

# AN EMPIRICAL ESTIMATION OF EXCHANGE RATE DETERMINATION IN INDIA : SINCE 1980-2011

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**Abstract**— The Historical perspective of foreign exchange Rate determination in India concludes that the Par value system of Exchange Rate was fixed at 4.15 grains in terms of gold with the pound sterling as the intervention- currency under the time period 1947-1971 in India. In 1998 foreign exchange management ACT (FEMA) was enacted which takes into account improved economic liberalization and improved foreign exchange Reserve position during the period (1980-2011). Indian exchange Rate policy has seen a “gradual shift” from a par value system to basket-peg exchange rate system; and further to a managed floating exchange rate system in India. The study reveals that a stable exchange Rate may be maintained in the market. For this situation Necessary for the macro economic stability of the economy. The experience in foreign exchange management in the post reforms years the policy of maintain the flexibility of the exchange Rate in avoidance with market forces of Demand and Supply without undue volatility as adopted by the RBI, has stood the test of time in case of India. Exchange Rate Management policy of the RBI supported with sterilization Intervention in the face of Heavy capital inflows in the recent year also considerably served to the bias in current account besides limiting undue volatility in the exchange Rate. For ensuring Economic Stability, we have to remove the temporary shocks, increase capital mobility and control the Inflation in the economy. The exchange Rate Policy should also facilitate the convertibility of Rupee in the Market. Any economic enterprise or person should be able to convert their holdings of Rupee into any foreign currencies. The result arrived with the help of annual data present a clear picture of Exchange Rate determination in India under the period of the study. This implies that PPP theory in India in the long run.

## 1 INTRODUCTION

In the era of globalization and financial liberalization; exchange Rate (s) play an important role in International Trade and finance. Foreign trade helps the economy to get through exports the much needed foreign exchange for the development. International Trade as well as the movements of capital Inflows / out flows among different countries necessitate the conversion of currencies at an existing exchange Rate.

Every nation has its own currency. The currency of India is Rupee (₹); USA (\$). Most of the international financial transactions involve an exchange rate for one currency into another currency. There may be one or more than one currency involved in the process of exchange, the price of one currency in term of another is known as exchange rate.

Exchange Rate is the single most, vital relative price in the financial world. In a more open economy, monetary transmission operates through exchange rate effects on net exports and Interest rates that affect the financial portfolio. In the International finance literature, various theoretical models are available to analyze the exchange rate behaviour. While the exchange rate model existed period to 1970s (Nurkse, 1944; Mundell, 1961, 1962, 1963); the most of them were based on the fixed price assumption, with the advent of the floating exchange rate regime amongst major Industrialized countries in the early 1970s.

India's exchange rate policy has been evolved over time in line with the gradual opening up of economy as a part of the broader strategy of macro economic reforms and liberalization since the early 1990. In the post independence period, India's exchange Rate system the rupee was linked with

pound sterling. In order to overcome the weaknesses associated with a single currency peg and to ensure stability of the exchange Rate, the rupee w.e.f. September 1975 was pegged to a basket of currencies till the early 1990s.

The exchange rate regime in India can best be characterized as Intermediate between fully managed and 20th century faced a severe macroeconomic crisis in India. Indian economy faced the problem of exchange rate which was grossly overvalued and the rupee was devalued by about 18 percent in two stages in July 1991. At the same time, the government has introduced the Liberalized Exchange Rate Management System (LERMS); and thereby ending an era in dual exchange rate regime. This system was abolished in March 1993. The dual exchange rate was replaced by a unified external rate system in March 1993. Since then the external value of the Indian rupee has been determined by Market forces.

The Rupee attained current account convertibility in August 1994. The exchange rate policy in recent years has been guided by the broad principles with flexibility, without a fixed or a pre announced target or a band while allowing the underlying demand and supply conditions to determine the exchange rate movements over a period.

In the year 2006-07, the average annual exchange rate of rupee was 45.25 per US \$ and Rs. 58.64 per pound sterling. During the fiscal year 2007-08 due to high capital inflows, the rupee appreciated against major international currencies. The appreciation was 12.4 percent against the US \$.

During 2009-2010; the rupee depreciated against major International currencies except pound sterling due to de-

celeration in capital flows and trade deficit.

Exchange Rate is the Single Most vital relative Price in the financial World. In an open economy, Monetary transmission operates through exchange- Rate effect by a number of economic variables such as: exports, Imports, Balance of trade, foreign exchange Reserves, Gold, SDR's Money Supply (M1,M2, M3, M4), Reserve Money, wholesale Price Index (WPI) consumer Price Index (CPI), Balance of Payment, NEER, REER.

Empirical Studies applying various model of exchange Rate determination on a country by county basis over the modern exchange rate period have been of enormous Importance in formulating appropriate exchange Rate Policy Since they can provide useful Information about exchange Rate market Behaviour.

The main objective of this research paper is to study the factors that determine the exchange rate in the India. In this paper, we apply the common theory and Model of the PPP and Monetary Models. Thus, essentially this paper is structural to test foreign exchange Rate determination Model for India by Appling econometric Models.

