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An Analysis of India's Forex Reserves and its Determinants

Dr. R. Marimuthu

M.Com., M.Phil., Ph.D., MBA., PGDPM & IR., Principal, Sasurie College of Arts & Science, Tiruppur, Tamil Nadu, India
Cell : +91 9843165641
Mail ID: *balumarimuthukarur[at]gmail.com*

Abstract: ***As indicated earlier, Foreign exchange reserve is a barometer that reflects the economic strength of a nation. The low foreign exchange reserves were one of the compelling reasons for the introduction of economic reform in India. Therefore, it is imperative to analyse the growth of foreign exchange reserves before and after the adoption of economic reform to assess its impact. Over the last 19 years, the initiatives have generated an intense debate and considerable popular resistance. The desirability of the reforms and their effects remain contentious issues, and opinions continue to be divided. Hence this study tries to assess some aspects of economic reforms focusing mainly Foreign exchange reserves.***

Keywords: Foreign exchange, US dollar, new economic policy, Rupee value, Re forms

1. Introduction

As indicated earlier, foreign exchange reserve is a barometer that reflects the economic strength of a nation. The low foreign exchange reserves were one of the compelling reasons for the introduction of economic reform in India. . Therefore, it is imperative to analyse the growth of foreign exchange reserves before and after the adoption of economic reform to assess its impact. In the backdrop of the Bretton woods system, the monetary authorities mainly to maintain the external value of their respective currencies at a fixed level used foreign exchange reserves. The objectives of holding foreign exchange reserves are (i) maintaining confidence in monetary and exchange rate policies (ii) enhancing the capacity to intervene in foreign exchange markets (iii) limiting external vulnerability so as to absorb shocks during times of crisis (iv) providing confidence to the markets that external obligations can always be met and (v) reducing volatility in foreign exchange markets.

There are many reasons why monetary authorities of emerging market economies aspire to hold large reserves. First, the advents of the Euro as an alternative to US dollar; second, movement of many central banks out of gold, third, changes in exchange rate regimes, fourth, large capital flows from the developed countries because of interest differentials and fifthly, changing views on reserve adequacy and its role in crisis prevention.

2. Statement of the problem

Faced with rising inflation and a balance of payment crisis in mid-2001, then government introduced a fairly comprehensive orthodox policy reform package with currency devaluation as its centrepiece. A sudden drying up of inward remittances and the west Asian markets because of the gulf war, and the collapse of the Soviet economy- then India's largest trading partner was there proximate economic cause of the crisis. Long time critics of India's development strategy widely welcome this change. For example for behrman and T.N.Srinivasan, the reforms meant getting rid of an internationally discredited statist development paradigm.

Over the last 30 years, these initiatives have generated an intense debate and considerable popular resistance. The desirability of the reforms and their effects remain contentious issues, and opinions continue to be divided. To illustrate kirit parikh thinks," ... the reform has put the Indian economy on your higher growth path.... with more sensible policies, we have an opportunity to accelerate our growth further and take off into a higher growth trajectory however Arun Ghosh believes"... in no sector or manner has the NEP (new economic policy) succeeded". This study tries to assess some aspects of economic reforms focusing mainly foreign exchange reserves.

3. Objectives

The specific objectives of the study are

1) To analyse the dynamics and connection between foreign exchange reserve and Economic growth under liberalization in India.
2) To examine the growth, determinants foreign exchange reserve in India

4. Review of literatures

The former finance minister of India at the economic summit argued that the government has no clue as to how to use the foreign exchange to make India competitive. That India has foreign exchange reserves of nearly $ 100 billion but hasn't found a way to make good use of the resources. he argues the government should account for what they are doing about public sector assets and foreign exchange reserves

Sinha S.L.N.(2003) had cautioned the authorities concerned with the foreign exchange reserves to be more cautious in the matter of reserves that have grown from the operation of foreign investors, institutions, as well as individuals because the institutional flows are much more important and therefore these can lead to substantial instability because the flows of both directions will be large unlike in the case of individuals. The authorities must have an appropriate regulatory mechanism to ensure that the investment is of reasonably long-term nature.

Jeevan Kumar Khundrakpam (2008) had examined the behaviour of exchange rate pass-through to domestic prices in India after the reforms initiated in the early 1990s. Unlike observed in several countries it finds a rise in exchange rate pass-through to domestic prices until recent years. Besides economic factors typically associated with economic liberalisation, the persistence of higher inflation is an important factor for the rise in pass-through.

