

DETERMINANTS OF FOREIGN EXCHANGE RESERVE IN INDIAN: A POST-REFORM ANALYSIS

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ABSTRACT— This paper investigates macroeconomic determinants of the foreign exchange reserve in India for the period 1991 to 2011. The macroeconomic variables are being categorised into internal as well as external variables. The investigation was conducted through multiple regression method. The investigation reveals that during the post-reform, wholesale price index is the only determinants that positively influence foreign exchange reserve in India. The factors such as nominal exchange rate, broad money supply and international (foreign) investment are found to be negatively related with foreign exchange reserve. Interestingly, trade, as an internal variable, happens to be non-significant determinant. This implies that policy makers need to assess the forecast of Indian foreign exchange reserve in term of exogenous determinants.

Key Words: Foreign Exchange Reserve, WPI, Foreign Investment, Exchange Rate

JEL Classification: F31, F21, E31

INTRODUCTION

According to the International Monetary Fund, foreign exchange reserves are defined in the Balance of Payments manual (5th edition) as “Those external assets that are readily available to and controlled by monetary authorities for direct financing of payments imbalances, for indirectly regulating the magnitudes of imbalances through intervention in exchange markets to affect the currency exchange rate, and/or for other purposes” In a strict sense, *it is the total of a country's foreign currency deposits and bonds held by the*

central bank and monetary authorities. However, the term often refers to the total of a country's gold holdings, convertible foreign currencies held in its banks, plus special drawing rights (SDR) and exchange reserve balances with the International Monetary Fund (IMF). Foreign Exchange reserves are also called Reserve Assets in the Balance of Payments and are located in under the financial account. Hence, they are usually an important part of the International Investment Position of a country. The reserves are labeled as reserve assets under assets by functional category. In terms of financial assets classifications, the reserve assets can be classified as Gold bullion, Unallocated gold accounts, Special drawing rights, currency, Reserve position in the IMF, interbank position, other transferable deposits, other deposits, debt securities, loans, equity(listed and unlisted), investment fund shares and financial derivatives, such as forward contracts and options. There is no counterpart for reserve assets in liabilities of the International Investment Position. Usually, when the monetary authority of a country has some kind of liability, this will be included in other categories, such as Other Investments. In the Central Bank’s Balance Sheet, foreign exchange reserves are assets, along with domestic credit.

Purposes for Holding Official Foreign Reserve

1. To give credibility to foreign investors
2. To back the banknotes in use
3. To store of nation’s wealth
4. To support the fixed-exchange-rate policy

Factors influencing the Foreign Exchange Reserve -

1. International trade- Trade of goods and services between countries is the major reason for the demand and supply of foreign currencies. The value or strength or weakness of a country's currency in terms of other currencies depends on its trade with those countries. If a country's imports are higher, the demand for foreign currency in this country will be high. Higher demand for foreign currency means high value of foreign currency and low value of the domestic currency. This is a typical case for underdeveloped countries which rely on imports for development needs. The current account balance (deficit or surplus) thus reflects the strength and weakness of the domestic currency.

2. Capital movements- International investments in the form of foreign direct investment (FDI) and foreign institutional investments (FII) have become the most important factors affecting the official reserve in today's open world economy. Countries which attract large capital inflows through foreign investments will witness an appreciation in its domestic currency as its demand rises and is more financially stronger than others.

3. Change in prices- Domestic inflation or deflation affects the exchange rate by affecting the demand and supply of domestic currency in the foreign exchange market. The country having higher demand of their currency is able to make their official reserve larger.

4. Strength of the economy- If the economic fundamentals of a country are strong, the exchange rate of its domestic currency remains stable and strong. Fiscal balance, international current account balance, international liabilities, foreign exchange reserves, resilience to international trade fluctuations, GDP, inflation rate all are indicators of a country's economic strength.

5. Government policies- The different policy adopted by the government also affects the foreign reserve of a country. The policy which liberalized the economy and bring

homogeneity into the world will lead to an increase in Foreign exchange reserve.

