

Exchange Rate and Foreign Exchange Reserves in India: Issues and Implications

Jasjit Kaur¹ and Paramjit Nanda²

¹Research Scholar, Punjab School of Economics Guru Nanak Dev University Amritsar

²Punjab School of Economics Guru Nanak Dev University Amritsar

E-mail: ¹jasjit28410@gmail.com, ²paramjitnanda2002@yahoo.com

Abstract—The substantial increase in reserves due to the external sector reforms in India which were initiated in the wake of the balance of payment crisis in 1991 has raised various issues in the form of trade-off between costs and benefits of holding reserves, between maintaining competitive exchange rate and inflation and between managing volatility in all prices, goods and exchange rate. The present paper is an attempt to discuss these issues for the period spanning 1990-91 to 2013-14. The paper has been divided into three sections. Section I deals with developments in foreign exchange, sources of foreign exchange reserves and adequacy of reserves. Section II analyses costs and benefits of holding reserves theoretically and empirically by considering volatility in exchange rate. Section III brings out the policy implications in the light of rapid surge in foreign exchange reserves. Tabular analysis techniques such as percentages, averages, etc., ordinary least square, trend co-efficient and simple regression analysis are used for the estimation purpose. The study reveals that reserves increase at a higher rate mainly due to higher growth of foreign currency assets and current account and further foreign investment and NRI deposits contribute mainly to surplus in capital account. Secondly, different measures of reserve adequacy indicate comfortable position of foreign exchange reserves. Finally, cost of reserves when measured in terms of volatility in exchange rates shows that NEER (6 country) as well as REER (36 country) are highly volatile while less variations are found in REER (6 country) and REER (36 country). This indicates that in the absence of mounting foreign exchange rate, the exchange rates might have depreciated at much higher rates.

The study implies that to combat with conflicting goals of inflation and external competitiveness, monetary policy is to be supplemented with durable macro economic policies during surplus in current account (such as financial adjustment, liberalisation of trade policy and capital outflows and greater degree of flexibility in the exchange rate) to absorb excess capital flows. In the context, of rapid capital flows, there is also need to strengthen financial sector. Banks should follow strict prudent regulatory and supervisory norms in the form of (i) sound capital adequacy standards, (ii) risk based

management system and (iii) effective supervision. Foreign exchange transaction and external liabilities should be managed effectively

1. INTRODUCTION

Exchange rate serve a variety of purposes in the global business world for instance, by helping in the translation and conversion of foreign currency, exchange rates expedite global commerce, the flow of products and services internationally. They also serve as economic indicators, for instance a strong exchange rate indicates a growing economy and political stability for a particular country, on the contrary, a weak exchange rate may indicate economic recession. Foreign exchange reserves can be used by politicians to exert an influence on currency rates and manage the economy. This happens when government officials use foreign exchange reserves to repurchase domestic currency and strengthen its value. Exchange rates can also be used as strategic instruments

The external sector reforms in India were initiated in the wake of the balance of payments crisis of 1991. There reforms led to rapid increases in foreign exchange reserves from \$5834 million in 1990-91 to \$304224 million in 2013-14. The substantial increase in reserves has raised various issues in the form of trade-off between costs and benefits of holding reserves, between maintaining competitive exchange rate and inflation and between managing volatility in all prices. This paper is an attempt to discuss these issues. The paper has been divided into three sections. Section 1 deals with developments in foreign exchange reserves and adequacy of reserves during the period 1990-91 to 2013-14. Section 2 analyses costs and benefits of holding reserves theoretically and empirically by considering volatility in exchange rates. Section 3 brings out policy implications in the light of rapid surge in foreign exchange reserves.

In India the Reserve Bank of India Act 1934 contains the enabling provision for the RBI, to act as a custodian of foreign reserves and manage foreign reserves with defined objectives. The exchange rate system in India has undergone a

paradigm shift from a system of fixed exchange rate (until March 1992) to market determined regime in March 1993, to introduction of current account convertibility and thereby achieving article VIII status of IMF in August 1994 and to gradual liberalisation of a capital account convertibility. Since 1991, the major objective has been to achieve a sustainable current account deficit and manageable foreign exchange situation thereby reducing excess volatility, preventing the emergence of destabilizing speculation activities and developing an orderly foreign exchange market.