The research paper has been divided into five Sections. The first Section discusses the SURVEY OF LITERATURE for foreign Exchange Rate determination and second section discusses the Historical Perspective of Foreign Exchange Rate In India. Section - III analyze the methodology and econometric analysis; and also use the Technique of unit Root test for stationarity and also used the OLS Method.section-iv explain the empirical estimation of foreign exchange rate determination since-1980-2011 Section - V deals with the Main conclusion and policy implication of this chapter.

## SECTION-1 SURVEY OF LITERATURE

Recent years, particularly in the context of globalization and currency crises have seen a main issues relating to the exchange rate regime. Which is evident in large and growing body of theoretical and empirical literature on exchange rate determination. The review of literature in the context of developing countries is related by and large to the empirical body of research devoted to testing the applicability of the purchasing power parity [PPP] concept for exchange rate determination. Recently the literature on foreign exchange rate determination emphasized a monetarist approach with most of its versions assuming strict [PPP].Many theoretical and empirical studies have been undertaken to assess the foreign exchange rate determination.

Before exploring new phenomena, it is necessary to look into various aspects already studied. As research is a continuous process and it must have some continuity with earlier facts. The knowledge gathered in the past should be consolidated to keep it on record for future use. It is like consulting attempts to present a review of some of the important research findings relevant to the objective of present study.

Craig S. Hakkio (1981);In his study examines the conventional monetary equation of exchange rate determination. under certain erogeneity conditions, one can write the price level.

At home and abroad as the ratio of the nominal money supply to the demand for real money balances. He estimate the exchange rate as a function of the money supply differential, income differential, and interest rate differential.

Krueger, Anne(1983);In his study examines exchange rate determination as it emerged in the decade of the 1970s. the theory of exchange rate determination is based upon an analytical structure equivalent to that analyzing the determinants of the balance of payment under fixed exchange rate. The difference is that the shifts in excess demand for foreign exchange lead to quantity adjustments under fixed rate and price adjustments under flexible rates.

Mitsuhiro Fukao (1983);in his paper explain the International transaction have increasingly been denominated in other currencies such as the German mark, the Japanese yen ,and Swiss franc .When Japan intervenes in the foreign exchange market by selling dollars and buying yen this affect the dollar-mark, exchange rate.

Williamson (1994) In his study particularly in the context of EU member states in transition, in his approach that takes into account variables such as unemployment and inflation as determinants of exchange rate equilibrium.

R.N. Aggarwal (2000);In his study has been done 1971-1972 to 1996-1997 time period. The variable is used in their study is prices, interest rates, and money supply in the home and foreign country are found to explain the behaviour of the bilateral exchange rate. Other significant variable found are balance of payment and foreign exchange reserves. The result show that the model can be used for forecasting the exchange rate in the short run.

Mohammad Najand and Charlotte Bond (2000);In his study compares the forecasting accuracy of state space techniques based on the monetary models of exchange rate with univariate and random walk models for four countries. A state space vector that contains variables based on the monetary model easily outperforms.

Renu Kohli (2000);In her study mainly used 1993-1999 time period. The change in regime in India from a multi-currency peg to a floating price convertibility provides sufficient motivation for a preliminary analysis of the country's exchange rate behaviour and management between 1993-1999. using international experience with floating exchange rate as a reference point, their paper examines these changes in a comparative perspective. Result is the response of the central bank to exchange rate instability during this period.

Sweta Chaman Saxena [2001];In her paper examines the links between India's exchange rate, trade flows and the trade regime. Her paper estimates some standard trade elasticities before and after the commencement of reform to examine the effects of this structural change.

Sitikantha Pattanaik, Arghya Kusum Mitra [2001];In his study show that in India, besides foreign exchange market interventions and use of several administrative measures RBI has occasionally resorted to the high rate of interest option during major episodes of significant pressures on the external value of the rupee. An empirical assessment suggests that one standard deviation shock to the call rate leads to rupee appreciation in the very second month. Similarly for one standard

deviation shock to net interventions, the exchange rate appreciates gradually by a few paise over five months.

Lin Jun-Qing, Huang Zuhui And Zhan Ming-Hua [2002]; His model shows that central banks can adjust exchange rate by several policy instruments and that different instruments may have different effects on exchange rate determination. He specifies potential policy instruments for central bank as well as their policy effects.

Renu Kohli (2002); In her paper tests for mean-reversion in real exchange rate for India during the recent float period. She find evidence of mean-reversion in real exchange rate series constructed with the consumer price index as deflator, as well as for a series constructed using the ratio of wholesale and consumer price indexes to proxy for shares of tradable and non-tradable goods.

P.R. Bhatt (2002); In his study was empirically investigated between 1970 and 1998 –which covers the oil boom of the 1970s, the collapse of the oil market prices in the early 1980s and the structural adjustment programme of 1986. In his study examines the portfolio composition of commercial bank and its impact on the economy. Their result of the analysis suggest that portfolio variables –loans and investment contribute significantly to our cross national product for the period under review.