6. Political factors- Political scenario of the country ultimately decides the strength of the country. Stable efficient government at the centre will encourage positive development in the country and therefore contribute to enhance foreign exchange reserve.

In the view of above background, the present paper is an attempt to analyse the post reform determinants of foreign exchange reserve in India. The study shall take into consideration the impact of all the above factors (except political factor) for determining the behaving pattern of India's foreign exchange reserve.

2. Review of Literature

After gone through a reasonable amount of published literature on foreign exchange reserve, we found that most of the studies were based on only some aspect of it.

Foreign exchange reserve of a country majorly is affected by two set of variables. First one is the endogenous to our balance of payment and the second one is exogenous to balance of payment.

In most of the literature, it has been found that the inclination of researcher's interest is majorly towards three variables, named as nominal exchange rate, import, optimal reserve level whereas other variable like wholesale price index (WPI), Board money (M_3), gross domestic product (GDP) and foreign investment (FI) have not been considered.

Hence we felt there is a need for making comprehensive study and find out significant variables which determine foreign exchange reserve of a country.

Major work done is focused on three variable named above and pre reforms period. Some of which are listed below:-

Bahmani-Oskooee and Brown (2002) distinguish two sub-periods (pre-1973 and 1973-present) in the empirical literature on the demand for international reserves. In the

pre-1973 era, the empirical studies of reserve demand identified five theoretical sound variables; the level of world trade, the money supply, the marginal propensity to import and an opportunity cost measure (Heller, 1966) and a payments variability measures as postulated by Machlup (1966). Triffin (1961) argues that demand for international reserves grows proportionally with the absolute level of world trade. Therefore, a suitable reserves-to-import ratio was seen as a good

Measure of a country's reserve adequacy. However, Malchup (1966) proposed that the variability of trade was a better indicator of the adequacy of a country's foreign reserves. Heller (1966) went further by introducing the opportunity cost of holding international reserves, predicated on the assumption that there should be a negative relationship between reserve demand and opportunity cost. In addition, Heller also incorporated a country's marginal propensity to import (m) derived from the theory that the marginal cost of adjustment for a country is equal to the inverse of its marginal propensity to import. He hypothesized that when a country uses expenditure-reducing policies a high marginal propensity to import impacts negatively on (or diminishes) the demand for reserves. Therefore, if the adjustment costs for a country are large, then the demand for international reserves is expected to be substantial. If the converse holds, the demand for reserves would not be that great. Frenkel, in his 1978 seminal paper, argued that the marginal propensity to import (MPI) measures an economy's openness to external shocks, and therefore would be positively related to foreign currency reserves if the reserves were held as a precautionary measure. Frenkel measured a country's MPI as the ratio of imports over GDP. His study concluded that "optimal Reserve holdings would increase as the volatility of reserves increased." His empirical study showed that volatility of reserves is indeed a robust predictor of foreign reserve holdings.

Barten (1982) conducted an empirical study partly based on Frenkel's model to determine the demand for foreign

reserves under fixed and floating exchange rates. He developed an argument he called the intervention model, which assumed that reserves are held only to enable the central bank to intervene in foreign currency markets. He identified four major determinants of reserve demand: the variability of international payments and receipts, the propensity to import, the opportunity cost of holding reserves, and a scale variable measuring the size of international transactions.

Aizenman and Marion (2002) focused on the demand for international reserves in the Far

East compared to the demand in other developing countries. Their research found that reserve holdings for the 1980-1996 periods are the outcome of several factors such as: international transactions, international transaction's volatility, the exchange rate arrangement, and political considerations. After the 1997 Asian financial crisis, they found that this model significantly under-predicted reserve holdings. In their research they showed that "sovereign risk and costly tax collection to cover fiscal liabilities lead to a large precautionary demand in reserves".

