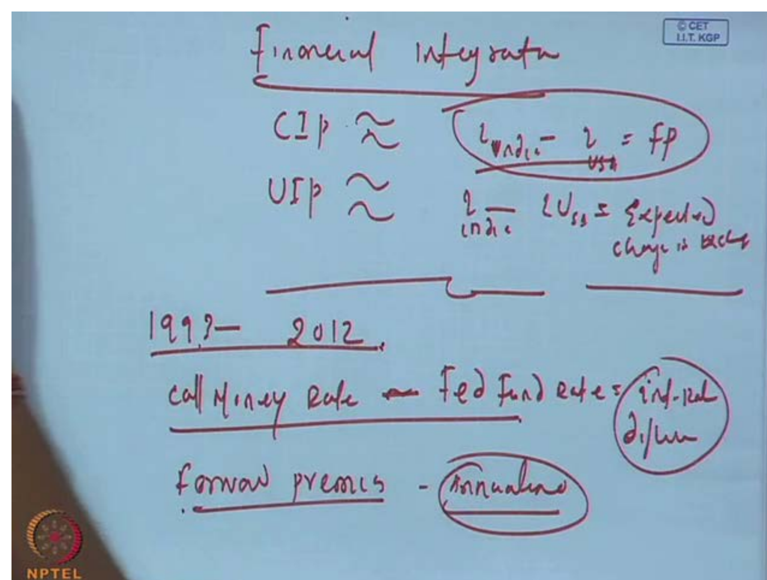

When there is financial integration you have to understand this financial integration lead to financial integration or international financial integration, international financial integration lead to covered interest parity that is interest rate differential in India minus interest rate, interest rate in US should equal to the forward premium.

In case of UIP uncovered interest hypothesis the interest rate differential in India and US, India and in US equal to the rupee change, depreciation of appreciation of expected change in the exchange rate, expected change in exchange rate, expected change in exchange rate. This should be there then there is a, there is what is called a financial sector integration is there.

How otherwise the in domestic market is integrated with the world financial market or whether it is possible in case of India, we have to understand that. What I have done here I have taken the covered interest parity and uncovered interest parity, what I have done here last 10 years the 20 years data I have taken, last 30 year data starting from 1993 to 2012 data, here I have taken call money rate, call money rate minus the fed fund rate, fed fund rate for and I mentioned here what is called interest rate differential and interest rate differential. These two rate differential I have taken over the 93 to 2012 annual data and converted into a difference I have taken interest rate differential.

Then I have taken what is called the forward premium. Annualise forward premium I have taken, forward premium annualise, forward premium annualise I have taken and try to find these two rate are moving together, that is CIP interest rate differential equal to forward premium. CIP hypothesis I want to test so I have taken the call money rate minus the fed fund rate and try to, the differential I have taken as in the form of a interest rate difference and the forward premium annualise I have taken from 93 to 2012, the graph you can see here.

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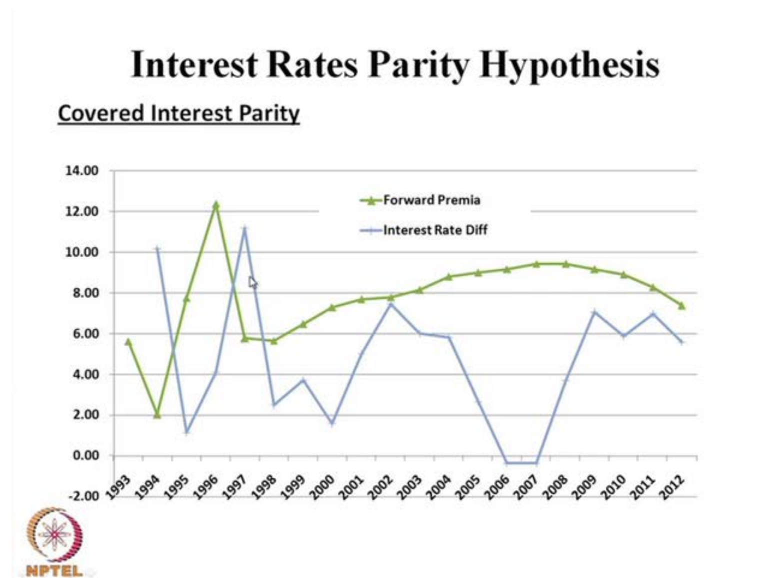

The graph here the green is you are looking at the forward premium, forward premium is a green and the blue is the interest rate differential. Here I have taken the percentage here, difference in interest rate percentage, interest rate differential. Here I have taken the year y axis is the interest rate differential, x axis is the year and blue is looking, giving us

the blue graph, blue graph is interest rate differential, green graph is the forward premium. If you see initial year it was very high differential after 93 98 91 this graph is moving very high.

However, in case of 2006 7 4 6 7 8, these are 6 7 8 is the, is a period of period of what is called recession or the world financial crisis period. So, domestic economy was control so as to not allow any kind of negative aspect of the financial integration to the domestic part. So, it is this part we cannot compare however after 2008 these two are moving together. So, it may happen that after 2012 if I take 13 14 graph then we will find the two parts moving together.