5. Methodology

Methodology refers to the method or methods used to conduct a research. When researcher design the research it is necessary to plan all the procedure and methods to be used. As per the requirement of the paper, methodology for this paper comprises the following.

6. Reference period

The period of the study taken for analysis is 18 years 2001-01 to 2018-19 however much emphasis has been given for India's external sector after the economic reforms process initiated after 2001 to access the impact of external sector reform on Indian economy.

7. Data source

They study is completely based on secondary data, since it requires aggregate time series data over a period of time. The secondary data has been obtained from various published and unpublished sources. The information required for the study has been collected from Reserve Bank of India Bulletin, RBI- report on currency and Finance, Economic survey, statistical office records, annual reports available in government and non government websites various Indian economy and the econometrics books, articles published in Economic and political weekly, Global economic prospects international monetary fund's Balance of payments statistics. Articles published in the Journal of Econometrics International Review of Applied Economic Research, the journal of World Economic Review Asian-African Journal of Economics and Econometrics.

8. Data analysis under tools used

The collected data have been processed both manually and with the help of computer software systems Microsoft EXCEL and statistical package for social sciences (SPSS) for the analysis of data and testing the hypotheses. The following appropriate statistical tools have been used in the study.

The methodology adopted to analyse the dynamics of Forex reserves are briefly presented as follows.

1) Accumulation of foreign exchange reserves.

India's foreign exchange reserves consists of Gold, Special Drawing Rights (SDRs), Foreign Currency assets (FCA) and Reserve Position in the IMF.

Table 1 shows the growth of foreign exchange reserves since liberalization of Indian economy portrays some interesting insights. From a mere 15834 crores in 2000-01, it has increased to 13,09, 723 crores in 2017-18 it is vivid clear that the largest share of India's foreign exchange reserves consist of various foreign currency assets followed by Gold assets.

Table 1: Growth of foreign exchange reserves (US $ million)

Year	Gold	SDRs	Foreign Currency Assests	Reserve position in the IMF	Total
2001-02	3499 (37.00)	90 (0.97)	5631 (61.07)	-- (0.00)	9220 (100.00)
2002-03	3380 (33.00)	18 (0.17)	6434 (63.53)	296 (2.92)	10128 (100.00)
2003-04	4078 (21.00)	108 (0.55)	15068 (77.06)	299 (1.53)	19533 (100.00)
2004-05	4370 (17.00)	7 (0.027)	20809 (81.55)	331 (1.30)	25517 (100.00)
2005-06	4561 (21.00)	82 (0.370)	17044 (77.48)	291 (1.32)	21997 (100.00)
2006-07	4054 (15.00)	2 (0.007)	22367 (83.73)	283 (1.06)	26714 (100.00)
2007-08	3391 (11.00)	1 (0.003)	25975 (87.61)	663 (2.24)	29650 (100.00)
2008-09	2960 (8.10)	8 (0.024)	29522 (89.05)	658 (1.99)	33159 (100.00)
2009-10	2974 (7.70)	4 (0.010)	35058 (90.60)	658 (1.70)	38694 (100.00)
2010-11	2725 (6.70)	2 (0.005)	39554 (92.21)	616 (1.44)	42897 (100.00)
2011-12	3047 (5.60)	10 (0.018)	51049 (93.30)	610 (1.11)	54716 (100.00)
2012-13	3534 (4.60)	4 (0.005)	71890 (94.47)	672 (0.88)	76100 (100.00)
2013-14	4198 (3.70)	2 (0.002)	107448 (95.12)	1311 (1.16)	112959 (100.00)
2014-15	4500 (3.20)	5 (0.004)	135571 (95.80)	1438 (1.02)	141514 (100.00)
2015-16	5755 (3.80)	3 (0.002)	145108 (95.70)	756 (0.49)	151622 (100.00)
2016-17	6784 (3.40)	2 (0.001)	191924 (96.36)	469 (0.24)	199179 (100.00)
2017-18	10039 (3.20)	18 (0.006)	299230 (96.61)	436 (0.14)	309723 (100.00)
2018-19	9577 (3.30)	74 (0.029)	241426 (95.81)	981 (0.39)	251985 (100.00)

Source, Hand Book of Statistics on Indian Economy 20018-19

Note: 'The values in brackets indicate the percentages of Gold. SDRs, and Foreign Currency Assets and Reserve Position in the IMF to total foreign exchange

Table 2: Trend analysis of foreign exchange reserves in India during the pre- reform period from 2000-01 to 2010-11