2. FOREIGN EXCHANGE RESERVES

External sector reform introduced in 1991 led to increase in India's foreign exchange reserves which stood at US \$ 5.8 billion at the end of March 1991 increased gradually to US \$ 25.186 billion in March 1995. The growth in the second half of the 1990s with the reserves touching the level of US \$ 32.490 billion in March 1999 and finally since 1999, there has been phenomenal increase in reserves, the reserves rose to US \$ 309.7 billion at end March 2008. However, reserves declined to US \$ 236 billion in Feb. 2009 but with US central Bank pumping \$1.5 billion into the US economy as interest rate in US dipped down which led to an increase in foreign investment, as a result, reserves stood at US \$ 252 billion as at end of March 2009 and further increased to US \$ 304.2 billion in 2013-14. Of the various components of foreign exchange reserves, foreign currency assets constitute major share thus, reflecting almost entire movement in foreign exchange reserves (table 1) US \$ 2.236 billion (constituting 38.3 percent) in 1991 to US \$ 299.230 billion (96.6 percent) in 2008, but got declined to US \$ 276.359 billion (90.8 percent) in 2014. On an average, foreign currency assets are found to be US \$ 708.999 billion in all these years. These assets constitute major share in foreign exchange reserves mainly due to rise in foreign investment inflows, external commercial borrowings and bank capital. The gold holdings of the reserve bank remained broadly stable at around US \$ 3-4 billion from 1990-91 to 1997-98, but after that holdings of gold declined to US \$ 2.75 billion in 2000-2001, due to redemption of obligation under gold bond scheme at the end of March 1999 and due to reduction in international gold prices. The gold holdings of reserve bank in 2014 were maximum of US \$ 21.567 billion (7.08 percent share). Share of gold holdings in foreign exchange reserves has been varying between 59.9 percent to 7.08 percent during 1990-91 to 2013-14. Average holding of gold is found to be US \$ 4.75 billion during these years. SDR holdings of the government show a downward trend in the foreign exchange reserves. It was maximum of US \$ 5.006 billion in the year 2009-10. Share of SDRs has been ranging between 1.74 percent to 1.46 percent during 1990-91 to 2013-14. Reserve Tranche Position in IMF, was included as main component of foreign exchange reserves in 2002-03. RTP has shown upward movement of US \$ 672 million in the year 2003 (0.88 percent share) to US \$ 1438 million in the year 2009 (1.01 percent share) after that in the year 2006 it

declined to US \$ 756 million to US \$ 436 million in 2008-09 to US \$ 1834 million in 2013-14. Share of RTP has been ranging between 0.88 percent to 0.60 percent during 2002-03 to 2013-14

3. SOURCES OF FOREIGN EXCHANGE RESERVES

The increase in foreign exchange reserves has been the net result of all external transactions which are reflected in a country's BOPs, the analysis of various sources of foreign exchange in India given in table 2 shows that accretion in foreign exchange as reflected by BOP, has not been supported by current account as it has been mostly in a deficit form since 2000-01 and it is the surplus in the capital account which has been playing a major role in the accretion of foreign exchange reserves. Current account balance turned from deficit of US \$ 69.680 billion in 1990-91 to surplus of US \$ 3.40 billion in 2001-02 and further US \$ 6.345 billion in 2002-03 and to US \$ 14.083 billion in 2003-04 (this is the only second time since the mid 1950s that India had three successive years of surplus in current account, early years being 1976-77 and 1977-78). Surplus in current account higher in these years due to higher earnings from merchandise exports and strong private remittance net invisibles which was US \$ 27.80 billion in 2004 not only covered the trade deficit which was US \$ 13.718 billion but also resulted in surplus in current account of US \$ 14.083 billion. Deficit in invisibles as well as deficit in current accounts as percentage of GDP turned from (-) 0.1 percent and (-) 3.1 percent in 1990-91 to surplus of 4.3 percent and 1.7 percent respectively in 2003-04 but after that country runs trade and current account deficit due to oil and non oil imports, so notwithstanding the growth in exports. As a result, the current account deficits amounted to US \$ 88.1 billion during 2012-13 as against to US \$ 98.1 billion in 2011-12. As a proportion to GDP the current account deficit at 1.5 percent in 2012-13 was higher than that of last year (1.1 percent) led by the higher trade deficit under the capital account, the foreign investment plays a major contribution in its upsurge at US \$ 54.723 billion (59.4 percent), external assistance amounted to US \$ 1.268 billion (1.37 percent), commercial borrowings to US \$ 8.583 (9.33), rupee debt service to US \$ 58 million, NRI deposits to US \$ 14.842 billion (13.7) percent in 2012-13. But in 1990-91, the bulk of capital flows into India were in the form of debt flows (loans including external assistance, commercial borrowings and short term credit) in 1990-91, loans constituted 78 percent share in capital account, while banking capital and foreign investment constituted only 11 percent and one percent share in capital account. Increase in foreign exchange rate reflects the dramatic shift in composition of capital account.

