

**THE NATURE AND DETERMINANTS OF FOREIGN
CAPITAL INFLOW : WITH SPECIAL REFERENCE TO
INDIA, 1993-97**

Dissertation submitted to the Jawaharlal Nehru University
in partial fulfilment of the requirements
for the award of the Degree of

MASTER OF PHILOSOPHY

ATULAN GUHA

**Centre for Economic Studies and Planning
School of Social Sciences
Jawaharlal Nehru University
New Delhi - 110067**

**India
1997**

To
My
Family Members




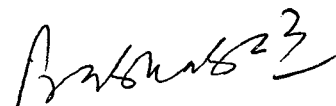
21st. July, 1997

Certificate

Certified that this dissertation entitled The Nature and Determinants of Foreign Capital Inflow: With Special Reference to India, 1993-97 submitted by *Atulan Guha* in partial fulfillment of the degree of Master of Philosophy is entirely his own work and has not been considered for the award of any other degree either at this or any other university.

We recommend that this dissertation be placed before the examiners for evaluation.


(Prof. Amit Bhaduri)
Supervisor


(Prof. Prabhat Patnaik)
Chairperson



Acknowledgement

I have been given an opportunity to thank those who have helped me write this dissertation. Although it would be extremely unfair and unworthy on my part to merely 'thank them'. I would take this occasion to gratefully acknowledge their contribution.

Among them, my supervisor Prof. Amit Bhaduri stands apart in many ways : as a guide he raised the kind of questions which invariably never occurred to me, gave me enough confidence to solve them, and patiently accepted my failures to solve them. As an economist he has been a constant source of inspiration since my graduation days.

Prof. Abhijit Sen, who has always come to my rescue, with his useful suggestions and active support, when ever, I got stuck with any problems.

Dr. Archana Agarwal took great pains to fill up my inadequate knowledge in econometrics.

I fondly remember my encounters with Papada (Sambit Basu), in his room or in front of Hari's Canteen, who helped me in many stages of my work with his insightful comments.

My seniors, Saumenda (Chatterjee), Subratada (Guha) Ranjadi, Somda, Basabda, Jshitadi, Saumenda (Bagchi), Sabya, Nirupam, Raghu, Sujata, Beena, Murli helped me with suggestions and references. Then

there are other seniors of mine, who have always encouraged me, although their names have been left out unintentionally.

Each of my classmates, Arvind, Suman, Bibhuti, Jitendra, Sujay, Jaynta, Nandan, Akhilesh, Anindita, Binod and obviously Krishna Kumar have provided help and encouragement to me.

Other friends Ashim, George, Abbas have been continuous source of encouragement.

In no small way I would like to thank my friends of broader struggle for providing continuous help to me.

I am extremely grateful to the library staff of NJPFP, JSJ, NCAER, UNDP, World Bank and Ratan Tata Library, for their co-operation and Parthada for giving final shape to my dissertation.

Last, but not the least, I would like to thank Saubhik, Niladri, Partha and Chatto, for providing throughout spontaneous help and encouragement in every step of my JNU student life.

However, I am solely responsible for any error and omission exists in the dissertation.

Atulan Guha
Atulan Guha

CONTENTS

Chapter 1	Interaction Between the Capital and the Current Account in the Indian Economy: A Survey	1
Chapter 2	The Evolution and Determinants of the Exchange Rate Regime	13
Chapter 3	Determinant of Portfolio Investment Investment in the Financial Asset Market	19
Chapter 4	Volatility of Foreign Investment in India	34
Chapter 5	Conclusion	42
	Bibliography	46
	Appendix	

CHAPTER 1

Interaction Between the Capital and the Current Account in the Indian Economy : A Survey

The focus of this chapter is a brief survey of the changing nature of the interaction between the current account and the capital account in the Indian economy. We would like to enquire, whether the former is dominant over latter ,or on the contrary, the latter is becoming dominant over former. The crucial element in this interaction is the capital inflow on the capital account. We shall discuss about the structural change in the composition of capital inflows through capital account and then how this has influenced the relationship between the current account and capital account.

According to standard classification, also followed by the Reserve Bank of India , in Indian Economy different sources of foreign capital inflows through capital account are mainly (1) external assistances (net) (2) commercial borrowing (net) (3) transaction with IMF (net) (4) NRI deposits (net) (5) rupee debt -service and (6) foreign investment. The parts of foreign investments are (a) direct foreign investment and (b) foreign portfolio investment, the parts of which are (i) foreign institutional investment and (ii) euro equities.

The first five catagories of capital inflows, as mentioned by R.B.I., are debt incurring and the sixth category is non-debt incurring. Since , 1993-94, the debt

incurring capital inflows are showing declining trend. Infact from this category in the financial year of 1995-96 capital outflows took place.

Two main sources of debt incurring capital inflows are external commercial borrowing and NRI deposits. These two were our main source of capital inflows to tide over our balance of payment problem in the latter half of eighties. In this period external commercial borrowings accounted for more than 25 percent of the total capital inflows into the economy and this trend continued upto 1991-92. The share of NRI deposits in total net capital inflows were 38.2 percent in 1985-86 and were approximately around 30 percent in the next three years. In 1989-90, it was 26.7 percent but during the balance of payment crisis and political instability in the years of 1990-91 and 1991-92, which lead to uncertainty and depreciation of the Indian currency, share of NRI deposits to total net capital inflows had reduced drastically to 6.1 percent.

From 1992-93 onwards the government discouraged external commercial borrowing and NRI deposit. The rational behind such a motive was that both were costly for Indian economy. In 1991-92 the gross disbursement was \$1.10 billions and interst payment alone was \$1.01 billions.due to external commercial borrowing. During the period of seventh plan, external commercial borrowing through authorisations were \$10.8 billions and disbursement were of \$ 10.48 billions.But net transfer comes to only \$ 3.58 billions because a substaintial part of

it was paid back in terms of debt service payments and interest payments (which accounted for around \$ 3.49 billions). These figures established the high cost nature of external commercial borrowings. But in recent years, from 1995-96 onwards external commercial borrowings are showing an increasing trend. The government's logic behind such an increasing trend is that it is allowing external commercial borrowings within an annual ceiling to provide an additional source of funds for Indian companies for new investment at the relatively lower international interest rate. Hence, in this decade the amount of capital inflows through external borrowing have reduced considerably.

Indian government has several schemes for NRI deposits. These schemes are -

- (1) foreign currency non-resident accounts [FCNRA]
- (2) non-resident (External) rupee accounts [NR(E)RA]
- (3) foreign currency non-resident (banks) accounts [FCNR(B)]
- (4) non-resident (non-repatriable) rupee deposits [NR(NR)RD]
- (5) foreign currency ordinary non-repatriable [FCON]
- (6) foreign currency (banks & others) deposit [FC(B&O)D]

The oldest two schemes are NR(E)RA and FCNRA. Before 1992, the former used to offer higher rate of interest than the domestic demand deposits, while in case of the latter, interest rate used to continuously change in order to keep it at par with international interest rate. In this scheme, exchange rate risk was borne by the RBI. So government had to bear lot of costs for these foreign

exchange inflows. In 1990-92, India had faced a severe problem of foreign exchange reserve. Among the different remedial policies, which was adopted by the govt., one was to reduce the external debt and the cost of it. For this reason, external commercial borrowing was reduced after 1992 for a few years. For NRI deposits government had closed down the FCNRA scheme in 1994 and concentrates in another scheme FCNRB. For NR (E) RA scheme in 1992 government had brought down the interest rate to the domestic level rate of interest applicable to the demand deposits. It has reduced further in 1994 but from 1995 onwards it is increasing with other measures. Another drawback of these NRI deposit schemes are its high volatility. In 1990, when the foreign exchange reserve crisis started, it aggravated the fear of capital loss and on these accounts massive capital outflows took place. As a remedy, government started some other schemes. One such scheme was FC (B &C) D scheme which was initiated to bring some stability in the capital inflows not only through NRI deposit but also through capital inflow from foreign citizens or banks. In this scheme, withdrawals were not allowed before maturity unlike in the case of other NRI deposits. But these scheme were suspended from end-July of 1992. Another scheme FC(O)NR which operated during was June 1991 to August 1994 was designated in US dollar and banks were free to determine rate of interests on different maturities. The NR (NR) RD scheme was introduced in 1992 and is still effective.. It is designated in Indian rupees and banks are free to determine rate of interest on different maturity. With the scrapping of FCNRA, RBI has given permission to the commercial bank from

May 1993 to collect foreign currency deposits under FCNR(B) scheme for which the commercial banks bear the exchange rates risks. In various schemes after 1992, government has taken some steps, such as, lowering interest rate, increase of CRR ratio and also scrapping of various schemes. As a result, capital inflows through NRI deposit has reduced but from 1995 onwards there is a slight change in the trend, again higher interest rate were being offered. CRR has either been lowered or removed, in order to facilitate the increase in capital inflows through NRI deposits after 1995. But there are very few steps taken to reduce the cost burden of the NRI deposit. There is no fundamental policy change which can reduce the volatility element of NRI deposits successfully. Hence, if the economy faces a big shock as had happened in the 1990s, there is a high probability that the NRI deposit account would face a similar fate.. On the average, in this period, we can say capital inflow to on account of net NRI deposits has also reduced.

Indian government has started to encourage foreign investment from 1991. They had given the permission of automatic approval for foreign investment upto 51 percent equity in 34 industries. NRI and overseas corporate bodies (OCB) (predominantly owned by NRI'S) are also permitted to invest upto 100 percent equity in high priority industries with repatriability of capital and income. Price of equities for disinvestments by the foreign investors are no longer set by the RBI. FERA has been relaxed for the foreign companies. They are also allowed to use their trade marks on domestic sale.

In the field of portfolio investment, government has allowed FII to invest in the Indian stock market, if they are registered with SEBI and cleared by FERA. FIIs can buy upto 24 percent of the issued share capital in any company and are required to allocate their total investment between equities and debentures in the ratio of 70:30. They also faced some concessional tax rate on dividend and long term capital gains. Government has encouraged Indian companies to access global capital markets through global depository receipts (GDR) mechanisms. In this regard the new policies are

- (1) Foreign investor can invest in Indian companies through the GDR route with out any lock-in period.
- (2) These receipt can be listed on any of the over seas stock exchanges and denominated in any convertible foreign currency, but the underlying shares would be denominated in Indian rupees.
- (3) Private placement with US investors is also permissible in accordance with US Securities Act.
- (4) Short term capital gains are taxable at the rate of 65 percent along with business income. Long term capital gains are taxable at the rate of 10 percent.
- (5) In 1993-94 besides pure equity issues , companies are also allowed to issue foreign currency convertible bonds (FCCB). FCCBs form part of the countries external debt till its conversion into equity.

In recent years i.e. in 1996-97 the restrictions have been lowered further. The limit of investment for an individual FII has been raised from 5 percent to 10 percent. However, the aggregate limit is unchanged at 24 percent. They are also allowed to invest into unlisted companies and debt-securities of companies as 100 percent debt funds and in gilt - edged government securities subject to certain guidelines. Proprietary funds have been allowed to invest in the country through FII route. The guidelines for euro-issues has been also liberalised. As a result from 1993 onwards foreign investment has increased .

With the decline of importance of external commercial borrowings and NRI deposits to bring capital inflow in India the importance of non-debt incurring capital inflow has increased, especially, the portfolio investment. Within the period of April 1993 to March 1997 non-debt capital inflow i.e. total foreign investment accounted for twenty thousands millions US dollar. Two third of it came as portfolio investment either through foreign institutional investors or euro equities. Where as NRI deposit accounted for only five thousand millions US dollars. External commercial borrowing accounted much lesser than NRI deposits. Net debt incurring capital inflows in the period of April, 1993 to March, 1996 was only three thousand five hundred million US dollars, whereas in the period of 1990-91 to 1991-92, debt incurring capital inflow constituted more than sixteen thousands million US dollar and foreign investment constituted only two hundred

fifty million US dollar. So, from 1993 onwards, there is the drastic shift in the composition of capital inflows towards foreign investment, specially portfolio investment. Therefore, the considerable amount of foreign exchange reserve which India presently has, is largely constitutes of the foreign portfolio investment..