Romero '05(2005) empirically studied the accumulation of foreign exchange reserves by the countries of India and China. Particularly, it focuses on the determinants of this policy and on the role that the choice of exchange rate regime plays in driving it. Annual data points for the years between 1980 and 2003 were collected and their frequency increased to quarterly through a quadratic match process. The accumulation of foreign exchange reserves in India is best explained as a function of exchange rate volatility and the degree of openness of the economy. Dash And Narayanan (2011) explained the key determinants of foreign exchange reserves in India using Johansen (1995) Maximum-Likelihood Vector Error Correction Model (VECM) on monthly as well as annual data for reserves, imports and nominal exchange rate. The empirical results confirmed that there exists a long-run cointegrating relationship among reserves, imports and nominal exchange

rate. The shocks to imports and exchange rate have permanent effects on reserves, on level as well as volatility.

Zeng, Shihong (2012) determined that whether the Chinese foreign exchange reserves have been too large. They empirically analyzed the foreign exchange reserves by using the rate analysis method and the cost-profit method. Using the rate analysis method, they found that the Chinese actual foreign exchange reserves greatly exceeded the 3-month import foreign exchange demands and also that the optimal foreign exchange reserves demands were calculated to be 40% of the total foreign debt balance and therefore it is one of the imp factor which affect foreign exchange reserve of a country.

Puah, Chin-Hong and Mohamad (2011) empirically examined the determinants of international reserves in Malaysia. The relationship between international reserves and its determinants, namely economic size, exchange rate, balance of payments and the opportunity cost of reserves holding have been examined. Annually data spanning from 1975 to 2007 were utilized in the study. The ADF unit root test results prove that all the variables are stationary after being difference once. The cointegration test results further show that international reserves and the specified determinants are cointegrated.

3. Rationale of the Study

Most of the studies are mainly focus on three variables named as import, nominal exchange rate and optimal reserve level where as we have a strong belief that as we move from closed to open economy and also witnessed economic reforms include liberalization, globalization and privatization, we are expecting there are also other variables which significantly affecting foreign exchange reserve of a country.

4. Objectives of the Study

The objective of the study is;-

- ✓ to analyse the general trend of foreign exchange reserve;
- ✓ to estimate the post-reform determinants of foreign exchange reserve in India;

- ✓ to analyse the impact of both internal as well as external variables on foreign exchange reserve.

5. Data and Methodology

5.1 Data Source - As per the requirement of our study, there is a need of two set of variable. One set of variable related to current account and capital account whereas other set of variables is related to macroeconomics.

First set of variable that is endogenous variables includes

- ✓ Trade that consist combine impact of import and export
- ✓ Foreign investment which further subdivide into two part
 - Clubbed impact of FDI inflow and outflow
 - Clubbed impact of FII inflow and outflow

In order to find out net foreign investment, we will combine both the sub-factor.

The other set of variables comprises Gross domestic product (GDP), Nominal exchange rate (NER), Wholesale price index (WPI) and Broad money (M₃)

Both the set of data collected from handbook of statistics on Indian economy, released by RBI of India (2010-2011).

5.2 Research Methodology – In this paper we have employed the following set of methodology for analysing the post reform determinants of foreign exchange reserve in India.

5.2.1 Descriptive Analysis – Descriptive statistics are used to present quantitative descriptions in a manageable form. It also give us the overall picture about the different features of time series properties such as mean, standard deviation, range, moments, kurtosis et

5.2.3 Growth Analysis

The purpose behind such analysis is to show the annual growth rate, at which level of variables increases or decreases. We have regressed the log of each variable with respect the time. Therefore, regression equation can be written as follows in exponential form:

$$Y = e^{\alpha + \beta t} \dots (1)$$

Taking log of both sides and adding an error term;

$$\text{Log } Y = \alpha + \beta t + \mu t$$

.... (2)

Where Log Y = natural log of variable Y
 α = intercept term
 β = slope of the regression equation, which basically tell us about the instantaneous growth rate.
 t = time (1990-091 to 2010-11)
 μt = error term.

5.2.4 Actual and Predicted Analysis

With the help of actual and predicted analysis we can easily see whether the variables are departing from their predicted values. It shows the level of variability exist inherently with the variable and the time at which it occur.