However, these two cannot be equal. Why? There may be some transaction cost also involved. The transaction cost we have to reduce so transaction cost may not, the arbitrage opportunity may be there because the arbitrage opportunity is there the transaction cost also there. So, you have to remove the transaction cost you will see that these two graphs also moving together. Similarly, I have taken the uncovered interest parity.

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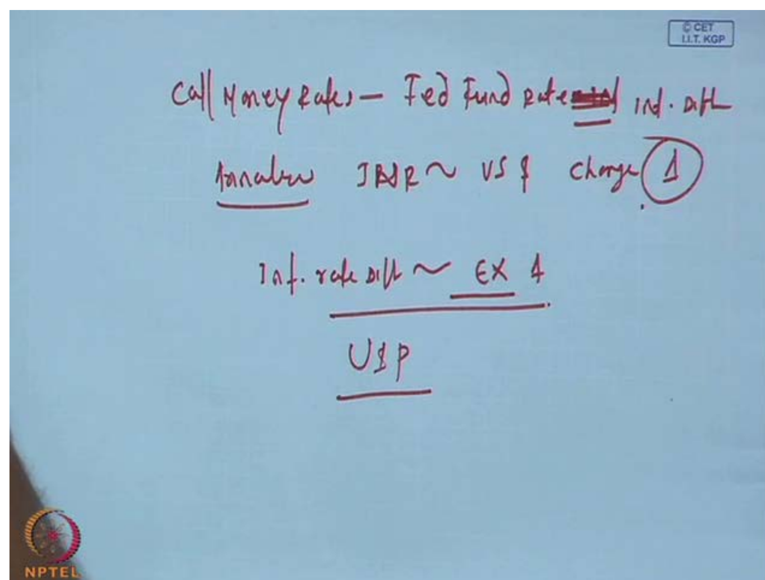

In case of uncovered interest parity what I have done, I have taken the call money rate call money rate minus fed fund rate, I put as interest rate differential. This is nothing but interest rate differential and I have taken the annualise INR and US dollar rate depreciate change, that is percentage change and try to find this interest rate differential and the

movement of a exchange rate change, exchange rate, exchange rate change, what is the relations? Because this is UIP hypothesis telling us uncovered interest parity, interest rate differential should be equivalent to the expected change in exchange rate spot rate.

So, I have taken annualised data, annualised call money rate, annualised fed fund rate differential and say rupee dollar exchange rate percentage change every year and try to find percentage change is telling or the spot exchange, expected change in exchange rate. Try to find the whether UIP hypothesis revealing something to us about financial integration, if these two are almost same then you can say integration is there, these two if you see uncovered interest parity see the graph here.

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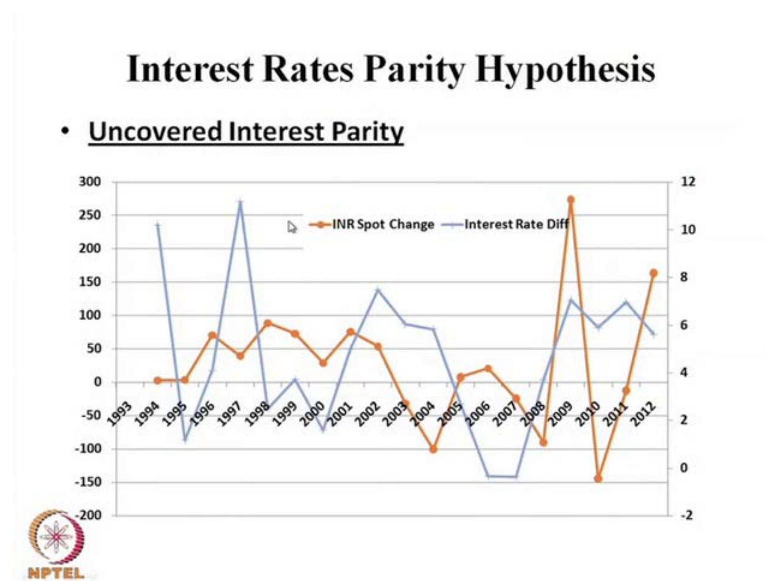

See the graph is the uncovered interest parity also the blue INR spot change is the red, light red colour graph and the interest rate change differential is the blue colour graph. If you see these two also moving together, that two are moving together this indicate some degree of integration is there. However, these two are not moving together only, there cannot be equal together. Why? Because interest rate parity hypothesis can only be equal if risk perception is almost 0 within two markets, the political uncertainty is 0 almost two market. There should be complete capital account convertibility between India and between US dollar and India, US dollar and Indian rupee.

So, capital account convertibility cannot be complete, risk perception cannot should be there and difference will be there, this may be because may be because of this reason

these two cannot equal, but these two can move together, moving together or co-movement indicate some degree of integration. This also indicates some degree of integrations are there. So, integration is moving in a moving in a systematic way.