This structural change in capital inflows has brought a distinct change in the outlook towards the capital account. Earlier the case was that India had a current account deficit (still now also it is true). So to fill up this deficit, India had to depend upon, apart from NRI deposits or external commercial borrowing, International assistance, IMF's assistance etc. Apart from NRI deposit amount of capital inflows through other channels was largely linked with average current account deficit, because, the essential notion behind any manipulation of the capital account was that it is a tool to solve the current account deficit. Government did not encourage particularly capital inflows from commercial sources, because, it was mainly debt incurring capital inflows . So it would increase burden of external debt. Hence, capital account was largely a residual part of current account deficit. But now the scenario has changed. A major source of capital account inflow coming into India is through foreign portfolio investment. But this structural change has brought more autonomy of capital account from current account. The people, who argue against this , has argued along the following line -

Following the commodity market equilibrium condition

$$Y = C + I + [(X-M) + z]$$

where, Y = Gross National Product

C = Consumption

I = Investment

X = Export

M = Import

Z = Net factor income from abroad.

Suppose, government sector's investment and saving are either balanced or subsumed under total investment and total saving.

$$\text{So, } I - S = [(M - X) + Z]$$

Let us postulate some alternative interpretations of the above balance equation to understand its economic implications. For $[(M - X) + Z] > 0$, that is current account is in deficit. So the investment-saving gap is positive. Now this inequality can be adjusted by price adjustment and quantity adjustment. The exchange rate will depreciate for trying to adjust the current account deficit. The rate of interest will rise because of a pressure from domestic investors on inadequate funds. Both these high rate of interest and exchange rate depreciation should have impact on foreign investment, specially on portfolio investment. Because of high interest rate portfolio investment should increase. On the other hand if the marginal efficiency of capital i. e. expected return on foreign direct investment in India is higher than the international interest, foreign direct investment should also be stimulated. This might place Indian entrepreneurs in disadvantageous competition because of high

domestic interest rate. So the GNP should reduce. We shall check whether this proposition holds for India or not in the third chapter we shall also check the dependence of portfolio capital inflow on rate of interest and exchange rate. If it is independent of rate of interest change and exchange rate change then we can say capital account is generally autonomous of current account.

Now the exogeneity or autonomy of the capital account also implies that the average propensity to imports becomes an endogenous variable. that is, under open general license (ogl) more is imported due to greater availability of foreign exchange through capital inflows. In this case, in the import function $M = a + b Y$, the intercept 'a' is shifted by capital account borrowing or lending.

Hence, $M - X + Z$ should increase, if X and Z are constant. So the output should fall.

It implies current account should adjust with capital account..

To see briefly the consequence of this kind of analysis for the Indian economy we consider the following facts.

In India import G.N.P. ratio has increased over the years. (See the Table 6) . In the period of 1985-86 to 1989-90 the average propensity to import varied between 7.6 % to 8.7 % . Leaving the two unnatural years, 1991-90 and 1991-92, on external account in the period of 1992-93 to 1995-96 the average propensity to import varied from 10.24 % to 12.6 % . So, there is a marked increase in average

propensity to import. This can be only possible if we have large foreign exchange reserves , whose major source is portfolio investment.

Table 6

IMPORT - G.N.P. RATIO

(in per centage)

Year	85-86	86-87	87-88	89-88	90-89	91-90	92-91	93-92	94-93	95-94	96-95
Imp- GNP Ratio	8.4	7.78	7.6	8.1	8.7	9.18	8.1	10.2	10.3	10.6	12.6

Source: Economic Survey

In India the current account deficit as a percentage of GDP has decreased.in post 1993 period and investment -saving gap as a percentage of GDP has reduced (See the table A3) This has counter balance the impact of increase of import -GNP ratio.Consequently, the probable down ward quantity adjustmentdid not take place.. In this period the industrial growth rate was also quite high.Consequently, we can conclude that capital account has influence on current account in a more complex way in the Indian case. and from the third chapter's discussions we shall able to know whether current account has influence upon capital account or not.

Apart from this quantity adjustment , it can have a price adjustment too. Besides, large portfolio investment is building up foreign exchange reserve after covering up the current account deficit. Exchange rate may depend upon the amount of stock of exchange reserve, with price adjustment through exchange rate, taking place through capital account transfer. We shall check this in the next chapter.

From this chapter we can only conclude with some confidence that after the liberalisation of the regime of trade and exchange rate in India, capital account has impact on current account through increase of import-GNP ratio.

CHAPTER 2

The Evolution and Determinants of the Exchange Rate Regime

The objective of this chapter is to test a hypothesis that has become particularly relevant for the Indian Economy in recent years. It relates to large foreign portfolio investment, which lead to building up of foreign exchange reserve after covering up the current account deficit. Our hypothesis is that the level of exchange rate depends upon the amount of stock of foreign exchange reserve.

Prior to 1975 India had the fixed exchange rate regime. Indian currency - rupee was pegged to the pound sterling at a fixed parity. Reserve Bank of India used to buy and sell spot pound sterling against rupee within a margin of one percent on either side of the parity. In 1971 after the breaking of Bretton Woods system rupee was pegged against US dollar for a small period of August 71 to December 71. Whereas, pound sterling was the intervention currency. with the Smithsonian realignment of currencies in December 1971 the rupee was delinked from the dollar and relinked to the pound sterling. But now it was with a wider margin of 2.25 per cent on either side of the parity.

With the introduction of floating exchange rate regime in 25th September 1975, Indian rupee was delinked from pound sterling and linked to an undisclosed basket of currencies and pound sterling was the intervention currency. The exchange rates vis.a.vis. a other currencies were determined on the basis of cross rates with rupee sterling rate and the exchange rate of sterling against the relevant

currencies, based on the London closing rates. The basket of currencies was undisclosed to avoid speculation. And a five percent margin on either side of the basket related parity was there.

The 1992-93's Budget introduced Liberalized Exchange Rate Mechanism System (LERMS) which was a dual exchange rate system. 40 per cent of foreign exchange earnings were to be surrendered at the official exchange rate and remaining 60 percent were to be converted at a market determined rate.

Next year the policy of full convertibility of the rupee on trade account took place. So the dual exchange regime was abolished and unified exchange rate regime started. Under this unified exchange rate, entire trade account transaction and all receipts were allowed. In 1994 the full convertibility in current account took place. After that Reserve Bank of India has continued to relax the exchange rate regulations for current account. Not only this - now capital account convertibility exists for foreign investors and Non-Resident Indians for direct and portfolio investment in India and Indian investment abroad up to US \$ 4 millions are eligible for automatic permission of Reserve Bank of India.

Now we would like to discuss in particular the behavior of exchange rates after March 1993, because in March 1993 the unification of exchange rates took place. From then on, exchange rate of rupee has been determined mostly by the

supply and demand conditions in the foreign exchange markets. But Reserve Bank of India also stands ready to intervene, as Economic survey - 1995 -96 has mentioned, 'to maintained orderly market conditions and to curb excessive speculation'.

Over 2 years after March 1993 the rupee dollar exchange rate was steady at 31.37. This had happened because of two reasons firstly, there was large inflow of foreign exchange through foreign investment particularly through foreign portfolio investment and secondly, due to this foreign exchange inflows the probable exchange rate appreciation had been prevented by Reserve Bank of India by building a foreign exchange reserve. In fact between March 1993 to December 1994 India had accrued a foreign exchange reserve of 13 billion dollars. In 1995-96 the portfolio capital inflow had reduced and current account deficit had widened. So exchange rate had started to depreciate after the allowance of some depreciation Reserve Bank of India had intervened in the market by selling dollars. During this period of interventions and allowance of some falling, the exchange rate was a little bit volatile. This is reflected in the reduction in reserve in this period (See the graph) It varied between rupees 31.62 Rs. 36.6 within the period of August 1995 to April 1996. But after that it became steady within the range of Rs. 35.0 to Rs.35.9 between May 96 to January 97. As a result this period, is marked for reserve loose. (See the table B1)

Although in India exchange rate is determined broadly by the market, the RBI monitors it very closely and if needed by intervening into it either by selling or buying the foreign currency. At relatively short notice. Consequently, the stability of the exchange rate depends upon the stock of foreign exchange reserve as a measure of the RBI's strength as an interventionist agent. In turn, this gives a confidence to the other private agents who are participating in the market, regarding the stability of exchange rates. So the exchange rate may be postulated to depend upon the stock of foreign exchange reserve, proxying for the confidence of the market in the stability of the rupee in the foreign exchange market.

To check the hypothesis we can estimate an equation

$$S_t = a + b \text{Res}_t + u_t$$

where, S_t is the nominal exchange rate of rupee vis.a.vis dollar.

Res_t is the foreign exchange reserve at period t.

u_t is the error term

We have estimated this equation by a monthly data of the period May, 1993 to October, 1996.

From the Run test, we notice positive autocorrelation. This requires economic interpretation, perhaps along the following line : it is not the case that whenever there is an actual (or expected) change in the exchange rate, RBI has intervened immediately, rather it intervened generally only when the change

tended to be 'large' i.e. exceeded some threshold value. So, it may be the case that there is a small excess supply of Indian rupee, say, due to certain withdrawal of foreign investment. As a result, the exchange rate has fallen, i.e. S_t has increased, more than what it would have been the case with immediate intervention. So this change in exchange rate can not be captured by the change in foreign exchange reserve. It has been captured by the error term u_t , i.e. u_t should increase. Since, RBI has generally tried not to intervene, the exchange rate is allowed to fluctuate within a certain range until some definitive change, exceeding the critical or threshold value, takes place. Since the foreign exchange is speculative in nature, the change in one period's exchange rate can bring change in the exchange rate of the next period, even though foreign exchange reserve has not change in the same direction. So the error term of the next period will change. If the increase in S_t , explained by the increase in u_t , increases S_{t+1} then this increase also should be explained by the increase in error term u_{t+1} . As a result, it is very much likely that there is a positive correlation between at least two consecutive period's error terms, that is, $E(u_t, u_{t-1}) > 0$.

To solve this problem we have assumed that the error terms are generated as follows -

$$u_t = \Phi u_{t-1} + \varepsilon_t$$

$$\text{and } E(\varepsilon_t) = 0$$

$$\text{Var}(\varepsilon_t) = \sigma^2$$

$$\text{COV}(\varepsilon_t, \varepsilon_{t+s}) = 0, s \neq 0$$

It is called AR(1) scheme. For the reason behind using AR(1) scheme, look appendix B.

From the estimated equation it was found that stock of change in foreign exchange reserve can explain 91 % of the change in spot exchange rate. (For detail see the appendix B).

From this chapter, we can conclude that this result is compatible with the view that, in situations where foreign exchange reserve is built up by net capital inflows on the capital account after covering up the current account deficit, this stronger reserve position can influence the exchange rate by strengthening the domestic currency. As a result, the exchange rate adjust through the capital account as stated in chapter 1, and this influences in turn the trade performance on the current account. Thus, the economic causation might run from capital inflow and reserve build up on capital account influencing the subsequent performance of the current account.

CHAPTER 3

Determinant of Portfolio Investment in the Financial Asset Market

In this chapter we would like to discuss about the determinants of portfolio investment in India. The reason behind this discussion is in India portfolio capital inflow is the major constituent of capital inflows through capital account. According to the mainstream economic theories current account deficit has influence on rate of interest and exchange rate and the determinants of portfolio capital inflow should be exchange rate change and rate of interest differential between India and rest of the world. If this chain breaks somewhere then we can say capital account is largely autonomous to current account.

THE MODEL

Behind any investment decision in stock market an investor can have two motives - income-earning motive and capital-gaining motive. For example, we can take the example of government bond. Suppose, an investor has bought one government bond which has a promise of giving yearly dividend "a". The present price of the bond is P_{b0} . After one year the price of this bond has increased to P_{b1} . Now if the investor continues to hold the bond he will enjoy the income of dividend only. But if he sells it then he will enjoy a capital gain of $P_{b1} - P_{b0}$ also. So, generally, investment in the stock market as well as their composition is an outcome of the

interplay of these motives by various participants in the market at least any of these motives works. Keynes had assumed, that an investor had a choice set of financial assets consists of bond and money. He viewed rate of interest as a variable which can measure the premium, which had to offer to induce investors to hold their wealth in some form of less liquid financial assets, say bond instead of money. It can be defined as following - suppose, annual yield of a government bond is "a", the price of this bond is P_b . Then the bond rate of interest i_b is

$$i_b = a / P_b$$

To discuss the repercussion of rate of interest on prices of the financial asset I can quote from Keynes¹ by substituting the word "financial assets, say, bond" for his use of the word "capital assets" -

The owner of wealth, who has been induced not to hold his wealth in the shape of hoarded money, still has two alternatives between which to choose. He can lend his money at the current rate of money interest or he can purchase some kind of financial assets, say, bond. Clearly in equilibrium these two alternatives must offer an equal advantage to the marginal investor in each of them. This is brought about by shifts in the money prices of bond relative to prices of money loans. The prices of bonds move until having regard to their prospective yields and account being taken of all those elements of doubts and uncertainty, interested and disinterested advice, fashion convention and what else you will which affect the mind of the investor, they offer an equal apparent advantage to the marginal investor who is wavering between one kind of investment and another.