4. ADEQUACY OF FOREIGN EXCHANGE RESERVES

With the changing profile of capital flows, the approach to reserve management as part of exchange rate management

underwent a paradigm shift. India's approach to reserve management until 1991, was to maintain an appropriate level to import cover defined in terms of number of months of imports equivalent to reserves. But High Level Committee on Balance of Payments under the Chairmanship of C. Rangarajan (1993) recommended that target level of reserves should be determined in terms of payment obligations. Further, reserves should be assessed in relation to stock of short-term debt and portfolio flows (RBI, 1996-97). Tarapore Committee on Capital Account Convertibility (RBI, 1997) suggested four measures of reserve adequacy : (i) import cover of not less than 6 months; (ii) reserves should not be less than 3 months of imports plus 50 percent of annual debt service payments plus one month's imports and exports to take into account the possibility of lags and leads; (iii) ceiling of 60 percent in the ratio of short term debt and portfolio stock to reserves and (iv) net foreign exchange assets to currency ratio (NFA/currency ratio) of not less than 40 percent but objective should be to maintain it at around 70 percent. With currency crisis in East-Asian Countries and with volatile cross-border capital flows, emphasis also shifted from adequacy (size) of reserves to quality of reserves. For this purpose, unrestricted reserve assets must be available at any time and forward liabilities must be kept at relatively low level as proportion of gross reserves (RBI, 1999). Recently Pablo Guidotti, the Deputy Finance Minister of Argentina at the G-33 Seminar in Bonn argued that countries should manage their external assets and liabilities in such a way that they are always able to live without new foreign borrowings for up to one year (RBI, 2003). He suggested a 'Liquidity at Risk' rule that would take into account the foreseeable risks that a country could face. A country's liquidity position can be calculated under a range of possible outcomes for relevant financial variables like exchange rates, commodity prices, credit spreads, etc.

Considering different measures of reserve adequacy. Table 3 shows traditional based indicators of reserve adequacy i.e. the import cover of reserves (defined as the 12 times the ratio of reserves to merchandise imports) which fell to low of three weeks of imports in June 1991 has improved to 10.3 months of imports in 2009. Import cover of reserves shows an upward movement from 1991 to 2008 but in 2009 it shrank a little bit. 21 percent of imports could be financed by reserves in 1991 which rose to 119.46 percent in 2008. But in 2009 the ratio of reserve to import was declined to 95.73 percent. In terms of debt-based indicators of reserve adequacy, the ratio of short-term debt to reserves declined from 146.5 percent in 1990-91 to 4.2 percent in 2003-04 but after that it started increasing and stood at 19.6 percent. The ratio showed that reserves were clearly adequate to cover short term debt and ratio of short-term debt to currency assets declined from 382.148 percent in 1990-91 to 4.12 percent in 2003-04 and increased in 2008-09 to 20.45 percent. The reserves to external debt ratio has gone up from 10.8 percent in 1991-92 to 138 percent in 2007-08 and declined to 109.6 percent in 2008-09. Over the same period, the reserves to short-term debt ratio has shot up from

68.28 percent in 1990-91 to 2549.2 percent in 2003-04 and further declined to 510.37 percent in 2008-09. In terms of money-based indicators, the ratio of net foreign assets of the Reserve Bank to currency in circulation sharply increased from 14.44 percent in March 1991 to 209.2 percent in March 2008 and dipped to 185.2 percent in 2009, while that of net foreign exchange assets to broad money increased from 3.2 percent in March, 1991 to 34.5 percent in 2008 and declined to 29.5 percent in 2009. Thus, different measures of reserve adequacy indicate comfortable position of foreign exchange reserves.