5.2.5 Multiple Regression Analysis – for Determinant

We have simply used multiple regression frameworks for analysing the determinants of foreign exchange reserve. We have used double log equation model which given below;

$$(\text{FER})_t = e$$

$$a_1 + d_1 T (\text{NER})_t^{b_1} * (\text{FI})_t^{c_1} * (\text{BM})_t^{d_1} * (\text{WPI})_t^{e_1} * (\text{Trade})_t^{f_1} \quad \dots(3)$$

Taking log on both sides and adding error term

$$\text{Ln}(\text{FER})_t = a_1 + b_1 \text{Ln}(\text{NER}) + c_1 \text{Ln}(\text{FI}) + d_1 \text{Ln}(\text{BM}) + e_1 \text{Ln}(\text{WPI}) + f_1 \text{Ln}(\text{Trade}) + d_1 T + u_1 t \dots(4)$$

Where, NER-nominal exchange rate, FI- foreign investment, BM- broad money, WPI- wholesale price index.

5.2.6 Diagnostic and Residuals Based Analysis

We have also conducted diagnostic analysis and analysis of residuals for testing the robustness and degree of explanatory power of model. Such as, Jarque-Bera’s Test of the Normality of Residuals, plot of actual and fitted value, histogram of residuals with two standard error, are being considered.

6. Results Analysis and Interpretation

6.1 Descriptive Analysis

	BM	FER	FI	NER	TRAD E	WPI
Mean	199298 5.	-55806.00	52261.7 1	39.462 46	81500 3.8	85.15 238
Median	131322 1.	-27366.00	22184.0 0	43.332 70	47595 0.0	83.10 000
Maximum	649954 9.	97100.00	239900. 0	48.395 30	28740 62.	143.3 000
Minimum	265828. 0	-369689.0	183.000 0	17.942 80	83239 .00	39.40 000
Std. Dev.	184672 2.	91410.10	67092.1 7	8.4651 02	82707 8.8	29.33 864
Skewness	1.15320 0	-1.910427	1.77333 3	1.01619 3	1.233 904	0.298 675
Kurtosis	3.19925 9	7.908078	4.91059 9	3.1213 13	3.286 716	2.169 221
Jarque-Bera	4.68928 5	33.85214	14.2005 7	3.6271 43	5.400 750	0.916 143
Probability	0.09588 1	0.000000	0.00082 5	0.1630 71	0.067 180	0.632 502
Sum	418526 94	-1171926.	109749 6.	828.71 17	17115 079	1788. 200
Sum Sq. Dev.	6.82E+1 3	1.67E+11	9.00E+1 0	1433.1 59	1.37E +13	17215 .11
Observations	21	21	21	21	21	21

Table 6.1 Descriptive Analysis-

With the help of descriptive analysis we always come to know the basic characteristic of any time series distribution. If we see clearly the two variables named foreign exchange reserve and foreign investment are happened to be non-normally distributed since jarque bera test is highly significant which reject the null hypothesis that the distribution is normal. This may occur because of the unique nature of the variable. Both the variables are theoretically highly volatile. In case of FER the balance is the resultant value of both current account as well as capital account balance. All other variables- trade, nominal exchange rate, wholesale price index and broad money- are happened to be normally distributed.

6.2 Growth Analysis

Table 6.2 Overall Growth Rate

Growth Rates (%)		
Variables	Growth Rate (%)	P-Value
Foreign Exchange Reserve (FER)	(-)0.0975	0.19
Foreign Investment (FI)	25.536	0.00
Trade	17.020	0.00
Nominal Exchange Rate (NER)	3.352	0.00
Wholesale Price Index (WPI)	5.773	0.00
Broad Money (BM)	15.769	0.00

Table 6.2 shows the overall growth rate of all the variables over a period of 21 years. From the above table it is clear to interpret that except foreign exchange reserve, all variables are highly significant. Statistically speaking it is significant even at 1 %. But it can be seen that although FER growth rate is not significant but one can observed the direction of growth by pointing out the sign of the coefficient. Therefore, FER is growing at a very small rate but it is moving negatively. This may be because of the ratio that we have used for FER, which is being normalised on GDP.