Let expected normal rate of interest on bonds be i_b^* . If the present rate of interest i_b is less than the i_b^* then for two reasons shift from that particular bond asset will take place. Firstly, interest income is not attractive enough and secondly, $I_b < I_b^*$

¹ Keynes (1937)

implies $P_b > P_b^*$. So the expectation will be the coming down of bond price i.e., there will be a expectation of capital loss and investor will try to withdraw his money from that bond and hoard money.

Now. Suppose, there are two kinds of assets, domestic asset "d" and foreign asset "f" and rate of interest of domestic asset is less than rate of interest of foreign asset.

$$\text{Let, } i_d < i_f < i^*$$

$$\text{then, } p_{bd} > p_{bf} > p^*$$



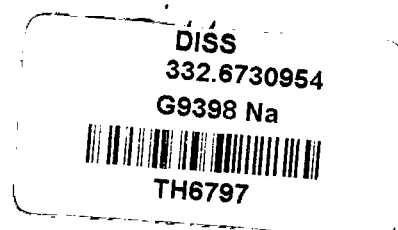
The expected fall in the price of domestic bond (P_{bd}) will be lesser than that of foreign bond (p_{bf}).

$$\text{Similarly, if } p_{bd} > p^* > p_{bf}$$

investors will expect price of domestic bond price will come down and price of foreign bond will go up. So there will be shift to foreign bond and it depends upon rate of interest differential of domestic and foreign country in relation to the long-term or 'normal' expected interest rate.

TH-6797

Another source of capital gain for the portfolio investors whose portfolio consists of financial assets across the countries is exchange rate between the currencies of different countries. In fact it gives scope for both arbitrage and speculation. Normally merchants engaged in international trade or investors with



international portfolios often enter into contracts to deliver or receive foreign currency at a future date. Such contracts expose these traders in foreign exchange to the risks of losses or gains from the changes in the exchange rates during the periods before the foreign currency payment is due. To prevent this uncertainty, forward exchange markets provides a mechanism - i.e. arranging in advance to convert domestic currency into foreign currency, or vice versa, on the future payment date a pre-specified forward exchange rate. But it has other impact too. Suppose, to a buyer of rupee in U.S.A. the spot rate of rupee is twenty rupees per dollar and the one month forward rate is twenty rupees and twenty five paise per dollar per dollar. So a person with twenty rupees will buy one dollar at spot rate and sell it at the forward rate and at the end of the month he will earn twenty five paise. So through out the month the person will keep his money in dollar. And yearly he will earn at fifteen percent rate. According to Keynes this profit rate will induce him to keep his money in dollar or dollar denominated assets. Apart from this arbitrage profit exchange rate can generate speculative profit also. Suppose there is an expectation that Indian rupee is going to appreciate. So the speculator will invest in Indian rupee to get the benefit of this.

To discuss regarding the determinants of difference between forward rate and spot rate Keynes thought that rate of interest differential between two countries is the main determinant. He had argued ,²

² Keynes (1923)

The difference between the spot and forward rates is, therefore, precisely and exactly the measure of the preference of the money and exchange market for holding funds in one intention Centre rather than in another, *the exchange risk apart*, that is to say under conditions in which the exchange is covered. What is that determines these preferences?

The most fundamental cause is to be found in the interest rates obtainable on short money- that is to say, on money lent or deposited for short periods of time in the money markets of the two centers under comparison. If by lending dollars in New York for one month the lender could earn interest at the rate of 5 [and] 1/2 percent per annum, has by lending sterling in London for one month could only earn interest at the rate of 4 per cent, then the preference observed above are for holding funds in New York rather than in London is wholly explained. That is to say, forward quotations for the purchase of the currency of the dearer money market tend to be cheaper than spot quotations by a percentage per month equal to the excess of the interest which can be earned in a month in the dearer market over what can be earned in the cheaper.

This is known as covered interest parity hypothesis. The basic argument behind it is as follows - suppose r_t and r_t^* are the interest rates that can be earned between times t and $t+1$ on local currency investments in countries A and B, respectively. Also let S_t and F_t be the spot and forward exchange rates between the currencies of the two countries measured in the units of currency A per unit currency B. Note that, one unit of currency B converted at the spot exchange rate and held in a currency A - denominated investment would accumulate to $S_t(1+r_t)$ units of currency A at time $t+1$. Alternatively, under a forward contract arranged at time t , the initial unit of currency B could be held in a currency B - denominated investment until time $t+1$ and then converted into $F_t(1+r_t^*)$ units of currency A. Accordingly, if the two investment opportunities were regarded as equivalent in all respects other than their currency denominations and interest rates, market pressures would tend to generate an equilibrium outcome with

$$F_t(1+r_t^*) = S_t(1+r_t).$$

This implies, $(F_t - S_t) / S_t = (r_t - r_t^*) / (1 + r_t^*)$.

There is another hypothesis, uncovered interest parity, says that market forces bring the equilibrium between the return that investors expect to earn on the uncovered interest alternative to the return on the risk less option of converting into currency A initially.

That is, $E_t S_{t+1}(1 + r_t^*) = S_t(1 + r_t)$

where $E_t S_{t+1}$ denotes the expected value at time t of the spot exchange rate at t+1.

It has already been mentioned that there two kinds of participants in stock market - speculator and arbitrators. Speculators seek profit from expected change in the exchange rate, that is the speculator will invest his money into country A's currency denominated asset if he expects country A's currency will appreciate vis-à-vis other countries. So, speculators investment depends upon $(E S_{t+1} - S_t)$.

The problem is how we can calculate expected spot exchange rate, that is $E S_{t+1}$. To solve this problem we have taken recourse to two assumptions. First, $E S_{t+1}$ is a mathematical conditional expectation, based on the true probability distribution underlying the events impinging on financial markets. Secondly, the foreign exchange market is weakly efficient, in the sense that market expectations

of future spot rates are always conditioned on an information set that includes past forecast error.

The first assumption implies ,

$$S_{t+1} = ES_{t+1} + \varepsilon_t, \quad \sum (\varepsilon_t) = 0$$

The second assumption implies , the stochastic process (ε_t) is a white noise prices, so that the forecast errors are mutually uncorrelated at all distributed lag.

I.e. $\text{cov}(\varepsilon_t) = 0$

So, we can use S_{t+1} in place of ES_{t+1} .

Hence, speculators decision depends upon $S_{t+1} - S_t$

Now, arbitrators shifts funds if there is any difference between $(F_t - S_t)/S_t$ and $(r_t - r_t^*)$, i.e. forward exchange rate premium and rate of interest differential.

So, we can write portfolio investment depends upon change in rate of interest differential, change in exchange rate and the gap between exchange rate premium and in rate of interest differential.

Hence we can write,

$$PI = f(S_{t+1} - S_t, (F_t - S_t)/S_t - (r_t - r_t^*), (r_{t+1} - r_{t+1}^*) - (r_t - r_t^*))$$

In countries with developed stock market this discrepancy between forward premium and rate of interest differential has been tried to analyze in terms of political risks (Aliber)³, capital control (Dooley and Isard)⁴, transaction costs. (Frankel and Levich)⁵. In India there is a difference between forward premium and rate of interest differential. (See the table) But it is debatable to what extent the above causes may be applicable in India, specially because we have a less developed stock market and no full capital account convertibility. It will be interesting to check whether these factors can explain the difference between the forward premium and rate of interest differential. For this study selecting data-base is very important. (Taylor)⁶ Anyway because of lack of evidence to the contrary, we assume that the covered interest parity hypothesis holds in India.

So, the function can be modified as,

$$PI = (S_{t+1} - S_t, (r_{t+1} - r_{t+1}^*) - (r_t - r_t^*))$$

³ Aliber (1973)

⁴ Dooley and Isard (1980)

Dooley and Isard have the view that political risk associated with prospective capital controls can lead to deviations from covered interest parity. They have established two points - (1) changes in capital control measures say, effective tax can be a major cause behind the change in interest rate differential and (2) given the prospect of controls on capital flows into a particular country, the interest rate differential due to political risk depends essentially on the gross stock of outside claims against residents of that country and on the distribution of world wealth between residents and non-residents. If both has increased in favour of outsiders political risk premium has to be increased. For India India also it has some validity.

⁵ Frankel and Levich (1977)

⁶ Taylor (1987)

Now the constructed econometric model

$$P_{it} = \alpha + \beta_1(S_{t+1}-S_t) + \beta_2 ((r_{t+1}-r_{t+1}^*) - (r_t-r_t^*)) + u_t$$

where α = the constant term

$\beta_i, i=1,2$ = the co-efficient term which represent the dependence of portfolio investment on exchange rate change and rate of interest differential.

u_t = the error term

From the run test it is clear that it has positive auto-correlation.

To find out, by which equation we can estimate the error term, such that, it does not carry any auto-correlation, we have used correlogram of residual and found that we can use AR(1) scheme. In stock market suddenly a new information which the investor feel it is relevant, though in reality it may not be, can change the portfolio investment decision and it may not be explained by the independent variables. Since, this investment is speculative in nature, this can have impact on next period's investment decision, the error terms can be positively correlated.⁷

⁷ Data Source :

Foreign Portfolio Investment - Monthly Economic Review, Center for Monetary Economy publication

Exchange Rate - International Financial Statistics, I.M.F., various monthly issues.

Indian Rate of Interest - Economic Survey. Govt. Of India

U.S.A. Rate Of Interest - International Financial Statistics, I.M.F. various minthly issues.

Rate of Interest is defined as the yield rate in three month treasury bill.

RESULTS: R^2 is very low , (.2) and the coefficients are statistically insignificant and constant is statistically significant and it has a high value. Hence we can not say that portfolio capital inflow in India can be influenced by exchange rate change or change in rate of interest differential.

The result suggest that in India foreign portfolio investment can not be increased by creating expectations of getting more advantage of speculative or arbitrage opportunity . Then what is the reason behind it? Ajay Shah and Susan Thomas⁸ has tried to give the answer according to the following line-

Diversified portfolio of financial assets reduces the risk of the investors. International diversification reduces risk by spreading funds across many countries financial assets. High correlation between Indian and USA stock market limits the risk-reduction of a USA investor by investing in India. And low correlation makes Indian stock market more attractive to US investors for reducing risk. Using seventeen years' data they found overall average correlation between monthly return on the S & P 500 and NSE-50 index is - 0.0198. And this is a very low correlation as compared with the similar correlation that exists among OECD countries.

⁸ Ajay Shah and Susan Thomas (1997)

In another study of 'Policy Development and Review Department' of IMF has expressed the same view in a different manner. They have followed 'capital asset pricing model'. According to this model a representative investor is expected to hold a portfolio of risky assets identical to the world portfolio. And he will deviate from holding the Indian financial asset if by doing so he could improve his expected return without any additional risk. Sensitivity of a particular asset's return to the expected return on the world portfolio should be the only factor which should affect the investor's demand for that particular asset. It can be measured by the covariance of two markets' expected return. This is termed as the asset's beta (β). If a asset of a particular economy offers the same risk as the world portfolio, that investor would be willing to hold it in place of the assets of world portfolio which has the same expected return. For negative "β" the investor will accept a lower rate of return to reduce his risk of the portfolio. Similarly, if 'β' is positive investor will demand a higher rate of return to hold it because it will increase the overall risk of his portfolio.

Initially this IMF group have formulated this model

$$r_{j,t} = \alpha + \beta_w \cdot r_{w,t} + u_t$$

where, $r_{j,t}$ is return on domestic market j ,

$r_{w,t}$ is the return on the world portfolio at time t .

Then they have separated development stock markets' assets from world portfolio. So ,

$$r_{j,t} = \alpha + \beta_w \cdot r_{w,t} + \beta_{cm} \cdot r_{cm,t} + u_t$$

where, $r_{em,t}$ is the return on a portfolio of developing countries' stocks at time t , the coefficient β_{em} represents the covariance between expected returns in a domestic market j and the expected returns on a developing countries' equity portfolio, where the return an investor would require to hold the assets in market j - as contrary to hold the developing countries' stock market portfolio - would be an increasing function of covariance.

They have taken weekly data covering the period January 1989 to April 1995 and found for India $\beta_w = -0.19$ and $\beta_{em} = 0.18$ but both are statistically insignificant. In the case of monthly data $\beta_w = -0.35$ and $\beta_{em} = 0.10$ but here also both are statistically insignificant. This study suggests that Indian stock market's rate of return doesn't have any statistically significant relationship with world stock markets' rate of returns. So this supports the view that the foreign investors might be investing in India because they want to diversify their portfolio by holding financial assets across countries whose financial asset markets are weakly linked.