For developing countries sharp exchange rate movements can be highly disequilibrating which may cause huge losses in GDP and welfare. The objectives of holding the foreign exchange reserves include (a) enhancing the capacity to intervene in foreign exchange markets, (b) maintaining confidence in monetary and exchange rate policies, (c) providing confidence to the markets that external obligations can be met, (d) limiting external vulnerability so as to absorb shocks during times of crisis, (e) adding to the comforts of the market participants by demonstrating the backing of domestic currency by external assets, and (f) reducing volatility in foreign exchange markets (RBI, 2003). The costs of holding reserves have to be examined in the back drop of these objectives.

Costs of reserves include (1) Financial cost of holding reserves is the difference between interest paid on external debt and returns on external assets in reserves, such costs have to be treated as insurance premium to assure and maintain confidence in the availability of liquidity. If high costs borrowings are used to build up reserves on which modest returns are obtained because of emphasis on safety and liquidity of reserves, such as reserves build-up policy may prove more costly, (2) Fiscal cost of holding reserves is to sterilize the liquidity impact of foreign exchange intervention, RBI started issuing sterilization bonds under the market stabilization scheme (MSS) beginning April, 2004. The interest payments on these bonds have to be borne by the central government, thus putting pressure on the already constrained fiscal finances. The fiscal cost of holding excess reserves is calculated for various adequacy measures as the difference between the interest paid on the sterilization bonds and the interest earned by RBI on foreign currency assets, (3) Economically surge in capital flows in the context of limited capacity of the economy to absorb capital flows can lead to sharp increase in monetary base, higher inflation, lowest interest rates and increase in consumption. Large capital flows can destabilize macro economic management and can constrain the effectiveness of monetary policy. As a result, foreign exchange markets are often prone to herd behaviour. Sharp exchange rate movements can further destabilize economy. These economic costs are likely to be substantially higher than the net financial cost of holding reserves, (4) The social cost of reserves holding through the spread between the private sectors cost of short term borrowing abroad and the

yield that central bank earns on its liquid foreign assets. While these borrowings are for more than one year and are not connected as short term debt, they nevertheless impose a cost on domestic investors. The social cost of holding excess reserves is calculated for various adequacy measures as the difference between the interest paid by domestic firms on external borrowings and the interest earned by RBI on foreign currency assets, (5) Maintaining a high level of reserves to tide over external shocks, however, involves opportunity cost. The opportunity cost of holding reserves is the foregone cost of holding investment because resources have been used to purchase reserves instead of increasing domestic capital is the opportunity cost of holding reserves and reserve management seeks to minimize the opportunity cost against the benefits that accrue from holding reserves, (6) Accretion cost of holding reserves may also be examined from the angle of accretion cost. In India, debt creating flows constitute smaller (about 20 percent) of the source of reserves, therefore the cost of accretion is not very significant, (7) The increased reserves largely reflected higher remittances, quicker repatriation of export proceeds and non-debt flows. Due to lower interest rates prevailing in the international markets, the maintenance cost of reserves declines.

The impact of foreign exchange reserves on exchange rate can be examined through nominal effective exchange rate (NEER) and real effective exchange rate. Trends in different exchange rates given in the Table 4 show that rupee has depreciated by 45 percent against US dollar in 2005 as compared to 1993 (i.e. from Rs. 31.44 in 1993 to Rs. 44.93 US dollar in 2005) and further to Rs. 60.50 in 2014. In terms of nominal effective exchange rates, NEER (6 country index) depreciated by 30 percent, while NEER (36 country index) depreciated by 31 percent in 2004 as compared to 1993. Cost of reserves when measured in terms of volatility in exchange rate, Table 4 shows that NEER (6 country) as well as NEER (36 country) are highly volatile (56 percent) while less variations are found in REER (6 country) and REER (36 country) (23 percent variations).

Regression results given in Table 5 indicate that after inclusion of time variable for taking care of the trend, foreign exchange reserves have indicated fairly stabilising effect on the NEER (6) and REER (6). Even the effects on NEER (36) and REER (36) was positive though non-significant. This indicated that in the absence of mounting foreign exchange reserves the exchange rates might have depreciated at much higher rates.