Foreign investment is growing positively and at rate of 25.53% p.a. Next highest growth rate is of trade which is 17% p.a. Broad money is growing positively at a rate of 15.76% p.a. WPI is growing at a rate of 5.77%. It is good to see that nominal exchange rate is growing at lowest rate of around 3% p.a.

6.3 Actual and Predicted Analysis

We have also conducted the actual and predicted analysis for each variable.

Foreign Exchange Reserve

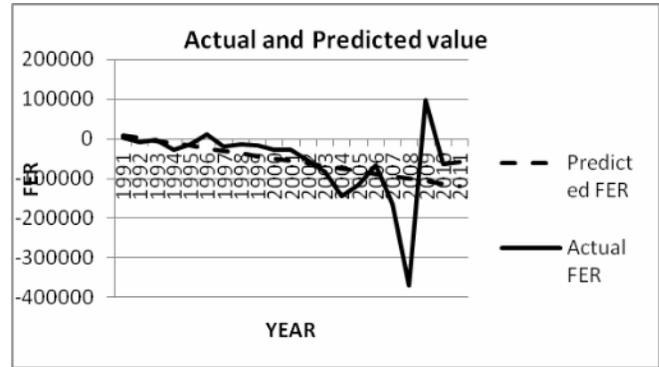


Fig 6.1 Actual and Predicted of Foreign Exchange Reserve

Till 2003, both actual and predicted values are moving into same direction and almost with similar proportion. During the two years- 2004 and 2007, the actual value of reserve was at lower side. Especially in the year of 2008, the global environment was facing a problem of global crisis which leads low foreign exchange inflows into the country. Ironically, in the next year 2009, the foreign exchange inflows were at peak in India. However, thereafter it leads to decline continuously.

Foreign Investment

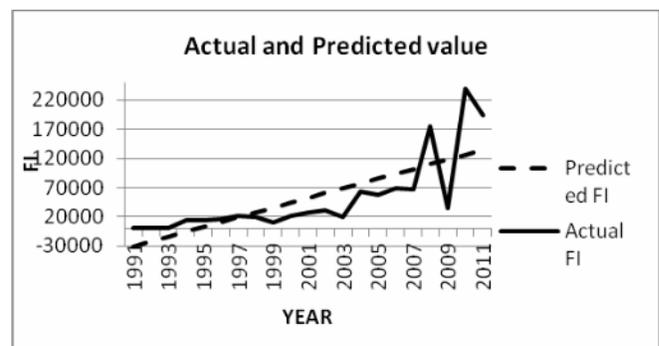


Figure 6.2 Actual and Predicted Value of Foreign Investment

The actual and predicted values of foreign investment are behaving exactly the opposite as that of foreign exchange reserve. In the year 2008, the total value on account of investment at abroad was highest as compared to all preceding years. Anomaly picture has appeared immediately in the next year where there has been a drastic decline in the foreign investment. However, in the year 2010, it once again started to reach at new peak point. Thereafter, it again decline. Therefore, it could be concluded on the pattern of

foreign investment that they are more volatile and market oriented variables.

Trade

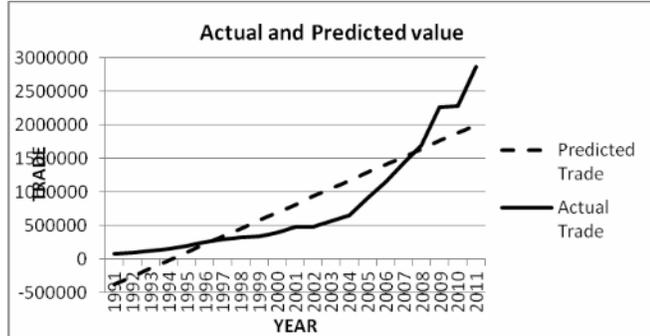


Fig 6.3 Actual and Predicted Value of Trade

The behaving pattern of trade is almost distributed as “U Shape” picture during the year 1991-2009. From 2004 onwards, the magnitude of the trade has started to move upwards till 2009. It is increasing because of high amount of devaluation of Indian rupees during these years. It is interesting to note that value of trade is also increasing even during the period of global crisis. This shows that there has not been a significant impact of global crisis on India’s foreign trade magnitude.