But there are some problems with these studies. Firstly, India has opened its capital markets to foreign institutional investors since 1993 and Indian firms have been allowed to issue ECB and GDR from 1992. These investments have a significant impact on share prices in Indian stock market. Share prices and the expectation about it determine the short term capital gain. On the other hand

portfolio investment decisions depend upon rate of return of initial assets so there is a two way relationship. If any study takes the time period of prior April 1993, it doesn't reflect the first causal relationship. The second problem is that they did not try to analyze the reason behind the large cyclical fluctuations in portfolio investment within the period of April 1993 to March 1997.

If only because of little correlation between India and world stock market portfolio inflow is coming then total portfolio inflow should have a constant flow. Indeed in the period April, 1993 to March, 1997 the trend is a horizontal straight line and statistically significant and high value of constant indicates at the same thing. But in this period there is a cyclical fluctuation and 'β' factor can not explain that. There must be some other factor which is responsible for this cyclical fluctuation

To study this proposition we can compare Indian Stock Market to U.S.A. Stock Market. The reason behind choosing U.S.A. is that it has a developed stock market and well connected with the rest of the developed stock market.

DATA SOURCE;

To find out whether the little correlation between Indian stock market and U.S.A. stock market exists or not, we can use the B.S.E.-Sensex data published by Reserve Bank Of India, Currency and Finance Report and Monthly Bulletin of

R.B.I., various issues. For U.S.A.'s stock market various issues of International Financial Statistics have been used. The period have taken into consideration is April, 1993 to October,1996. The reason behind selecting post April, 1993 period is in January,1993 the door of Indian stock market was open for Foreign Institutional Investors. (F.I.I.). Another reason is in this year 's Budget India had left from the dual exchange rate policy to unified exchange rate policy.

METHODOLOGY:

To calculate monthly average return we would like to incorporated only the changes in expected share prices not the dividend. The reasons are we are using monthly data not yearly data and the portfolio capital inflows into India are speculative in nature .

We can calculated average monthly return as,

$$e_{i,t} = (p_{t+1,i} - p_{t,i}) / p_{t,i}$$

e = monthly average earning

p = share price

i = 1,2. i₁ => India , i₂ => USA

T = Months

Then we have computed the simple correlation between e_{1,t} and e_{2,t}

RESULTS : We have found a very low correlation coefficient (.14) for the period of April ,1993 to October 1996. It is similar with the results found by

Ajay Shah and Susan Thomas. So the argument that portfolio capital inflows are coming in India because it is not integrated with the developed world can hold good.

In the period of October ,1994 to February ,1996 there was a negative fluctuation in the portfolio capital inflows. In this period the average monthly return was negative . So it may be a reason for less capital inflows in this period. Investors may come into India to reduce overall risk of there total portfolio by diversifying it, despite the fact that it will give low return. But this return should be at least positive , because no one want to invest if the expected gain is negative.

As a conclusion from this chapter we can say portfolio capital is coming into India mainly because of disintegration of Indian stock market with the World stock market. It has no statistically significant relationship with the change in exchange rate and rate of interest differential Hence the chain of dependence of capital account on current account has largely brocken. So we can conclude that now in India capital account is largely autonomous to current account.

CHAPTER 4

Volatility of Foreign Investment In India

The objective of this chapter is to examine whether the foreign portfolio investment is more volatile than foreign direct investment or not. It is a general belief that since direct investments usually take place with the long run profitability objective and portfolio investments usually respond to the objective of short run capital gains. Consequently, it may be postulated that In short run foreign direct investment is lesser volatile than portfolio investment We shall check whether this holds for direct foreign investment and foreign portfolio investment in India.

Direct Investment by an investor can be defined as the gathering or creation of assets with a significant degree of managerial control. So here , owners are generally not seeking only short- run capital gains. They look upon the long run viability and growth of enterprise and relatively well informed regarding the enterprise than the short run capital gainers. If a person buys a financial asset issued by an enterprise without taking any managerial responsibility then it can be termed as portfolio investment. There can be other kind of financial assets issued by different economic agents. Financial assets market can be divided into two categories - first-hand financial assets market and the second hand financial assets market. In the first-hand market transactions of new bonds issued by Govt., new share- equities or bonds issued by various financial institutes take place. The

second hand financial assets market consists of old issues. Development of second hand market financial assets market has separated the management wealth from the management of enterprises in which that wealth is invested. An investor can buy equities of an enterprise and become at least a partial owner of the enterprise without taking the responsibility of managing the enterprise. It can have a benefit for the individual investors, while he is separated from the management who takes the responsibility of entrepreneurial function. These individual investors can easily shift their capital across the enterprises by simply buying and selling the equities of different enterprises where they think it has best prospects for capital formation or (for direct investors) short run capital gain (for portfolio investors) which may be linked with the best prospects of capital formation. So we can claim that the existence of the second hand market allows individual investment decisions to be revocable. Definitely this liquidity has reduced the risk-feeling of the investors and encourage them to channelise their savings to investment and probably raises investment. But on the other hand it has increased volatility of investment decision in the stock market. Thus the stock exchange becomes a double- edged weapon.

Keynes has seen the question - where to invest as a question of allocating wealth by the individuals, while the objective of the accumulation of wealth is often to produce results at a distant future. But the problem is knowledge about the future is fluctuating, vague and uncertain. Keynes used uncertain knowledge in the sense that the prospect of a war is uncertain i.e. it can not be calculated by the idea

of repeated experiment or 'objective criterion' or even subjective judgement of probability To overcome this problem Keynes¹ set up three conventions on the basis of which investors can take their investment decisions. These conventions are-

- (1) The present is a much more serviceable guide to the future than a candid examination of past experience would show it to have been hitherto. In other words (agents) largely ignore the prospect of future changes about the actual character of which we new know nothing
- (2) The existing state of opinion as expressed in prices and the character of existing output is based on a correct summing up of future prospects so that (agents) can accept it as such unless and until something new and relevant comes into picture Prospective .
- (3) Knowing (their) individual judgment is worthless (they) endeavour to fall back on the judgement of the rest of the world which is perhaps better informed. That is (they) endeavour to conform with the behaviour of the majority or the average. The psychology of a society of individuals each of whom is endeavouring to copy others leads to what we may strictly term a conventional judgement.

Following these three conventions, the valuations of the prospective yields of the existing investment takes place in the stock market. The first convention provides the rational basis to the investors to carry out valuations of existing investments. Second convention implies that agents accept that prices correctly sum up the existing state of opinion about future prospects. And the third convention gives certain degrees of stability into the expectations regarding the future prospects. But these conventions are based on very flimsy foundations. So the assessments about prospective yields of the financial assets it make are volatile. In fact Keynes² commented,

¹ Keynes (1937)

² ibid

'it (conventions) is subject to sudden and violent changes. The practice of calmness and immobility, of certainty and security , suddenly breaks down. New fears and hopes will, without warning, take charge of human conduct. The forces of disillusion may suddenly impose a new conventional basis of valuation.'

The determination of prospective yield on capital by second hand stock market would not cause volatility if it were also assumed that the market was populated by informed investors who chose stocks on the basis of the prospective yields over the long run. However Keynes description of the stock market did not have this valuation efficiency , it was dominated by relatively ignorant speculators pursuing short-term capital gains. Keynes believed that the increasing separation which had taken place between ownership and management: This has led to a³ ,

gradual increase in the proportion of the equity in the community's aggregate capital investment which is owned by persons who do not manage and have no special knowledge of the circumstances , either actual or prospective, of the business in question, the element of real knowledge in the valuation of investments by those who own them or contemplate purchasing them has seriously declined.'

In a nutshell we can say in Keynes' view , the combination of the inherent unknowability of the future , the liquidity provided by a broad and deep stock market , and the increasing significance of ill-informed investors trading for a short term gains lead to stock prices behaving in an unstable manner leading to the volatility of the portfolio investment.

³ Keynes (1936)

Keynes theorised that for an enterprise, owners and managers are different agents. They have different objectives and planning horizons. Owners as a part-time capitalist whose only concern is the management of their wealth without any managerial or entrepreneurial functions. They mainly seek short term capital gains. On the other hand managers look upon the long run viability and growth of enterprises. Another difference between these two agents are significantly different degrees of knowledge about the firm and environment - the owners are relatively ignorant and the latter are professionally well-informed. Now according to Keynes⁴ - it is by no means always the case that owners' decision predominates over enterprise. As the stock market develops the risk of dominance of former over the latter increases. The argument behind this in two statements, as Crotty⁵ also mentioned, - first, "there is no sense in building up a new enterprise at a cost greater than at which a similar existing enterprise can be purchased"⁶ and second, there is an inducement to spend on a new project what may seem an extravagant sum, if it can be floated on the stock exchange at an immediate profit.⁷

Hence, following Keynes' argument that when there is a conflict between owners and managers decisions former tends to dominate the latter. As a result, if there is instability in the stock market which mainly influence the owners decisions regarding investments it could also bring instability in investment in physical assets

⁴ ibid

⁵ J.R.Crotty (1990)

⁶ Keynes (1936)

⁷ ibid

taken by the managers. But the instability in portfolio investment would tend to be greater than that in direct investment. Because the direct investors taking the managerial responsibility, are more well informed than portfolio investors in general. Moreover, they are not merely and not short-run capital gainer. Hence it is less likely that they will reconsider their investment as frequently as portfolio investors. So direct investment can be postulated to be less volatile than the portfolio investment.

J.R. Crotty⁸ is critical about the Keynesian proposition that decision in stock market dominates over direct investment decision. He said that Keynes' second statement is not relevant because it is about the cost of financial capital, not the determination of the MEC. And Keynes's first statement can not provide the general validity for Keynesian proposition. Because, (1) first statement refers to the supply price of capital not to the projections of future profitability. (2) the argument is not symmetric, when rising stock prices lift the market value of acquirable firms above the supply price of newly produced goods, the market is no longer directly influence the relevant MEC.

Anyway, Crotty's arguments restricts the transfer of instability from stock market to direct investment decision. As a result, the volatility in direct investment can be expected to be lower than that of portfolio investment. Regarding the level

⁸ J.R. Crotty (1990)

of volatility of foreign direct investment and portfolio investment yet another factor is coming into consideration - exchange rate which can give the rise to short-run capital gain or losses. Hence it also influence the investment decision in stock market of the short run capital gainers. Since in a world of floating exchange rate regime, the exchange rate is determined by the market forces, this volatility is transmitted into the portfolio investment decision .We will have more discussion on chapter 3.

During period of Feb 1994 to Jan,1997, we have found that foreign portfolio investment is much more volatile than foreign direct investment. The reason behind choosing a post 1993 period is that only in 1993 the door of Indian stock market was open for foreign institutional investors for the first time. To compare volatility of foreign direct investment foreign portfolio investment we have used co- efficient of variation. . Since it is a time series data we have brought out the secular trend from it and then measure co- efficient of variation. So the volatility we have measured is solely generated by cyclical fluctuations seasonal fluctuations and irregular trends.

Data Source : Centre For Monitoring Indian Economy, various monthly issues.

The Results

Co-efficient of variation of Foreign Portfolio Investment and Foreign Direct Investment in India : Period 1994-97.

Year	1994-95	1995-96	1996-97	1994-97
Foreign Portfolio Investment	.877546	.46675	.584821	.878668
Foreign Direct Investment	.337175	.293939	.489429	.392369

To find out which period is much more volatile we have use standard deviation of the same time series which does not have the secular trend component. The results:

Standard Deviations of Foreign Portfolio Investment and Foreign Direct Investment in India : Period 1994-97.

YEAR	1994-95	1995-96	1996-97	1994-97
PORTFOLIO INVESTMENT	1.206845	.229677	.730053	.912544
DIRECT INVESTMENT	.310094	.317116	.484459	.389312

This result shows that initially foreign portfolio investment was more volatile compare to later periods. The period ,February,1995 to Feb,1996, has the lowest volatility. One of the reason may be very low amount of foreign portfolio capital inflow in this period. On account of foreign direct investment the volatility is increasing over the periods. In fact , in both the category there is a positive relationship between the amount of investment and volatility.(See the graph in appendix D).

CONCLUSION

In 'post-liberalisation' era, after 1991, a structural change has been taking place in the Indian trade and foreign exchange regime. Fundamentally, this structural change relates to the causal importance of the capital account, which is open to capital inflows of different types. The major source of capital inflows on capital account is foreign investment. Among these foreign investments, after 1993, two-third of it came through portfolio capital inflows. These has resulted in a structural change that has altered in turn the relationship between the capital account and current account.