The study reveals that to maintain the stability in external sector, policy makers should optimise the opportunities challenges trade-off. For reduction in cost of holding the reserves, careful monitoring of capital account transactions and sustainability of balance of payment is required. In case of capital account, extreme caution is needed in two areas; (i) unlimited access to short term, external commercial borrowings and (ii) providing unrestricted freedom to

domestic residents to convert their domestic bank deposits and idle assets into foreign investment/foreign collaborations (real assets). In this context, management of capital account involves management of its control, regulation and liberalisation. IMF Interim Committee in 1997 recommended that developing countries should reduce capital flows volatility with greater exchange rate flexibility without imposing capital controls. For current account, in view of growing importance of invisibles and to get advantage of IT services, government should facilitate further deregulation and privatisation in financial services, retailing telecom, etc. so that Indians can go to new markets and make Indian exports more broad based. In India, actual FDI flows have been very low in relation to approvals and these flows should be encouraged. Export promotion policy should be complemented with FDI which should encourage export activity. (RBI,2003)

For this purpose, RBI should keep a continuous vigil on market developments and should build adequate safety nets to withstand the effects of unexpected shocks and market uncertainties. In India, RBI is managing volatility with no fixed target while allowing exchange rate to be determined by demand and supply (policy of 'leaning against wind') (Pattnaik, 1998). To combat with conflicting goals of inflation and external competitiveness, monetary policy is to be supplemented with durable macro economic policies during surplus in current account to absorb excess capital flows. In the context of rapid capital flows, there is also need to strengthen financial sector. Banks should follow strict prudential regulatory and supervisory norms in the form of (i) sound capital adequacy standards, (ii) risk-based management system and (iii) effective supervision. Foreign exchange transactions and external liabilities should be managed effectively. (Nanda and Raikhy, 2005)

Table 1: Foreign Exchange Reserves (US \$ Million)

Year	Gold	RTP	SDRs	FCAs	Total
1990-91	3496	-	102	2236	5834
1991-92	3499	-	90	5631	9220
1992-93	3380	-	18	6434	9832
1993-94	4078	-	108	15068	19254
1994-95	4370	-	7	20809	22186
1995-96	4561	-	82	17044	21687
1996-97	4054	-	2	22367	26423
1997-98	3391	-	1	25975	29367
1998-99	2960	-	8	29522	32490
1999-00	2974	-	4	35058	38036
2000-01	2725	-	2	39554	42281
2001-02	3047	-	10	51049	54106
2002-03	3534	672	4	71890	76100
2003-04	4198	1311	2	107448	112959
2004-05	4500	1438	5	135571	141514
2005-06	5755	756	3	145108	151622
2006-07	6784	469	2	191924	199179
2007-08	10039	436	18	299230	309723
2008-09	9577	981	1	241426	251986
2009-10	17986	1380	5006	254685	279057

2010-11	22972	2947	4569	274330	304818
2011-12	27023	2836	4469	260069	294397
2012-13	25692	2301	4328	259726	292047
2013-14	21567	1834	4464	276359	304224

Source : Economic Survey (Various Issues)

Table 2: Sources of Foreign Exchange Reserves In India (US \$)

Items/Year	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02
D)Merchandise												
a)Exports Fob	18477	18266	18869	22683	26855	32310	34133	35680	34298	37542	45452	44703
b)Imports c.i.f.	27914	21064	24316	26739	35904	43670	48948	51187	47544	55383	57912	56277
Trade Balance (a-b)	-9437	-2798	-5447	-4056	-9049	-11360	-14815	-15507	-13246	-17841	-12460	-11574
II) Invisible (net)	-242	1620	1921	2897	5680	5447	10196	10008	9208	13143	9794	14974
III)CurrentAccount	-9680	-1178	-3526	-1159	-3369	-5912	-4619	-5499	-4038	-4698	-2666	3400
IV)Capital Account	7188	3777	2936	9694	91556	4690	11412	10010	8260	11100	8535	8357
a)Foreign Investment	103	1333	557	4233	4922	4803	6154	5390	2412	5191	6791	8146
b)External Assistance	2210	3039	1859	1901	1526	884	1109	907	820	901	427	1204
c)Commercial Borrowing Net	2248	1456	-358	608	1030	1275	2848	399	4362	313	4308	-1588
d)Rupee Debt Service	-1193	-1240	-878	-1054	-983	-952	-727	-767	-802	-711	-617	-519
e)NRI Deposits Net	1536	290	2001	1207	172	1104	3350	1125	961	5490	2376	2754
f)other capital	2284	101	-245	2800	2489	-2425	-1321	-643	508	3866	-4690	-1640
V)overall balance (III+IV)	-2492	2599	-590	8535	5787	-1222	6793	4511	4222	6402	5868	11757
VI)Monetary movement(VII+VIII+IX)	2492	-2599	590	-8535	-5787	1222	-6793	-4511	-4222	-6402	-5868	-11757
VII)reserve (increase/decrease)	1278	-3384	-698	-8723	-4644	2937	-5818	-3893	-3829	-6142	-5842	-11757
VIII)IMF, net	1214	785	1288	188	-1143	-1715	-975	-618	-393	-260	-26	-
IX) SDR allocation	-	-	-	-	-	-	-	-	-	-	-	-