Items	A	B	Standard Error	t Stat	Sig-t	R^2	CGR
Gold	-254.382	156.4273*	78.2255	2	0.0766	0.31	14.772
SDRS	483.6363	43.3182**	8.99	-4.818	0.0009	0.72	-16.215
Foreign Assets	5654.964	-160.1000	113.3864	-1.412	0.1916	0.18	-4.289
Reserve position in the IMF	-	-	-	-	-	-	-
Total reserves	5884.218	-46.9909	94.7969	-0.496	0.632	0.026	-0.867

*:1 per cent level of significance
** : 5 per cent level of significance.
Source: Calculated by the researcher

Table 2 shows that in the period from1 (2000-01 to 2010-11) the foreign exchange reserves in the form of Gold has increased at the absolute rate of US $ 156-43 millions per annum, whereas SDRs decreased at the absolute rate of US $ -43.32 million per annum. From the results it is clear that the foreign currency assets decreased at the absolute rate of US $ .160 10 millions per annum. Thus, the total reserve has increased at the absolute rate of US $ - 46.99 million per year The R^2 values for Gold, SDR, Foreign Currency Assets and Total Reserves were 0.31, 0.72. 0.18 and 0.026 respectively. The compound growth rate for Gold, SDR, Foreign Currency Assets and Total Reserves were 14.77, - 16 22. -4.29, - 0 87 respectively.

Table 3: Trend analysis of foreign exchange reserves in India during the post reform from 2011-12 to 20218-2019

Items	A	B	Standard Error	t- Stat	Sig-t	R^2	CGR
Gold	2136.641	262.9618**	75.5858	3.479	0.0031	0.46	4.582
SDRS	47.6601	-2.4437	1.5762	-1.55	0.1406	0.13	-8.187
Foreign Assets	-56355.1	14476.6088**	1938.789	7.467	0	0.78	24.511
Reserve position in the IMF	176.2614	44.4169**	12.9149	3.439	0.0034	0.43	--
Total reserves	-54022	14781.9742**	2004.082	7.376	0	0.77	21.722

** :5 per cent level of significance.
Source: Calculated by the researcher

Table 3 shows that in the period from 2011-2012 to 2018-19 the foreign exchange reserves in the form of Gold has increased at the absolute rate of US $ 262.96 million per annum, whereas SDRs decreased at the absolute rate of US $ -2.44 million per annum. From the results it is clear that the foreign currency assets increased at the absolute rate of US $ 14476 61 millions per annum. Thus, the total reserve had increased at the absolute rate of US $ 14781.97 million per year. The Re values for Gold, SDR, Foreign Currency Assets, Reserve Position in the IMF and Total Reserves were 0.43, 0 13, 0.78, 0.43 and 0.77 respectively.

The compound growth rate for Gold, SDR, Foreign Currency Assets and Total Reserves were 4.58, -8.18, 24.51, and 21.72 respectively.

Table 4: Trend analysis of foreign exchange reserves in india for the pre and post – reform period from 2000-01 to 2018-2019

Items	A	B	Standard Error	t- Stat	Sig-t	R^2	CGR
Gold	-822.254	263.9019**	30.7193	8.591	0.000	0.73	13.274
SDRS	2897733	-12.6492**	2.1566	-5.865	0.000	0.56	-16.473
Foreign Assets	-55479.1	7176.1862**	1098.05806	6.535	0.000	0.61	17.55
Reserve position in the IMF	-225.3202	39.7754**	5.19745	7.653	0.0000	0.68	--
Total reserves	-56235.9	7466.1763**	1117.36267	6.682	0.000	0.62	16.828

* : 5 per cent level of significance.
Source: Calculated by the researcher

Table 4 shows that in the period from1990-91 to 2007-08 the foreign exchange reserves in the form of Gold has increased at the absolute rate of US $ 263.90 million per annum, whereas SDRs decreased at the absolute rate of US $ -12.65 million per annum. From the results it is clear that the foreign currency assets increased at the absolute rate of US $ 7176.19 million per annum. Similarly reserve position in the IMF increased at the absolute rate of US $ 39.77 millions per year. Thus, the total reserve has increased at the absolute rate of US $ 7466.18 millions per year. The R2 values for Gold, SDR, Foreign Currency Assets Reserve Position in the IMF and Total Reserveswere0.73, 0.56,0.61, 0.68 and 0.62 respectively. The compound growth rate for Gold, SDR, Foreign Currency Assets and Total Reserves were 13.27, - 16.47, 17.55, and 16.83 respectively. Thus, the analysis vividly shows that the impact of economic reform in the accumulation of foreign exchange reserve is impressive and noteworthy.