Capital account is no longer a residual part, balancing the importance of the current account. The large amount of capital inflows through capital account have build up a substantial amount of foreign exchange reserve after counter balancing the current account deficit. Usually, current account deficit has influence on the exchange rate and the rate of interest of a country. Both of these variables have impact upon portfolio capital inflows to that particular country. As we have analysed, (chapter.3) in India portfolio capital inflows do not have a statistically significant relationship with either of these two variables. In India portfolio capital inflows seem to be coming, because of Indian stock market's lack of integration with the developed stock markets.(chapter3) To minimise the overall risk of their

total portfolio foreign investors diversify the financial assets holding across the countries whose average rate of return are either uncorrelated or weakly correlated. This might be the reason of portfolio capital flows into India. As a result, we maintain that, portfolio capital inflows are largely autonomous, i.e. independent of current account deficit. Since, such portfolio capital inflows are the largest source of capital inflows, the capital account is becomes an autonomous explanatory variable in many instances.

The exogeneity or autonomy of the capital account may imply that the average propensity to import become an endogenous variable, e.g. under open general license (ogl) more may be imported due to greater availability of foreign exchange through capital inflows. In India import-GNP ratio has increased in the post 1992-93 period than the second half of the last decade. (Chapter 1) From this data we can conclude with some confidence that after the liberalisation of the regime of trade and exchange rate in India, capital account had an impact on current account through the increase of import-GNP ratio.

Moreover the structural change in capital inflow has not only influenced the average propensity to import, and to that extent the current account, it has also influenced the exchange rate. Because of large capital inflows through capital account a substantial amount of foreign exchange reserve has been built up. In India, exchange rate is determined broadly by the market. But, Reserve Bank of India monitors it closely and when needed, by intervening in the market either by

selling or buying the foreign currency. So, the exchange rate, depends largely upon the foreign exchange reserve. This view is seen to be plausible statistically in chapter 2. Since, capital flows through capital account are the major constituent of foreign exchange reserve, both the quantity adjustment through the increase in import-GNP ratio (chapter1) and price adjustment through the influence of foreign exchange reserve on exchange rate (chapter2) are taking place through the reserve build up on the capital account as the major underlying mechanism.

At the same time, portfolio investment might have brought some instability and dampening effect on the aggregate demand in the economy. The demand generating capacity of portfolio capital inflows are limited. (Demand can be generated through the increase in the monetary base of the economy. For India this increase in monetary base has somewhat counter balanced by reducing the monetisation of fiscal deficit .) Capital inflows have negative impact on aggregate demand through the increase in import-GNP ratio. So long as other variables like investment, export remain constant. From this point of view, there might have a negative impact of portfolio capital inflows on aggregate demand unless this is compensated by direct foreign investment in expanding demand. At the same time, instability arises due to high volatility in foreign portfolio capital. In fact, if our foreign investment investment composition is such that, proportion of foreign direct investment is higher than foreign portfolio investment then this negative impact on aggregate demand would have been compensated to some extent. Moreover it would have reduced the instability also. Because foreign direct

investment is much less volatile than portfolio investment(chapter 4) This less volatility would have also reduced the instability problem of foreign exchange reserve. This however does not seem to have happened so far to any significant extent.

Bibliography

Aliber, Robert Z. (1973). "The Interest Parity Theorem; A Reinterpretation", *Journal of Political Economy* 81, 1451-9

Bhaduri, A. (1995). "Implications of Globalization for Macroeconomic Theory and Policy", presented in a seminar of Centre for Economic Studies and Planning

Bhaduri, A and R Skarstein (1996) " Short-period macroeconomic aspects of foreign-aid", *Cambridge Journal of Economics* 20, 195-206.

Crotty, J.R. (1990). "Owner-manager conflict and financial theories of investment instability: a critical assessment of Keynes, Tobin and Minsky", *Journal of post Keynesian Economics*; 12 no4, 519-42.

Domar, E.D. (1950). " The Effect of Foreign Investment on the Balance of payments", *The American Economic review* 40, 805-20.

Reprinted in Domar (edt). (1957), *the theory of Economic Growth*, Oxford University Press.

Frenkel, J.A. and Richard M. Levich (1977). " Transaction costs and Interest Arbitrage, Tranquil versus Turbulent Periods " *Journal of Political Economy* 85, 1209-1226.

Gujrati, D. *Basic Econometrics*, Macgraw-Hill

Hufbauer, G.D. Lakdawalla and A, Malani, (1994). "Determination of Direct Foreign Investment and its connection to Trade", *UNCTAD Review*. 1994.

I.M .F. Study,(1996) "Private Market Financing for Developing Countries" prepared by a Staff Team in the Policy Development and Review Department., I.M.F.

Isard P. and Dooley M.P. (1980). " Capital Controls, Political Risk and Deviations from Interest -Rate Parity," *Journal of Political Economy* 88, 370-84.

Keynes, J.M. (1923), *A Tract on Monetary reform* or Reprinted in *The Collected Writings of John Maynard Keynes*, Vol.4. London, Macmillan Press limited.

Keynes, J.N. (1936), *The General Theory of Employment Interest and Money*, Ch.12., London, Macmillan and Co. Limited.

Keynes, J.M. (1937). " After The General Theory" *The Quarterly Journal of Economics*, Feb 1937.

Kregel, J. (1994), " Capital Flows : Globalization of Production and Financing Development". UNCTAU Review, 1994.

Morande, F.G. (1988), "Domestic Currency Appreciation and Foreign Capital Inflows: What Comes First? (Chile, 1972-82)", *Journal of International Money and Finance*, 7, 447-66.

Pindyck, R.S. (1991). "Irreversibility, Uncertainty, and Investment", *Journal of Economic Literature* XXIX, 1110-1148.

Pradhan, H.K. 1992, " Effective Exchange Rate of the Rupee", Export-Import bank of India *Occasional Paper* no. 21.

Pratten, C. 1993, "The Stock Market" Cambridge University Press.

Scitovsky, T. 1994. " Towards a theory of Second Hand Markets", *Kyklos* 47, 33-52.

Shah, A and Susan Thomas (1997) "Chapt.10" , Kirit Parikh (ed) India Development Report

Taylor, M.P. 1987. " Covered Interest parity : A high-frequency, High-quality Data Study", *Economica* 54, 429-438.

APPENDIX - A

Table - A1
India's Balance of Payments

(In U.S.\$ million)

Year	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
Current Account	-9680	-1178	-3526	-1158	-2634	-5434
Capital Account	8402	4754	4254	10022	7593	2515
Reserve Use	1278	-3576	-728	-8864	-4959	2919

Source : *Economic Survey, Govt. of India*

Note : '-' implies increase in Reserve Use Only

Table - A2**CAPITAL ACCOUNT OF INDIA**

(In U.S. \$ million)

YEAR	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
External Assistance(net)	2210	3037	1859	1901	1434	780
Commercial Borrowing (net)	2249	1456	-358	607	1029	527
I.M.F. (net)	1214	786	1288	187	-1146	-1710
N.R.I. Deposit (net)	1536	290	2001	1205	811	945
Rupee Debt Service	-1193	-1240	-878	-1053	-1050	-963
Foreign Investment	102	139	555	4235	4895	4143
(a) Foreign Direct Investment	97	135	313	586	1314	1929
(b) Foreign Institutional Investment	0	0	0	1665	1503	2009
(c) Euro Equities and Others	5	4	242	1984	2078	205
Other Flows	2284	286	-213	2940	1620	-1207
Capital Account Total (net)	8402	4754	4254	10022	7593	2515

Source: *Economic Survey, Govt. Of India*

Note: '-' implies outflows

Table - A3

Year	Current account deficit as a % of GDP	Saving- Inv gap as a % of GDP
1985-86	2.538719183	4.6
1986-87	2.250487348	4.5
1987-88	2.138405388	1.6
1988-89	2.959707043	3
1989-90	2.48613793	1.7
1990-91	3.560525143	0.9
1991-92	1.755047575	0.1
1992-93	0.187605608	1.9
1993-94	0.481765727	-1.4
1994-95	0.134911574	-0.9
1995-96	0.267197681	0.6

Source :

Economic Survey, Govt. of India

APPENDIX - B

The Initial Regression Equation is

$$S_t = a + b \cdot \text{Res.}_t + u_t$$

Following Run Test :

From the Residual Plot (graph-B1)

Number of runs $k = 3$

Number of positive residuals $n_1 = 21$

Number of negative residuals $n_2 = 22$

$$E(k) = 2 \cdot n_1 \cdot n_2 / (n_1 + n_2) + 1$$

$$= 22.48$$

$$\sigma_k = 2n_1 \cdot n_2 (2 \cdot n_1 \cdot n_2 - n_1 - n_2) / (n_1 + n_2)^2 (n_1 + n_2 - 1)$$

$$= 10.48$$

$$\text{or, } \sigma_k = 3.237$$

So, for no Auto-correlation the required condition is

$$E(k) - 1.96 \cdot \sigma_k < k < E(k) + 1.96 \cdot \sigma_k$$

Here, $E(k) - 1.96 \cdot \sigma_k = 16.135$ and $E(k) + 1.96 \cdot \sigma_k = 28.825$ and $k = 3$

So, here Auto- correlation exists.

Since value of 'k' is less than the lower limit this auto- correlation is positive.

Now, from the Correlogram of Residuals (graph B2) the auto-correlations pattern is like a sine curve. It says us that we should follow Auto -Regressive scheme . From the plot of partial correlation we get at lag1 and lag 9 partial correlation is significant at 5 % level of significance.

So, the error term should be estimated as

$$u_t = \Phi_1 \cdot u_{t-1} + \Phi_2 \cdot u_{t-9} + \varepsilon_t$$

If we use this equation we will loose a large numbers of degrees of freedom.

Hence we have use, $u_t = \Phi_1 \cdot u_{t-1} + \varepsilon_t$

i.e. AR(1) Scheme.

After applying AR(1) Scheme from residual plot (graph B3) we get,

$$k = 19$$

$$n1 = 16$$

$$n2 = 26$$

And both the lower limit and upper limit are 14.9 and 26.716 respectively.

Hence now there is no autocorrelation. Though correlogram graph (graph B4) is showing little existence of autocorrelation.

In this estimated equation the co-efficient of Res. is significant at 12.41 % level and change in exchange rate can explain 91 % of the change in exchange rate.(if we could have estimate the error term by the error term of one period lag and nine period lag then a better result would have come.)

Graph - B1

obs	Actual	Fitted	Residual	Residual Plot
1993:04	31.3700	31.0585	0.31148	*
1993:05	31.3700	30.9911	0.37888	*
1993:06	31.3700	31.0118	0.35823	*
1993:07	31.3700	31.0428	0.32725	*
1993:08	31.3700	31.1112	0.25880	*
1993:09	31.3700	31.1636	0.20636	*
1993:10	31.3700	31.2266	0.14343	*
1993:11	31.3700	31.2669	0.10306	*
1993:12	31.3700	31.5191	-0.14908	*
1994:01	31.3700	31.6410	-0.27100	*
1994:02	31.3700	32.0453	-0.67527	*
1994:03	31.3700	32.3601	-0.99015	*
1994:04	31.3700	32.3507	-0.98070	*
1994:05	31.3700	32.4139	-1.04393	*
1994:06	31.3700	32.5604	-1.19039	*
1994:07	31.3700	32.7469	-1.37691	*
1994:08	31.3700	32.7568	-1.38680	*
1994:09	31.3500	32.9412	-1.59119	*
1994:10	31.3700	33.1107	-1.74072	*
1994:11	31.3700	33.0496	-1.67957	*
1994:12	31.3700	33.0314	-1.66142	*
1995:01	31.3700	33.0763	-1.70626	*
1995:02	31.3700	33.1272	-1.75723	*
1995:03	31.1000	33.2945	-2.19448	*
1995:04	31.4200	33.2111	-1.79107	*
1995:05	31.4200	33.1471	-1.72713	*
1995:06	31.3900	33.0854	-1.69541	*
1995:07	31.3700	33.1113	-1.74129	*
1995:08	31.5400	33.0246	-1.48461	*
1995:09	33.1500	33.2264	-0.07641	*
1995:10	34.4300	33.0701	1.35994	*
1995:11	34.6200	33.0136	1.60639	*
1995:12	34.9100	33.0829	1.82708	*
1996:01	35.7100	32.9739	2.73607	*
1996:02	36.5300	32.7826	3.74744	*
1996:03	34.1800	32.9237	1.25628	*
1996:04	34.1500	32.9370	1.21303	*
1996:05	34.9800	32.9951	1.98490	*
1996:06	34.9400	33.0832	1.85684	*
1996:07	35.4100	33.2100	2.19996	*
1996:08	35.6500	33.1990	2.45098	*
1996:09	35.7000	33.2984	2.40160	*
1996:10	35.6100	33.4270	2.18302	*