Wholesale Price Index

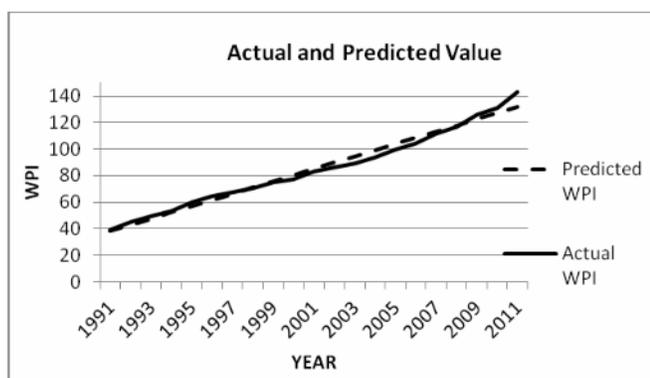


Fig 6.4 Actual and Predicted Value of WPI

Figure 6.4, is clearly depicts that both actual and predicted value of WPI are moving in same direction and almost with same proportion over a period of 21 years. This shows that there is no sign of any impact that may arise out of globalisation, deregulation and crisis.

Nominal Exchange Rate

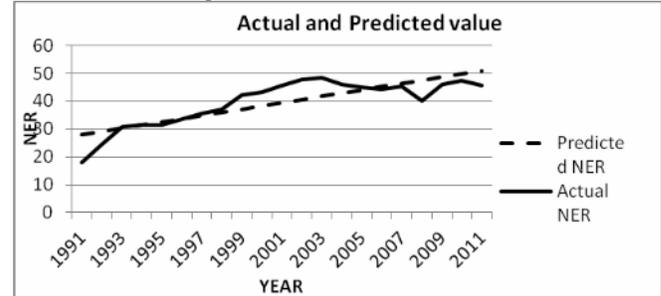


Fig 6.5 Actual and Predicted of Nominal Exchange Rate

Figure 6.5 reflects a case of Indian rupees depreciation till 2003. Thereafter is started to decline that is Indian rupees started to appreciate almost till 2008. After this it once again has started to increase and then remain continue to move upward. The consequence of depreciation of Indian rupee is that our exports become more competitive as compared to other ones. Therefore, the demand for exports, grow exponentially if Marshall-Lerner condition is met. More exports mean more foreign exchange inflows into foreign exchange reserve account.

Broad Money Supply

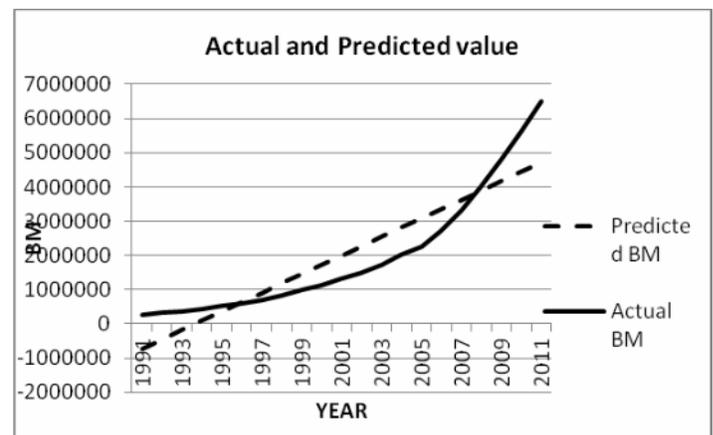


Fig 6.6 Actual and Predicted Value of Broad Money

Figure 6.6 shows that broad money is being a most important variable, is increasing over a period of time even exponentially. From 2005 onwards, broad money is growing flatly till 2011. This shows the indication of more money

supply available in the country. More money supply will lead to more demand for imports.