2) Determinants of foreign exchange reserves

Table 5 disclose there are some variables determining the foreign exchange reserves they are External Assistance, External Commercial Borrowings, FDI, FPI, NRI, and Current Account Balance. The determinant of Foreign exchange reserve is done on the basis of foreign exchange reserves after 1991.

Multiple regression models

It is a statistical procedure that attempts to assess the relationship between the dependent variable and two or more independent variables. The variables that generally determine the flows of Foreign Exchange Reserves to a particular country or region are referred to as the determinants.

Table 5: The time series data of total foreign exchange reserves and its determinants (US $ Million)

Years	Total foreign exchange reserves	External assistance	External commercial borrowings	FDI	FPI	NRI	Current Account Balance
2001-02	9220	3037	1456	129	4	290	-1178
2002-03	9832	1859	-358	315	244	2001	-3526
2003-04	19254	1901	607	586	3567	1205	-1158
2004-05	25186	1526	1030	1314	3824	172	-3369
2005-06	21687	883	1275	2144	2748	1103	-5910
2006-07	26423	1109	2848	2821	3312	3350	-4619
2007-08	29367	907	3999	3557	1828	1125	-5500
2008-09	32490	820	4362	2462	-61	960	-4038
2009-10	38036	901	313	2155	3026	1540	-4698
2010-11	42281	427	4308	4029	2760	2316	-2666
2011-12	54106	1204	-1588	6130	2021	2754	3400
2012-13	76100	-3096	-1701	5035	979	2978	6345
2013-14	112959	-2754	-2928	4322	11377	3642	14083
2014-15	141514	1923	5194	6051	9315	-964	-2470
2015-16	151622	1702	2508	8961	12492	2789	-9902
2016-17	199179	1775	16103	22079	7003	4321	-5085
2017-18	309723	2114	22633	32435	29395	179	-17034
2018-19	251985	2646	6938	35180	-13855	4290	-29817

Source: Hand Book of Statistics on Indian Economy 2009-10.

The analysis of determinants of foreign exchange reserves consists of inflow of Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI), Non Resident Indian Deposits (NRIs), External Assistance, External Commercial Borrowings and Current Account Balance. In order to find out the influence of the above variables on total foreign exchange reserves, the multiple regression of the following model is adopted.

3) Model specification

The model for foreign exchange reserve determinants has been specified as follows:

$FER,\ \Psi o+\Psi_1\ FDI_t+\ \Psi_2\ FPI_t+\Psi_3\ NRID_t+\Psi_4\ EA_t+\Psi\ _5\ ECB_t+\Psi_6 CAB_t+\Psi_9(D)$

FER_t = Foreign Exchange Reserves

FDI_t = Foreign Direct Investment

FPI_t = Foreign Portfolio Investment NRID, = Non Resident Indian Deposits

EA_t = External Assistance

ECB_t = External Commercial Borrowings -02 6 2018-19

CAB_t = Current Account Balance 2001

D = Disturbance term variable taking value of 1 for period 2001-01 to 2007-08

Table 6: Multiple regression results for determinants of forex reserves

Variables	Co- efficient	Standard Error	t. Statistics	Sig-t
Constant	20122.75	13328.13	1.51	0.157
External Assistance	-1.26337	5.838855	-0.216	0.8323
External commercial Borrowings	-2.90212	2.009711	-1.444	0.1743
Foreign Direct investment	9.225923	1.231924**	7.489	0
Foreign portfolio Investment	3.229423	1.089348**	2.965	0.0118
Investment Non Resident	-2.74775	5.058947	-0.543	0.597
Indians current account balance	0.528417	1.468513	0.360	0.7252

R^2 =0.96' Durbin Watson Test = 1.20416
** : 5 percent level of significance

Table 6 clearly shows that the total foreign exchange reserve is determined by external assistance, external commercial borrowings, foreign direct investment, foreign portfolio investment, non-resident Indians investment and current account balance. From the results the External Assistance (EA,) has a negative impact on foreign exchange reserve inflows ;into the country and there is no significant influence on foreign exchange reserves. The External Commercial Borrowing (ECB,) shows the positive impact on foreign exchange reserves and hasn't shown any significant influence on foreign exchange reserves. However, Foreign Direct Investment (FDI,) in the country is observed to be significant and positively signed. It is also observed that the Foreign Portfolio Investment (FPI,) in the economy has a positive impact on foreign exchange reserves and highly significant. The variable Non Resident Indians (NRI,) comes out with a positive sign and significant to the Foreign exchange reserves. The variable Current Account Balance (CAB,) has got a positive sign and there is no significance. This is quite revealing as it indicates how macroeconomic fundamentals can influence inflows of foreign exchange reserves. This clearly shows that much accretion of India's reserves is mostly contributed by surge in non-resident Indian deposits, followed by foreign portfolio investment and foreign direct investment.