Graph B2

CORRELOGRAM OF RESIDUAL

Sample: 1993:04 1996:10

Included observations: 43

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
*****	*****	1	0.912	0.912	38.304	0.000
*****	*	2	0.804	-0.160	68.841	0.000
*****	*	3	0.719	0.085	93.840	0.000
*****	**	4	0.613	-0.206	112.49	0.000
****	*	5	0.493	-0.103	124.85	0.000
***	.	6	0.384	-0.029	132.57	0.000
**	*	7	0.313	0.147	137.85	0.000
**	*	8	0.235	-0.132	140.90	0.000
*	***	9	0.097	-0.399	141.44	0.000
.	.	10	-0.025	-0.013	141.47	0.000
*	*	11	-0.134	-0.143	142.56	0.000
**	*	12	-0.225	0.165	145.71	0.000
**	*	13	-0.314	-0.117	152.08	0.000
***	*	14	-0.372	0.085	161.33	0.000
***	*	15	-0.394	-0.110	172.07	0.000
***	*	16	-0.406	0.068	183.91	0.000
***	*	17	-0.410	0.101	196.41	0.000
***	*	18	-0.410	-0.116	209.42	0.000
***	.	19	-0.406	-0.001	222.68	0.000
***	.	20	-0.380	-0.047	234.86	0.000

Regression Equation

LS // Dependent Variable is ST

Sample: 1993:05 1996:10

Included observations: 42 after adjusting endpoints

Convergence achieved after 6 iterations

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	59.60408	139.8098	0.426323	0.6722
RESERVE	-5.66E-07	3.60E-07	-1.571524	0.1241
AR(1)	0.993240	0.037647	26.38266	0.0000

R-squared	0.915581	Mean dependent var	32.57929
Adjusted R-squared	0.911252	S.D. dependent var	1.797989
S.E. of regression	0.535633	Akaike info criterion	-1.179865
Sum squared resid	11.18919	Schwartz criterion	-1.055745
Log likelihood -	31.81826	F-statistic	211.4903
Durbin-Watson stat	1.779741	Prob(F-statistic)	0.000000

Inverted AR Roots .99

Graph- B3

obs	Actual	Fitted	Residual	Residual Plot
1993:05	31.37	31.6276470417	-0.257647041741	*
1993:06	31.37	31.5299108877	-0.15991088771	*
1993:07	31.37	31.5182462498	-0.148246249815	*
1993:08	31.37	31.4762032753	-0.106203275313	*
1993:09	31.37	31.4935600134	-0.123560013399	*
1993:10	31.37	31.4814524163	-0.111452416308	*
1993:11	31.37	31.5061466977	-0.136146697698	*
1993:12	31.37	31.2695987881	0.10040121194	*
1994:01	31.37	31.4129632246	-0.0429632246428	*
1994:02	31.37	31.0970628484	0.272937151582	*
1994:03	31.37	31.1937425065	0.176257493542	*
1994:04	31.37	31.5531787545	-0.183178754522	*
1994:05	31.37	31.4721682486	-0.102168248629	*
1994:06	31.37	31.3788413606	-0.00884136062728	*
1994:07	31.37	31.3330444441	0.036955555857	*
1994:08	31.37	31.5286830049	-0.158683004933	*
1994:09	31.35	31.3339381331	0.0160618669411	*
1994:10	31.37	31.3292648711	0.0407351288817	*
1994:11	31.37	31.6051938549	-0.235193854936	*
1994:12	31.37	31.5576820331	-0.187682033119	*
1995:01	31.37	31.4875481384	-0.117548138403	*
1995:02	31.37	31.4803700343	-0.110370034322	*
1995:03	31.1	31.3502669888	-0.250266988848	*
1995:04	31.42	31.3604657206	0.0595342793927	*
1995:05	31.42	31.6572114749	-0.237211474929	*
1995:06	31.39	31.655215108	-0.26521510801	*
1995:07	31.37	31.5281480843	-0.158148084299	*
1995:08	31.54	31.6336753116	-0.0936753115966	*
1995:09	33.15	31.4813442747	1.66865572529	*
1995:10	34.43	33.4784838503	0.951516149741	*
1995:11	34.62	34.6395719805	-0.0195719804993	*
1995:12	34.91	34.6884118889	0.221588111076	*
1996:01	35.71	35.1748368348	0.535163165235	*
1996:02	36.53	36.0621524531	0.467847546939	*
1996:03	34.18	36.5070916285	-2.32709162849	*
1996:04	34.15	34.3146104162	-0.164610416177	*
1996:05	34.98	34.2346412121	0.74535878791	*
1996:06	34.94	35.0251975502	-0.0851975501801	*
1996:07	35.41	34.9415036619	0.46849633812	*
1996:08	35.65	35.5612068724	0.0887931275887	*
1996:09	35.7	35.6765090163	0.0234909836856	*
1996:10	35.61	35.6928457404	-0.0828457404462	*

Correlogram of Residual

Sample: 1993:05 1996:10

Included observations: 42

Q-statistic probabilities adjusted for 1 ARMA term(s)

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. *	. *	1	0.107	0.107	0.5147	
** .	** .	2	-0.230	-0.244	2.9548	0.086
. .	. *	3	0.037	0.100	3.0188	0.221
. .	* .	4	0.013	-0.069	3.0265	0.388
* .	* .	5	-0.133	-0.101	3.9109	0.418
*** .	*** .	6	-0.379	-0.395	11.265	0.046
. .	. *	7	0.044	0.115	11.367	0.078
. *	* .	8	0.088	-0.147	11.790	0.108
. .	. *	9	0.020	0.146	11.813	0.160
. .	* .	10	0.059	-0.065	12.013	0.213
. .	* .	11	-0.040	-0.073	12.109	0.278
. .	* .	12	0.019	-0.140	12.131	0.354
. .	. .	13	-0.027	0.023	12.178	0.431
. .	. .	14	-0.019	-0.051	12.202	0.511
. .	. *	15	0.032	0.113	12.271	0.585
. .	. .	16	0.023	-0.015	12.308	0.656
* .	* .	17	-0.061	-0.142	12.582	0.703
. .	. .	18	-0.007	-0.003	12.587	0.763
. *	. .	19	0.099	0.051	13.373	0.769
. .	. .	20	0.006	0.027	13.376	0.819

Table B1

YEAR	INDIA'S FOREIGN EXCHANGE RESERVE(in rupee)	SPOT EXCHANGE RATE (Rs / \$)
APR,93-94	2198998	31.37
MAY	2066236	31.37
JUN	2106926	31.37
JUL	2167935	31.37
AUG	2302759	31.37
SEP	2406028	31.37
OCT	2529975	31.37
NOV	2609486	31.37
DEC	3106088	31.37
JAN	3346221	31.37
FEB	4142457	31.37
MAR	4762621	31.37
APR,94-95	4744003	31.37
MAY	4868536	31.37
JUN	5156997	31.37
JUL	5524363	31.37
AUG	5543843	31.37
SEP	5907016	31.35
OCT	6240913	31.37
NOV	6120468	31.37
DEC	6084720	31.37
JAN	6173036	31.37
FEB	6273428	31.37
MAR	6602840	31.1
APR,95-96	6438553	31.42
MAY	6312613	31.42
JUN	6191049	31.39
JUL	6242038	31.37
AUG	6071301	31.54
SEP	6468769	33.15
OCT	6160834	34.43
NOV	6049644	34.62
DEC	6186158	34.91
JAN	5971497	35.71
FEB	5594582	36.53
MAR	5872603	34.18
APR96-97	5898691	34.15
MAY	6013182	34.98
JUN	6186631	34.94
JUL	6436527	35.41
AUG	6414821	35.65
SEP	6610553	35.7
OCT	6863798	35.61

Source;

For Reserv R.B.I, monthly bulletin, various issues

For Exchange Rate -I.F.S., various monthly number

APPENDIX - C

Table C1

TOTAL PORTFOLIO INVESTMENT (In Rs. Million)	SPOT EXCHANGE RATE (Rs. / \$)	RATE OF INTEREST DIFFERENTIAL (U.S.A. - INDIA)	MONTH
31.37	31.37	7.41	APR,93
345.07	31.37	6.73	MAY
1003.84	31.37	6.905	JUN
6964.14	31.37	6.85	JUL
3105.63	31.37	6.265	AUG
1505.76	31.37	5.765	SEP
12453.89	31.37	5.185	OCT
14743.9	31.37	5.27	NOV
7246.47	31.37	5.105	DEC
25942.99	31.37	5.31	JAN
43604.3	31.37	5.285	FEB
7058.25	31.37	3.935	MAR
9034.56	31.37	3.55	APR,94
11418.68	31.37	3.29	MAY
16124.18	31.37	4.07	JUN
20610.09	31.37	4.44	JUL
3638.92	31.37	3.625	AUG
9687.15	31.35	3.94	SEP
15590.89	31.37	3.81	OCT
8438.53	31.37	3.25	NOV
3607.55	31.37	3.99	DEC
1411.65	31.37	4.995	JAN
2007.68	31.37	5.49	FEB
6002.3	31.1	5.965	MAR
4524.48	31.42	6.045	APR,95
2073.72	31.42	6.31	MAY
3609.85	31.39	6.955	JUN
6619.07	31.37	7.37	JUL
7317.28	31.54	7.215	AUG
4342.65	33.15	7.345	SEP
3580.72	34.43	7.475	OCT
2734.98	34.62	7.62	NOV
4224.11	34.91	7.81	DEC
9963.09	35.71	7.95	JAN
26082.42	36.53	8.1	FEB
16645.66	34.18	8.01	MAR
14855.25	34.15	7.435	APR,96
11578.38	34.98	7.37	MAY
12473.58	34.94	7.03	JUN
12499.73	35.41	4.41	JUL
19286.65	35.65	4.21	AUG
4391.1	35.7	4.915	SEP
21472.83	35.61	3.485	OCT

Portfolio Investment - Centre for Monitoring Indian Economy, Monthly Review
 Exchange Rate and U.S.A. Interest - I.F.S. various monthly issues
 Indian Rate of Interest - Survey, Govt. of India

Source:

Table C2

INDIA - U.S.A. SHARE PRICE

YEAR	INDIA BSE SENSEX	U.S.A. SHARE PRICE
APR , 93-94	2205.37	375.8
MAY	2248.01	382.29
JUN	2281.95	383.84
JUL	2190.34	377.9
AUG	2556.16	382.26
SEP	2708.39	384.88
OCT	2688.51	392.15
NOV	2850.35	397.67
DEC	3301.85	400.29
JAN	3813.74	409.3
FEB	4039.42	409.88
MAR	3811.25	404.36
APR , 94-95	3824.75	386.91
MAY	3756.1	391.27
JUN	4135.67	393.31
JUL	4106.95	390.98
AUG	4407.4	403.48
SEP	4511.34	410.17
OCT	4351.16	409.88
NOV	4139.06	401.45
DEC	3949.78	402.32
JAN	3651.59	410.46
FEB	3474.92	428.19
MAR	3408.29	430.06
APR , 95-96	3359.29	448.83
MAY	3206.09	463.37
JUN	3336.46	477.03
JUL	3334.86	495.05
AUG	3402.81	494.18
SEP	3396.37	507.84
OCT	3528.1	507.84
NOV	3172.02	520.63
DEC	3060.05	536.62
JAN	2979.3	535.46
FEB	3405.56	567.44
MAR	3327.33	568.6
APR , 96-97	3599.66	570.34
MAY	3732.2	585.17
JUN	3906.72	592.73
JUL	3668.21	567.73
AUG	3449.17	582.26
SEP	3390.11	593.89
OCT	3159.79	615.4

Source:

Indian share prices - R.B.I, Monthly Bulletin

U.S.A. share prices - I.F.S. various monthly issues

Table C3

STOCK MARKET RETURNS

YEAR	MONTHLY AVERAGE RETURN IN U.S.A. STOCK MARKET	MONTHLY AVERAGE RETURN IN INDIAN STOCK MARKET
APR,93-94	1.728395062	1.933462412
MAY	0.404530744	1.509779761
JUN	-1.546775884	-4.01454896
JUL	1.153846154	16.70151666
AUG	0.684410646	5.955417501
SEP	1.888217523	-0.734015411
OCT	1.408450704	6.019691204
NOV	0.657894737	15.84015998
DEC	2.251270879	15.50312703
JAN	0.142045455	5.917550751
FEB	-1.34751773	-5.648583212
MAR	-4.313443566	0.354214497
APR,94-95	1.126972201	-1.794888555
MAY	0.520059435	10.1054285
JUN	-0.59127864	-0.694446124
JUL	3.197026022	7.315647865
AUG	1.657060519	2.358306485
SEP	-0.070871722	-3.550608023
OCT	-2.056737589	-4.874562186
NOV	0.217233888	-4.573018995
DEC	2.023121387	-7.549534404
JAN	4.320113314	-4.838166388
FEB	1.83299389	-1.917454215
MAR	2.933333333	-1.43767109
APR,95-96	3.238341969	-4.560487484
MAY	2.948557089	4.066323778
JUN	3.778184034	-0.047955018
JUL	-0.176159718	2.037566794
AUG	2.764705882	-0.189255351
SEP	0	3.87855269
OCT	2.51860332	-10.09268445
NOV	3.070910106	-3.529927302
DEC	-0.216684724	-2.63884577
JAN	5.971769815	14.30738764
FEB	0.204918033	-2.297125877
MAR	0.306748466	8.184640538
APR,96-97	2.599388379	3.682014412
MAY	1.29160457	4.676062376
JUN	-4.217753801	-6.105121432
JUL	2.56016385	-5.971304805
AUG	1.997004493	-1.712296002
SEP	3.622124327	-6.793879845

Source: Reserve Bank Of India ,Report On Currency And Finance
Reserve Bank Of India Monthly Bulletin , Various Issues
International Financial Statistics, Various Monthly Issues

Table C4
FORWARD PREMIUM AND RATE OF INTEREST
DIFFERENTIAL IN INDIA

Month	3 Months Forward Premium	Rate of Interest Differential	Difference Between Forward Premium and Rate of Interest Differential
APR,93-94	9.43	7.41	2.02
MAY	7.76	6.73	1.03
JUN	6.65	6.905	-0.255
JUL	5.46	6.85	-1.39
AUG	2.55	6.265	-3.715
SEP	2.45	5.765	-3.315
OCT	4.37	5.185	-0.815
NOV	3.3	5.27	-1.97
DEC	3.54	5.105	-1.565
JAN	1.31	5.31	-4
FEB	0.23	5.285	-5.055
MAR	0.86	3.935	-3.075
APR,94-95	1.65	3.55	-1.9
MAY	2.13	3.29	-1.16
JUN	2.33	4.07	-1.74
JUL	2.38	4.44	-2.06
AUG	1.35	3.625	-2.275
SEP	1.95	3.94	-1.99
OCT	2.79	3.81	-1.02
NOV	3.12	3.25	-0.13
DEC	4.26	3.99	0.27
JAN	5.47	4.995	0.475
FEB	6.74	5.49	1.25
MAR	6.9	5.965	0.935
APR,95-96	7.53	6.045	1.485
MAY	6.31	6.31	0
JUN	5.9	6.955	-1.055
JUL	5.39	7.37	-1.98
AUG	3.44	7.215	-3.775
SEP	3.99	7.345	-3.355
OCT	10.05	7.475	2.575
NOV	17.21	7.62	9.59
DEC	14.42	7.81	6.61
JAN	13.98	7.95	6.03
FEB	20.66	8.1	12.56
MAR	27.06	8.01	19.05
APR,96-97	15.57	7.435	8.135
MAY	14	7.37	6.63
JUN	11.44	7.03	4.41

Source:

For Forward Premium - Report on Currency and Finance, Reserve Bank of India
For Rate of Interest Differential - Economic Survey, Govt. of India

The Initial Regression Equation is

$$PI = \alpha + \beta_1 CER + \beta_2.DIRD + u_t$$

Run Test :

From the Residual Plot -

Number of runs $k = 15$

Number of positive residuals $n_1 = 18$

Number of negative residuals $n_2 = 24$

$$E(k) = 2.n_1.n_2 / (n_1+n_2) + 1$$

$$= 21.57$$

$$\sigma_k = 2n_1.n_2 (2.n_1.n_2 - n_1 - n_2) / (n_1+n_2)^2 (n_1+n_2-1)$$

$$= 4.1752$$

$$\text{or, } \sigma_k = 2.043$$

So, for no Auto-correlation the required condition is

$$E(k) - 1.96.\sigma_k < k < E(k) + 1.96.\sigma_k$$

Here, $E(k) - 1.96.\sigma_k = 17.565$ and $E(k) + 1.96.\sigma_k = 25.574$ and $k = 15$

So, here Auto- correlation exists.

Since value of 'k' is less than the lower limit this auto- correlation is positive.

Now, from the Correlogram of Residuals the auto-correlations pattern is like a sine Curve. It says us that we should follow Auto -Regressive scheme . From the plot of partial correlation we get at lag1 partial correlation is significant at 5 % level of significance.

Hence we have use, $u_t = \Phi_1.u_{t-1} + \varepsilon_t$

i.e. AR(1) Scheme.

After applying AR(1) Scheme from Run Test we get,

$$k = 20$$

$$n_1 = 20$$

$$n_2 = 21$$

And both the lower limit and upper limit are 15.2954 and 27.680 respectively.

Hence now there is no auto-correlation.

Graph - C1

obs	Actual	Fitted	Residual	Residual Plot
1993:05	34.5070	1096.40	-1061.89	*
1993:06	100.384	1096.40	-996.014	*
1993:07	696.414	978.471	-282.057	*
1993:08	310.563	1098.06	-787.494	*
1993:09	150.576	982.292	-831.716	*
1993:10	1245.39	1097.44	147.945	*
1993:11	1474.39	982.869	491.521	*
1993:12	724.647	1092.65	-368.002	*
1994:01	2594.30	984.672	1609.63	*
1994:02	4360.43	1089.98	3270.45	*
1994:03	705.825	986.330	-280.505	*
1994:04	903.456	1099.53	-196.079	*
1994:05	1141.87	979.372	162.496	*
1994:06	1612.42	1098.63	513.784	*
1994:07	2061.01	971.873	1089.14	*
1994:08	363.892	1109.60	-745.708	*
1994:09	968.715	972.408	-3.69255	*
1994:10	1559.09	1093.44	465.647	*
1994:11	843.853	983.626	-139.773	*
1994:12	360.755	1096.54	-735.788	*
1995:01	141.165	974.253	-833.088	*
1995:02	200.768	1202.77	-1002.00	*
1995:03	600.230	849.768	-249.538	*
1995:04	452.448	1094.78	-642.328	*
1995:05	207.372	992.793	-785.421	*
1995:06	360.985	1101.45	-740.467	*
1995:07	661.907	909.952	-248.045	*
1995:08	731.728	450.287	281.441	*
1995:09	434.265	469.502	-35.2366	*
1995:10	358.072	1016.95	-658.878	*
1995:11	273.498	866.002	-592.504	*
1995:12	422.411	772.533	-350.122	*
1996:01	996.309	653.409	342.900	*
1996:02	2608.24	2034.48	573.757	*
1996:03	1664.57	993.767	670.799	*
1996:04	1485.53	762.609	722.916	*
1996:05	1157.84	1001.27	156.569	*
1996:06	1247.36	903.114	344.244	*
1996:07	1249.97	891.110	358.863	*
1996:08	1928.66	1087.77	840.899	*
1996:09	439.110	1005.83	-566.718	*
1996:10	2147.28	1057.21	1090.07	*

Graph - C2

Correlogram of Residual

Sample: 1993:05 1996:10

Included observations: 42

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
. ***	. ***	1 0.343	0.343	5.3000	0.021
. .	. .	2 0.080	-0.042	5.5972	0.061
. **	. **	3 0.197	0.208	7.4443	0.059
. .	. .	4 0.162	0.033	8.7267	0.068
. .	. .	5 0.067	0.005	8.9525	0.111
. .	. .	6 -0.092	-0.167	9.3862	0.153
. .	. .	7 -0.143	-0.111	10.470	0.163
. .	. .	8 -0.111	-0.068	11.134	0.194
. .	. .	9 -0.141	-0.069	12.251	0.200
. .	. .	10 -0.163	-0.040	13.782	0.183
. .	. .	11 -0.206	-0.103	16.308	0.130
. .	. .	12 -0.279	-0.178	21.101	0.049
. .	. .	13 -0.237	-0.110	24.685	0.025
. .	. .	14 -0.177	-0.078	26.748	0.021
. .	. .	15 -0.166	-0.064	28.645	0.018
. .	. .	16 -0.190	-0.113	31.220	0.013
. .	. .	17 -0.109	-0.032	32.099	0.015
. .	. .	18 0.021	0.011	32.133	0.021
. .	. .	19 0.087	0.036	32.741	0.026
. .	. .	20 0.007	-0.104	32.745	0.036

Regression Equation

LS // Dependent Variable is PI

Sample: 1993:06 1996:10

Included observations: 41 after adjusting endpoints

Convergence achieved after 3 iterations

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	1084.231	199.3449	5.438971	0.0000
CER	-311.2290	225.6194	-1.379443	0.1760
DIRD	-11.20802	11.54124	-0.971129	0.3378
AR(1)	0.370033	0.152867	2.420625	0.0205
R-squared	0.202887	Mean dependent var	1023.114	
Adjusted R-squared	0.138257	S.D. dependent var	860.2017	
S.E. of regression	798.5264	Akaike info criterion	13.45800	
Sum squared resid	23592845	Schwartz criterion	13.62518	
Log likelihood	-330.0656	F-statistic	3.139176	
Durbin-Watson stat	1.936564	Prob(F-statistic)	0.036732	
Inverted AR Roots	.37			

Graph-C3

obs	Actual	Fitted	Residual	Residual Plot
1993:06	100.384	752.919	-652.535	* .
1993:07	696.414	593.989	102.425	. * .
1993:08	310.563	1068.25	-757.692	* .
1993:09	150.576	676.748	-526.172	* .
1993:10	1245.39	863.126	382.263	. * .
1993:11	1474.39	1023.91	450.476	. * .
1993:12	724.647	1345.20	-620.549	* .
1994:01	2594.30	836.782	1757.52	. . * .
1994:02	4360.43	1754.42	2606.01	. . * .
1994:03	705.825	2186.26	-1480.43	* .
1994:04	903.456	1069.51	-166.058	. * .
1994:05	1141.87	890.749	251.119	. * .
1994:06	1612.42	1233.47	378.952	. * .
1994:07	2061.01	1141.95	919.058	. . * .
1994:08	363.892	1588.71	-1224.82	* .
1994:09	968.715	683.008	285.707	. * .
1994:10	1559.09	1163.03	396.064	. * .
1994:11	843.853	1143.47	-299.619	. * .
1994:12	360.755	1117.49	-756.738	* .
1995:01	141.165	683.695	-542.530	. * .
1995:02	200.768	943.928	-743.160	* .
1995:03	600.230	500.622	99.6082	. * .
1995:04	452.448	1064.73	-612.279	* .
1995:05	207.372	738.121	-530.749	. * .
1995:06	360.985	881.562	-520.577	* .
1995:07	661.907	636.235	25.6715	. * .
1995:08	731.728	569.639	162.089	. * .
1995:09	434.265	621.112	-186.847	. * .
1995:10	358.072	1049.62	-691.552	* .
1995:11	273.498	628.611	-355.113	. * .
1995:12	422.411	686.103	-263.692	. * .
1996:01	996.309	557.276	439.033	. * .
1996:02	2608.24	1995.72	612.519	. * .
1996:03	1664.57	1267.56	397.004	. * .
1996:04	1485.53	1158.13	327.391	. * .
1996:05	1157.84	1225.90	-68.0587	. * .
1996:06	1247.36	1073.79	173.567	. * .
1996:07	1249.97	1014.36	235.612	. * .
1996:08	1928.66	1295.26	633.405	. * .
1996:09	439.110	1284.22	-845.114	* .
1996:10	2147.28	938.429	1208.85	. . * .