Items/Year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
D)Merchandise											
a)Exports Fob	53774	66285	85206	105152	128888	166162	189001	182235	250468	309774	306582
b)Imports c.i.f.	64464	80003	118908	157076	190670	257629	308521	300609	380935	499533	502237
Trade Balance (a-b)	-10690	-13718	-33702	-51906	-61782	-91467	-119520	-118374	-130467	-189759	-195655
II) Invisible (net)	17035	27801	31232	42002	52217	75731	91605	79991	86186	111605	107493
III)CurrentAccount	6345	14083	-2470	-9902	-9565	-15737	-27915	-38383	-44281	-78154	-88162
IV)Capital Account	10640	17338	28629	24954	46171	107901	7835	51824	57331	65324	91988
a)Foreign Investment	6015	15678	15298	21395	29743	61998	23818	65500	54835	50363	54723
b)External Assistance	-3096	-2754	2027	1766	1787	2119	2785	3261	4965	2451	1268
c)Commercial Borrowing Net	-1701	-2928	5426	2759	16443	22640	6648	3339	11599	9140	8583
d)Rupee Debt Service	-474	-376	-417	-572	-162	-122	-100	-97	-69	-79	-58
e)NRI Deposits Net	978	3642	-964	2789	4321	179	4290	2924	3238	11918	14842
f)other capital	6918	4076	7259	-3183	-5961	21088	-29606	-23103	-17238	-8468	12632
V)overall balance (III+IV)	16985	31421	26159	15052	36606	92164	-20080	13441	13050	-12832	3826
VI)Monetary movement(VII+VIII+IX)	-16985	-31421	-26159	-15052	-36606	-92164	20080	-13441	-13050	12832	-3826
VII)reserve (increase/decrease)	-16985	-31421	-26159	15052	-36606	-92164	20080	-13441	-13050	12832	-3826
VIII)IMF, net	-	-	-	-	-	-	-	-	-	-	-
IX) SDR allocation	-	-	-	-	-	-	-	-5106	-	-	-

Source: RBI Handbook of Statistics on Indian Economy (Various Issues)

Table 3: Indicators of Reserves Adequacy in India

Year	Import Cover of Reserves (in month)	Reserves/Imports (in percent)	Reserves/Short term external debt (in percent)	Reserves/External debt (in percent)	Net foreign exchange assets of RBI/Currency in Circulation (in percent)	Net foreign exchange assets of RBI/Broad money (in percent)	Short term debt to reserves (in percent)	Short term debt to foreign Currency Assets (in percent)
1990-91	2.5	22.79	68.28	6.96	14.44	3.20	146.50	282.10
1991-92	5.3	46.38	130.41	10.81	29.55	6.40	76.80	125.60
1992-93	4.9	42.70	155.07	10.92	31.75	6.58	64.50	98.50
1993-94	8.6	72.04	130.85	20.77	60.21	12.90	18.80	24.10
1994-95	8.4	70.76	589.97	25.43	71.37	15.60	16.90	20.50
1995-96	6.0	50.75	430.81	23.18	60.40	13.40	23.20	29.50
1996-97	6.5	54.63	392.84	23.92	69.10	14.75	25.50	30.10
1997-98	6.9	60.83	581.98	27.72	76.70	15.40	17.20	19.40
1998-99	8.2	69.03	760.17	33.26	78.45	15.30	13.20	14.50
1999-00	8.2	69.09	967.09	35.61	84.17	15.70	10.30	11.20
2000-01	8.6	74.50	1165.40	41.70	90.40	16.10	8.20	8.80
2001-02	11.3	98.41	1971.07	54.70	105.20	18.60	5.10	5.43
2002-03	13.8	115.90	1629.90	72.50	126.82	21.70	6.10	6.49
2003-04	17.0	133.44	2549.20	101.20	148.20	26.02	4.20	4.12
2004-05	14.3	116.04	798.40	106.40	166.20	28.90	12.50	13.06
2005-06	11.6	97.26	776.10	109.70	156.60	27.50	12.90	13.46
2006-07	12.7	100.60	708.06	116.25	171.82	29.35	14.10	14.65
2007-08	14.4	119.46	658.90	138.00	209.20	34.50	15.20	15.70
2008-09	10.3	95.73	510.37	109.60	185.20	29.50	19.60	20.45