6.4 Determinants of Foreign Exchange Reserve

Table 6.3 Determinants of Foreign Exchange Reserve

Dependent Variable: LFER				
Method: Least Squares				
Sample: 1 21				
Included observations: 21				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LBM	0.733610	0.414480	1.769953	0.0958
LFI	-0.060452	0.066870	-0.904031	0.3794
LNER	1.502411	0.487677	3.080749	0.0072
LTRADE	0.880147	0.636468	1.382862	0.1857
LWPI	-5.069334	1.932387	-2.623354	0.0184
R-squared	-2.740419	Mean dependent var		4.523418
Adjusted R-squared	-3.675524	S.D. dependent var		0.081967
S.E. of regression	0.177236	Akaike info criterion		-0.418412
Sum squared resid	0.502602	Schwarz criterion		-0.169717
Log likelihood	9.393331	Hannan-Quinn criter.		-0.364439
Durbin-Watson stat	0.656100			

In the above table, it is clear to interpret that the overall model is not at all significant. Moreover, the adjusted R-squared is not low rather negative which reject the entire model on one hand and selection of variables on the other hands.

In order to improve the results of the above model we drop trade variable, out of the total insignificant variables, because it contain high amount of standard error (volatility). We again regressed our dependent variable (LFER) with other independent variables in order to see the impact of other variables excluding trade.

Table 6.4 Determinants of Foreign Exchange Reserve (excluding trade variable)

Estimation Command: LFER LBM LFI LNER LWPI C

Estimation Equation:

$$LFER = C(1)*LBM + C(2)*LFI + C(3)*LNER + C(4)*LWPI + C(5) \dots(5)$$

Substituted Coefficients:

Dependent Variable: LFER				
Method: Least Squares				
Sample: 1 21				
Included observations: 21				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LBM	-0.130495	0.052898	-2.466913	0.0253
LFI	-0.018882	0.006643	-2.842237	0.0118
LNER	-0.062975	0.041894	-1.503201	0.1523
LWPI	0.460201	0.177831	2.587851	0.0198
C	100.2178	0.139274	719.5721	0.0000
R-squared	0.420949	Mean dependent vars		99.98151
Adjusted R-squared	0.276186	S.D. dependent var		0.020680
S.E. of regression	0.017594	Akaike info criterion		-5.038230
Sum squared resid	0.004953	Schwarz criterion		-4.789535
Log likelihood	57.90142	Hannan-Quinn criter.		-4.984257
F-statistic	2.907855	Durbin-Watson stat		1.666226
Prob(F-statistic)	0.055205			

$$LFER = -0.1305*LBM - 0.0189*LFI - 0.0623*LNER + 0.460*LWPI + 100.22 \dots(6)$$

(0.025)
(0.0118)
(0.15)

(0.0198) (0.00)

The overall model is significant at 5%. The adjusted R-square is 0.27 which shows that there are other variables that influence foreign exchange reserve in India. Although, the Durbin – Watson test statistic is 1.67 which close to 2. It indicates that the model is free from autocorrelation problem.

The coefficients of the output are too interpreted in term of elasticity because all the variables are being taken into log form.

Majority of the variables are significant at 5% whereas nominal exchange rate is significant at around 15%. Except WPI, all are affecting foreign exchange reserve negatively and significantly.