Graph-C4

Date: 08/12/97 Time: 12:41

Sample: 1993:06 1996:10

Included observations: 41

Q-statistic probabilities adjusted for 1 ARMA term(s)

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. .	. .	1	-0.008	-0.008	0.0030	
* .	* .	2	-0.139	-0.139	0.8800	0.348
. *	. *	3	0.144	0.144	1.8381	0.399
. *	. .	4	0.076	0.059	2.1157	0.549
. *	. *	5	0.084	0.128	2.4582	0.652
* .	* .	6	-0.065	-0.071	2.6720	0.750
* .	* .	7	-0.130	-0.129	3.5528	0.737
. *	. .	8	0.075	0.020	3.8513	0.797
. .	. .	9	0.057	0.033	4.0298	0.854
* .	* .	10	-0.127	-0.079	4.9484	0.839
* .	* .	11	-0.093	-0.074	5.4614	0.858
* .	** .	12	-0.162	-0.208	7.0636	0.794
* .	* .	13	-0.117	-0.162	7.9314	0.790
. .	* .	14	-0.036	-0.080	8.0151	0.843
* .	. .	15	-0.108	-0.053	8.8090	0.843
* .	* .	16	-0.110	-0.067	9.6603	0.841
. .	* .	17	-0.050	-0.072	9.8435	0.875
. .	. .	18	-0.007	-0.036	9.8474	0.910
. .	. .	19	0.058	0.043	10.118	0.928
. .	. .	20	-0.053	-0.038	10.351	0.944

APPENDIX - D

Table-D1

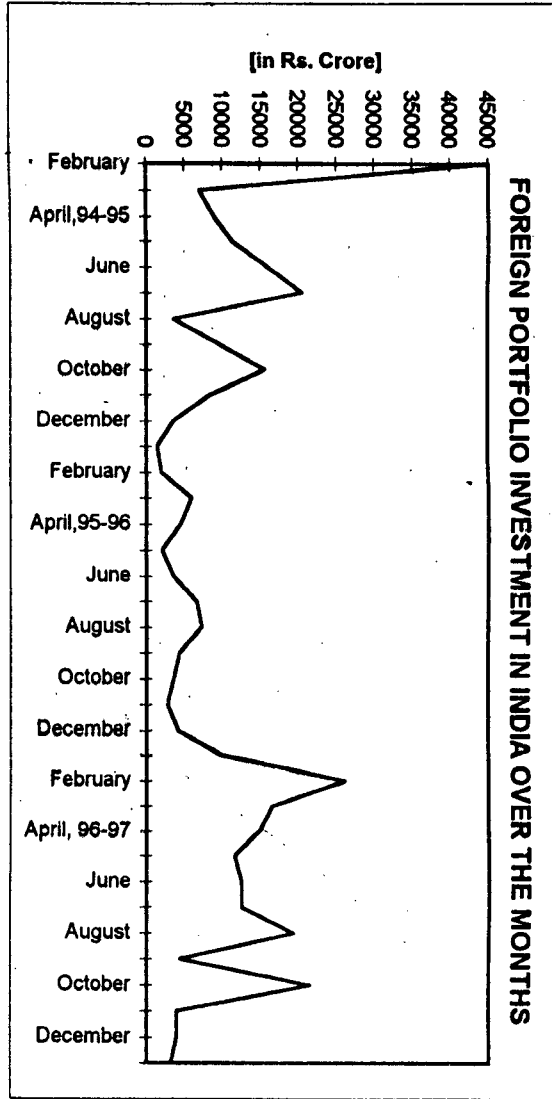


Table- D2

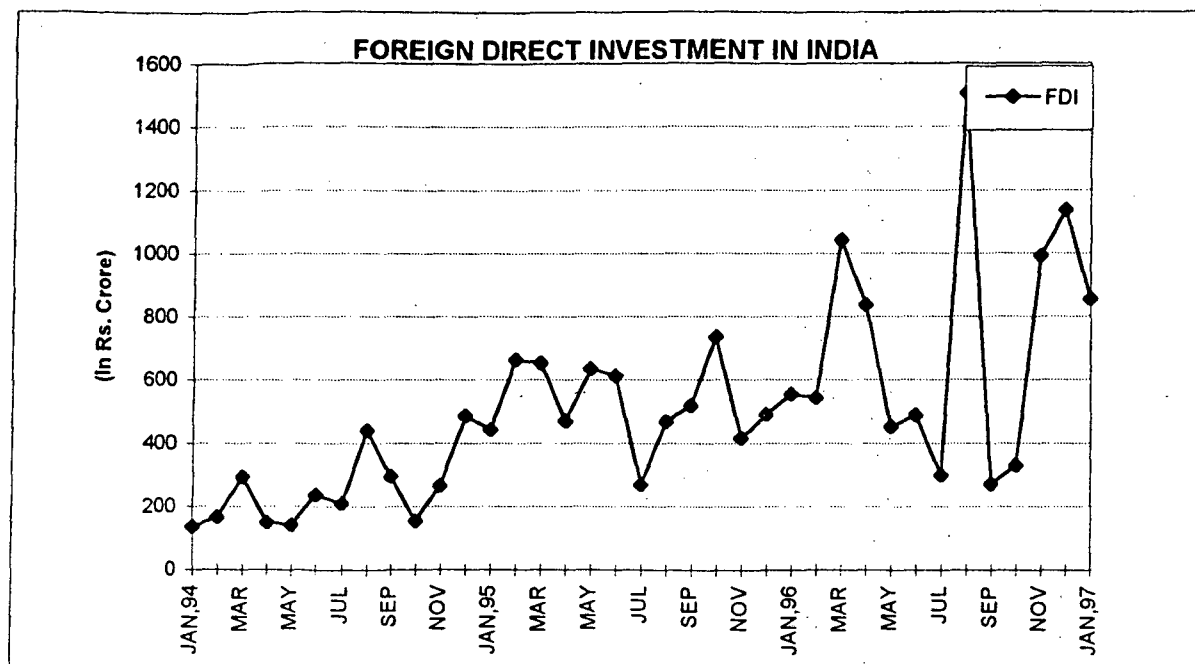


Table -D3

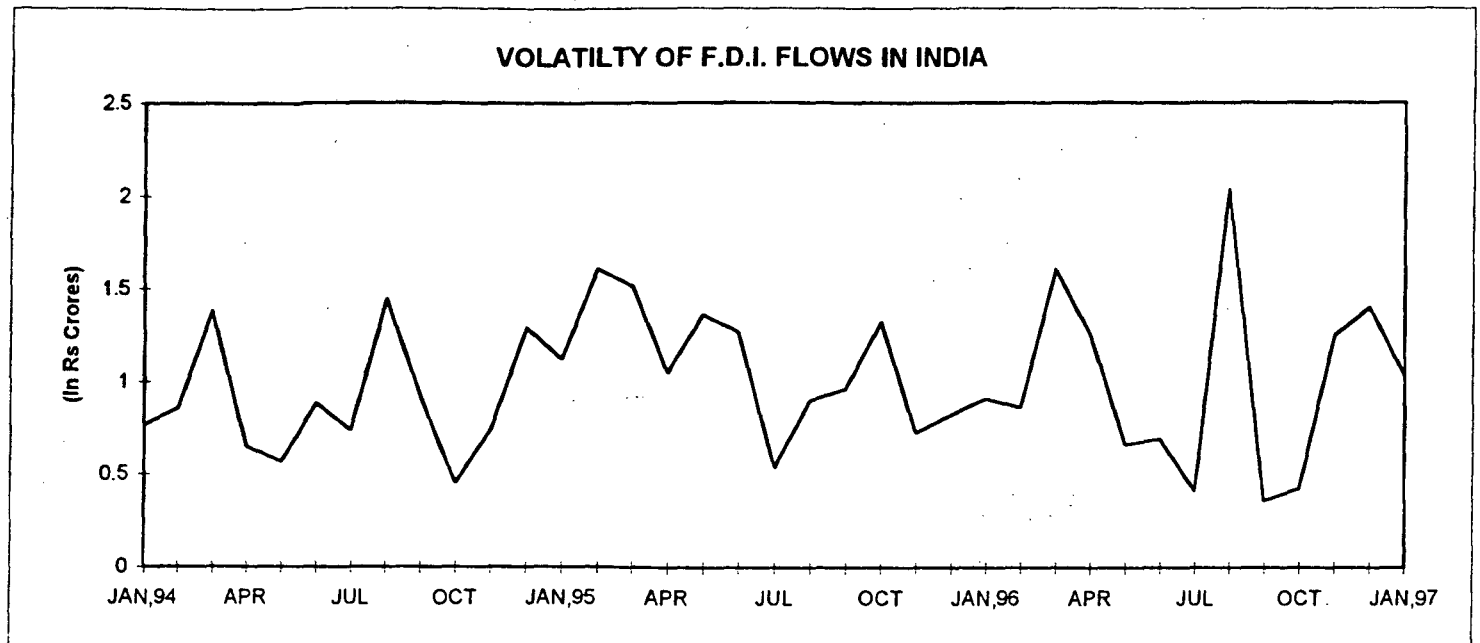
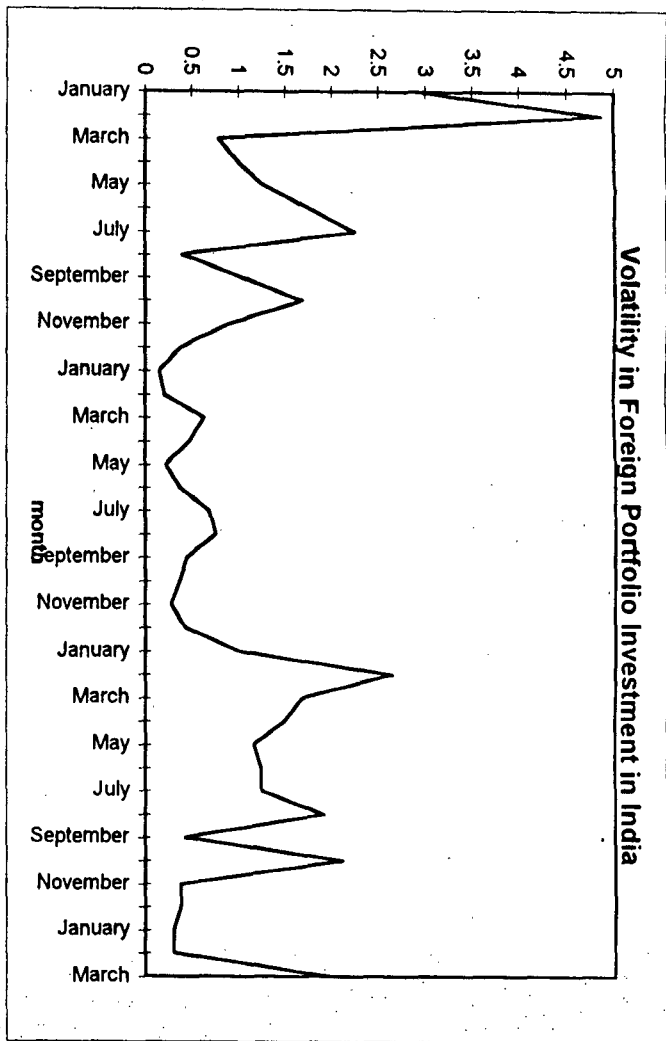


Table - D4



Errata

1. See Contents, in the title of ch. 3 one 'investment' should be removed.
2. In page 2, in the fourth line from the bottom line of the page, an extra full stop should be removed from the space between 'billions' and 'due'.
3. In page 19 in the 7th line from the top, the word 'breack' should be spelled as 'breaks'.
4. In page 26, in the last line of foot note 4 one 'India' should be removed.
5. In page 26, in the fifth line from the top, the table No. should be 'C4'.
6. In page 27, in the foot note 7, in the source of foreign portfolio investment, 'centre for monetary Economy publication' should be 'C.M.I.E.'.
7. In page 38, in the line 11 from the top, the line should be, 'The argument behind this was put forwarded by Keynes in two statements' instead of 'The argument behind this in two statements'.
8. In page 39, in line 4 from the top, the line should be, 'they are not merely short-run capital gainer' instead of 'they are not merely and not short-run capital gainer'.
9. In page 38 in the 2nd line of 2nd paragraph from the top, the line 'tends to dominates the latter' should be 'tends to dominate the latter'.
10. In page 44, in the 4th line from the bottom, one 'investment' should be removed.
11. In page 20, the source of the quotation is 'After the General Theory' pp. 113.
12. In page 22, the source of the quotation is 'A Tract on Monetary Reform' pp. 103.
13. In page 36, the source of the quotations is 'After the General Theory' pp. 114,115 respectively.
14. In page 37, the source of the quotation is 'The General Theory of Employment Interest and Money' ch. 12, pp. 153.
15. In Appendix B, the Correlogram of Residual figure should be named as 'Graph - B4'.
16. In Appendix C, in the table C1, the data source should be written as
source :
Foreign Portfolio Investment- Centre for Monitoring Indian Economy, Monthly Review.
Exchange rate and U.S.A. interest rate - I.F.S. various monthly issues

Indian rate of Interest - Economic Survey, Govt. of India.
14. In the 2nd page of acknowledgement, in the last line the word should be 'responsible' instead of 'resposible'.