Source: RBI Handbook of Statistics on Indian Economy (Various Issues)
RBI Annual Report (Various Issues)

Table 4: Trends and Variations in Nominal and Effective Exchange of Rupee (Base 1993-94=100)

Year	Rupee per US \$	NEER 6-Country Index	NEER 36-Country Index	REER 6-Country Index	REER 36-Country Index
1991	17.49	153.73	151.79	110.59	110.16
1992	22.68	143.92	142.40	105.88	105.57
1993	25.92	118.75	117.37	96.06	95.52
1994	31.44	110.21	111.36	95.51	96.80
1995	31.37	96.96	98.91	105.82	104.32
1996	32.41	88.56	91.54	101.27	98.19
1997	35.42	96.95	89.27	101.11	96.83
1998	36.31	87.94	92.04	107.41	100.77
1999	41.26	77.49	89.05	96.14	93.04
2000	43.05	77.16	91.02	97.69	95.91
2001	45.68	77.43	92.12	102.82	100.09
2002	47.69	76.04	91.58	102.71	100.86
2003	48.39	71.27	89.12	97.68	98.18
2004	45.95	69.97	87.14	99.11	99.56
2005	44.93	69.58	87.31	101.78	100.09

(Base 2004-05=100)

2006	44.27	103.04	102.24	104.40	102.38
2007	45.28	98.09	97.63	103.80	100.76
2008	40.26	104.62	107.75	113.40	109.20
2009	45.99	90.42	93.34	103.90	99.65
2010	47.41	87.07	90.93	110.70	103.88
2011	45.57	91.83	93.94	124.50	112.68
2012	47.92	84.49	87.38	121.20	110.27
2013	54.41	75.54	78.32	117.08	105.57
2014	60.50	67.72	72.32	112.70	103.27

Source: Economic Survey (Various Issues)

Table 5: Regression Results of Exchange Rates and Foreign Exchange Reserves

Dependent Variable	Constant	Coefficient of FER (X1)	Coefficient of Time (X2)	R2	R-2	F
NEER (6)	146.876 (29.94)	6.466 (3.52)**	-9.520 (6.97)*	0.92	0.86	48.86
NEER (36)	144.37 (28.64)	5.65 (3.02)	-8.210 (6.23)*	0.87	0.84	42.71
REER (6)	105.53 (39.68)	4.28 (3.38)**	-2.44 (2.018)	0.39	0.28	4.57
REER (36)	104.29 (39.26)	3.065 (2.354)	-0.668 (0.987)	0.18	0.07	2.08

Note : Based on Data given in Tables 1 and 4

FER- Foreign Exchange Reserves in US \$m.

NEER₍₆₎₍₃₆₎-Nominal Effective Exchange Rate (6)(36) country based index

REER₍₆₎₍₃₆₎-Real Effective Exchange Rate (6)(36) country based index

Figures in brackets are t-values

*significant at one percent level

REFERENCES

- [1] G.O.I., *Economic Survey* (various issues).
- [2] Pattnaik, Sitikantha, "Exchange Rate Management in India: An Empirical Evaluation", *RBI Occasional Papers*, Sept. 30, 1998.
- [3] R.B.I., *Annual Reports* (various issues).
- [4] R.B.I., *Monthly Bulletin*, February 2004
- [5] R.B.I., *Report on Currency and Finance* (Various Issues)
- [6] R.B.I. (1997), *Report of the Committee on Capital account Convertibility* (Chairman: S.S.Tarapore), Mumbai
- [7] Nanda, Paramjit and Raikhy, P.S.(2005), "Foreign Exchange Reserves in India: Issues and Implications", *PSE Economic Analyst*, Vol.XXV, No.2.