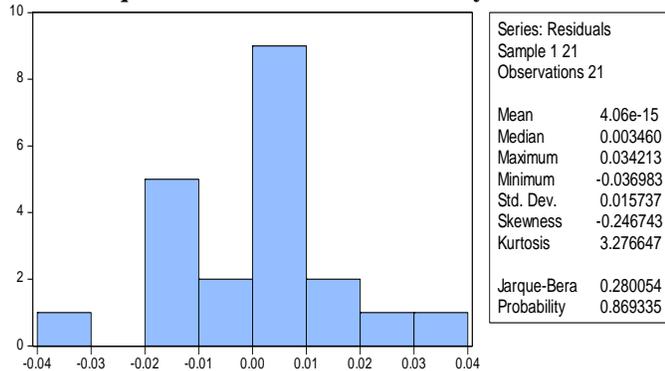
As far as LBM is concerned, 1% change in (Broad Money) LBM will lead to (-) 0.13% change in FER. It means that increase in money supply will lead to inflation in country and more demand for import which in turn lead to low foreign exchange inflows into foreign exchange reserve account. Similarly, 1% change in (Foreign Investment) LFI and (Nominal Foreign Exchange) LNER will lead to (-) 0.018% and (-) 0.063% change in foreign exchange reserve

respectively. This means with increase in exchange rate that is appreciation of Indian rupees, there would be low demand for our exports at international market which in turn certainly lead to low foreign exchange inflow into country. Because of the volatile nature of foreign investment there would be negative relation between both, capital mobility and foreign exchange reserve. However, the coefficient is very low.

However, WPI is the only one variable that promotes foreign exchange reserve in India. The interpretation of the coefficient is that 1% change in WPI will lead to 0.46% increase in foreign exchange reserve.

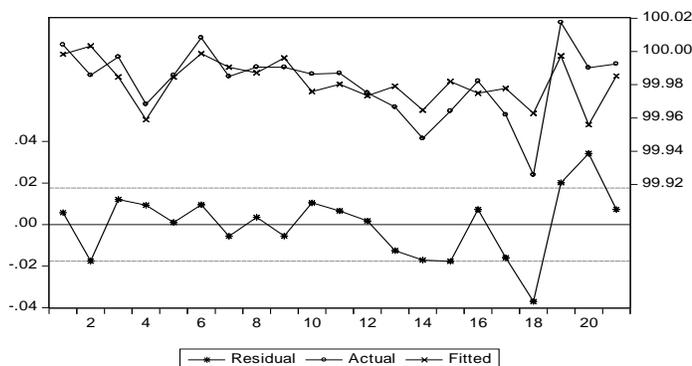
6.5 Diagnostic and Residuals Based analysis

6.5.1 Jarque-Bera's Test of the Normality of Residuals



The residuals of a multiple regression model are happened to be normally distributed. Moreover, the Jarque-Bera test is not significant means it reject the null hypothesis the distribution is normal. The normality of residuals shows that the model is logically good for finding out the determinants of foreign exchange reserve.

6.5.2 Actual and Fitted Value of Residual based on the Model



The above diagram shows the relationship between actual and fitted value of model over a period of 21 years. Since both the line is almost behaving in a similar patten the model is fit for determinant analysis of foreign exchange reserve in India. This shows the predicted power of the model.

The second part of the diagram shows the pattern of residuals in-between 2 standard error. The residuals of model are well behaved till 2008. Thereafter, it goes beyond the standard error bar. This is quite possible because during these years entire world was facing a problem of global crisis.

7. Conclusion

With the help of double log equations we have estimated the post reform determinants of foreign exchange reserve in India. The paper used both type of variables – endogenous (trade and foreign investment) as well as exogenous variables (nominal exchange rate, broad money and wholesale price index). The paper concludes that except WPI, all other variables have a negative impact on foreign exchange reserve. However, the elasticity of all the variables is happened to be less than one. As a main finding the paper suggests the followings;

- ✓ Trade is not at all a significant determinant of foreign exchange reserve
- ✓ WPI is the main determinant of India' foreign exchange reserve
- ✓ Other variables such as, exchange rate, money supply and foreign investment, are responsible for escalating deficit amounts in the foreign exchange reserve.

8. Limitation of the Paper

We have normalised our dependent variable on GDP, that is, actual foreign exchange variable has not been considered. There were several issues left unexplored in this paper due to data constraints such as long-term study of foreign exchange reserve. In particular, it would be interesting to

examine the relationship between the real exchange rate variance and the level of reserves. Furthermore, this paper did not touch upon the topic of optimal reserve levels. Moreover, the study did not capture the individual impact of both exports and imports.

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