The value of R' is 0.97. This reveals that the 97 per cent of variation in the total reserves is due to the above-mentioned variables. The estimated 'Durbin Watson test' value for the regression involving 18 observations is 1.20416, which shows that there is no auto correlation between the variables over the period from 2001-02 to 2018-19

4) India's approach to reserves management

In recent times the RBI is attempting to prevent the rupee from appreciating too fast. Because of heavy capital inflows from various sources. The Indian economy has been flooded with dollar that is not being adequately absorbed in the economy because of sluggish imports and capital controls. The swelling tide of dollar has lifted the rupee substantially. So, the RBI has been intervening excessively in the foreign exchange market to prevent rupee from appreciating too fast. With this end in view, it is buying up dollar from the market and selling rupee in turn. The dollars that are thus purchased add to the foreign exchange reserves of the country. The extra rupees that are released into the economy as a consequence of this policy have a potential of creating inflationary pressures in the economy or they can create ripples in the stock, bond and real estate markets. This entire process, purchasing dollar, releasing rupees and then sucking them out through sales of government securities-is called sterilization. This has been the corner stone of RBI's policy over the past few years.

9. Findings

The growth of foreign exchange reserves since liberalization of Indian economy portrays some interesting insights. From a mere 5,834 crores in 2001-02 it has increased to 3, 09,723 crores in 2018-19 It is vivid clear that the larger share of India's foreign exchange reserves consists of various foreign currency assets followed by Gold assets.

The ratio of reserves to imports is showing an impressive trend. In 2001-02 the months of import cover was just 3 months, which has increased to nearly 15 months by 2018 – 19. In terms of money-based indicators too, the situation is now much better. The proportion of foreign exchange reserves to broad money rose from 4 per cent in 2001-02 to 34 per cent in 2018-19, The ratio of reserves to short term debt rose from 0.68 per cent in 2001-02 to 6.99 per cent in 2018-19.This means that foreign exchange reserve is 7 times higher than the short-term debt.

The study has shown that much accretion of India's reserves is mostly contributed by surge in non-resident Indian deposits, followed by foreign portfolio investment and foreign direct investment.

Before the introduction of economic reform in 1991, the concept of disinvestment was not emphasised in the economic literature. But in recent years it provides a helping hand to cover the growth of fiscal deficit, which is an important indicator in determining the success of reforms. The public enterprises disinvestment programme was suggested by the new economic policy of 1991.In the year 1991-92 the ratio of actual in target receipt was 1.22, which is the maximum and the ratio has been continuously decreasing over the year and it has reached a ratio of 0.39.

10. Suggestions

The government instead of accelerating huge reserves, it should use it in improving the exports in order to avoid huge deficit in the current account balance in the balance of payments.

The foreign exchange reserves are composed of foreign funds borrowed from abroad, especially volatile hot money. Portfolio investment can easily flow out after garnering speculative profits from trading Indian stocks and shares. So the government should look for poorer mix, which can avoid volatility.

The huge foreign exchange reserves have facilitated full convertibility of the rupee, in the current account, which has created opportunity for investing Indian capital abroad. In a country with enormous need for investment to setup production of goods and services and for building infrastructure facilities in the country, the first call on wherever capital is available or can be mobilized, must be in favour of domestic investment.

Although the huge foreign exchange reserves has helped in maintaining stability in the exchange rate, another problem of inflation has aroused which might be more dangerous than the benefits of holding the reserves. So, it will be quite prudent for the government to keep check on inflation as the reserves are amounting.

11. Conclusion

A balanced diet is essential for the balanced development of the body. Likewise a continuous development of all the sectors is necessary to achieve growth rate and to reduce poverty. The present growth pattern which essentially creates jobless growth is not conducive for a country like India which has more than130 crores of population. Foreign exchange reserve does not bring any developmental activities and export orientation in secondary sector as well as service also. If effective remedies are taken to solve foreign exchange reserve management defects. This chance of India brings a giant global economy is likely
decades to come.

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