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Extent of Integration

- FII and FDI investments in India rising
- Trade-GDP ratio has been increasing significantly.
- Stock returns moving in tandem
- High correlation between call money and fed fund
- High correlation between stock returns
- CIP and UIP though not observed, however there discrepancy has been reducing.

So, what you understand so far the extent of integration. If you analyse all whatever the variable we have consider or the indicators we have consider, we can observe that some degree of, some degree of integration is there between two country. So, here the FII extent of integration if you analyse for Indian context the FII and FDI investment in India rising, this indicate some degree of international Indian markets are integrating with the world financial system, trade GDP ratio has been increasing significantly, more nearly 45 percent trade GDP ratio over the since 93 94. This indicates that so Indian financial market or trade flow of trade flows are there so Indian financial market integrated with the world financial system.

Stock market returns are moving in tandem, NASDAQ and BSE are moving together, this indicate the some degree of integration is there, there are high correlation between call money rate and fed fund rate. This indicate also some co-movement of short term interest rate, then a high correlation between stock return this indicate co-movement of returns in a stock market. CIP hypothesis though it is not observed in case of India however there are the discrepancy has been reduced over the year, this indicate that interest rate parity hypothesis is moving in progressing, progressing in a rapid manner

which indicate some degree of integration of Indian financial market. So, what are the drawbacks of, these are the some kind of integration or indicators of integration and Indian we have observed that Indian financial market moving to, moving at the rapidly towards the path of integration.

But integration provide some kind of challenges. The challenges are huge in nature. The first challenges is that when markets are integrated we get the benefit at the same time we also share the risk. The risk of volatility, risk of volatility has increased Indian stock Indian market. If you have seen rupee dollar there are what is called high volatility Indian stock market after the 93 94 we have seen very high volatility in Indian stock market because of the integration part.

The FII's are pulling money whenever they want to invest in other market. So, these pulling out of from the domestic market there is high volatility in the stock market. We have seen speculative attack on Indian currency that is INR, Indian currency was depreciated significantly over the year, the speculative attack because of the integration part. Integration leads to leads to risk, the world financial market risk has also come to the India and one Indian market also now exposed to financial sector risk of world market.

These are the challenges and then and at the same time, India at the same time RBI is not in a position, Indian central bank is not in a position to control the market because of the because of the high path of integration. Whenever they take a step to reduce the inflation, to reduce a domestic speculation of Indian currency, reduce the volatility in the market, they have to expose to the world financial system. The world exposed to Indian financial so world financial system has provide some degree of challenges on the part of the domestic monetary authority to control the world, domestic economy for the benefit of the domestic, domestic market.

So, when the when our markets are integrated with the world financial system the domestic monetary policy very difficult to manage and very difficult to control the world financial system and these are the some challenges which we have to, we have to accept because integration, integration with the world financial system is the order of the day. And we have to accept the integration, we have to integrate over the world financial

system at the same time we have to also take care two different policy measure to safeguard the own domestic economy from the speculative attack of world financial risk.

These all, these are the challenges and the references are there, here you can see the go through the references international finance by Thomas J O'Brien, international financial management by P G Apte. You can go through the book and see the some kind of integration of, some kind of discussion on the integration of domestic economy. And here model question I have designed for you, some model questions here while defining international financial integration describe various indicators of financial integration. So, we have to define what is financial integration and what are the indicators available to assess the integration.

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Model Questions

- While defining international financial integration, describe various indicators of financial integration.

- In the Indian context describe the movements of various indicators of international financial integration.

You have to defining, while defining financial integration, you have to define that the law of one price nothing but the nothing but prevail, the financial integration. When financial integration is there, there will be one price prevail in the market. So, that is as a, and one that investors are investor will not get any arbitrage opportunity. That is called a financial integration. So, the indicators of financial integration as I mentioned earlier there indicators are very difficult to, very difficult to measure the financial integration.

However, there are some indicators are there which provide some degree of clue to observe the integration process. Then the indicators are as we discussed at trade GDP ratio, FII, FDI investment that you have, we have discussed about interest rate parity, we

have discussed about short term movements of interest rate, the high correlation of short term interest rate, these are some indicators of integration we can discuss in the question.

In the second question I have mentioned here in the Indian context describe the movements of various indicators of international financial integration. As I, we have discussed last 20 years different indicators like FII investment, FDI investment, trade GDP ratio, call money movement along with fed fund rate, call money movement along with a forward premium, then also we have discussed Indian context the CIP hypothesis uncovered interest hypothesis, we have also discussed the returns differential in stock market of NSE, BSE and NASDAQ. You can discuss about NSE and NYSE. We can discuss about London exchange rate and Indian exchange rate, we can also discuss about other indicator of integration in a financial flow financial flow to GDP, these also part of the indicator process, this is and using the data from RBI website we can discuss other indicators of integration like the financial flow, like current account deficit to GDP, these are the some other indicators of current, other indicators of financial sector reform.

Thank you.