Ozlale and Yeldan (2002) ;Developed a state space model to estimate the equilibrium exchange rate using exchange rate volatility short term capital movements, industrial production, inflation budget balance of public sector, openness and lags of explanatory variables. In efforts made since the mid- 1990s, many studies have also been employing micro founded general equilibrium open economy models for determination of real exchange rate.

Hyun-Jae Rhee (2002); In his study the role of psychological impact is examined by investigating the determination of exchange rate, especially the U.S dollar. He has been applied to the Korean economic crisis which occurred between January 1997 and June 1999.

Golaka C.Nath and G.P. Samanta (2003); In their study examines the causal relationship between returns in stock market and foreign exchange market in India. Using daily data in the study from March 1993 to December 2002, they found that causal link is generally absent; though in recent years their has been strong causal influence from stock market return to foreign exchange market return. The results however; are tentative and a need further in-depth research to identify the causes and consequences of the findings.

K.Sham Bhat And R. Rajendran (2003); Their study investigated the empirical validity of the monetary model of exchange rate determination for Indian rupee, pound sterling and yen in terms of U.S dollar. The necessary monthly information were collected from the international financial statistics for the year 1975:10 to 1998:05. The model proves that the exchange rate are not determined by purely monetary factors. The study provides scope for developing a comprehensive structural model by incorporating other fundamental variables like trade balance, reserve position, government's fiscal deficit as percentage to GDP, public debt position etc. to judge the value and direction of exchange rate movements.

R.K. Pattnaik, Muneesh Kapur, S.C. Dhal (2003); Their study present the Indian experience of exchange rate management against the backdrop of international developments both at the theoretical and empirical levels. In Indian experience the last five decades since independence the exchange rate regime in India has transited from a per value system of the IMF during the 1950 and the 1960 to a basket-peg during the 1970 to 1980 and eventually culminating in the present from of a market determined exchange rate regime since march 1993 via a transitional phase of a dual exchange rate between march 1992 –February 1993. the empirical exercise undertaken indicates that monetary policy has been successful in ensuring orderly condition in the foreign exchange market and containing the impact of exchange rate pass-through effect on domestic inflation. Real shocks are predominantly responsible for movements in real as well as nominal exchange rate.

Santi Chaisrisawatsuk and Subhash C.Sharma (2004); In their paper examine the long run equilibrium relationship between exchange rate and currency substitution for a number of countries i.e. Indonesia ,Japan, Korea, Malaysia, Singapore and Thailand for the period 1980-1996. The hybrid portfolio-monetary model of exchange rate determination is derived and extended to incorporate the currency substitution factor and this is objective of the study. The evidence supporting a profound impact of currency substitution in determining long run exchange rates for Indonesia, Malaysia, Singapore and Thailand. Therefore, for these countries, the issue of currency substitution is worth a consideration as they are recently adopting the flexible exchange rate system.26

Mohsin Khan (2004); Investigated the applicability of the Balassa- Samuelson Effect on the long-run behaviour of real exchange rates in developing countries based on a panel data sample of 16 developing countries. The empirical evidence obtained underscored the significance of the traded-non-traded productivity differential in determining the relative price of non-traded goods, and hence the relative price ratio which in tern exerted a significant effect on the real exchange rate thereby providing a robust verification of Balassa-Samuelson effects for developing countries.27

Chai-On Lee (2005); In his paper presents a theory that the value of foreign moneys are not determined on the exchange markets but outside of them. 1. Even fiat money has a commodity character within the circle of commodity producers in the least to which any monetary and/or banking institute cannot belong.

Its three figures are to show symmetry between the structure of the dual exchange rate and that of the dual price of gold.

Bohn, Frank (2006) ;In his paper offers a theoretical explanation for the determination of exchange rates under specific conditions which could be found in some OECD and newly industrialized countries in an obstfeld (1994) framework extended to incorporate government expropriation renegeing on a fixed exchange rate promise unambiguously produces short term benefits but long term losses.

Himanshu Joshi (2007); In his paper attempts an estimation of the real equilibrium exchange rate for India for the period

in the latter half of the 1990s. The period of study is 1996: Q1 to 2005: Q4 quarterly. the model identifies the permanent impact of three fundamental structural shocks, viz real demand, supply and nominal shocks. The empirical result finding that the variability in the real exchange rate in India is explained predominantly by permanent real demand shocks followed by nominal and supply shocks. The significance of real demand shocks underpin the important of efforts of the RBI aimed at sterilizing capital inflows and maintaining stable conditions in the foreign exchange market. Since the aggregate nominal shocks explain just about 30% of the forecast error.

Christian Dreger, Georg Stadtmann (2007); In their paper, we use a unique disaggregated data set to model the expectations of the yen/USD exchange rate of about 50 leading foreign exchange rate professional. The survey includes not only exchange rate projections but also expectations regarding macroeconomic fundamentals, like GDP growth, inflation, interest rate. The result is heterogeneity in exchange rate in the expectation of macroeconomic fundamentals is not sufficient to explain the heterogeneity in exchange rate expectations.

Mita H.Suthar (2008); in his study is used 1996 to 2007 time period for the purpose. The present research tests validity of this hypothesis in association with the exchange rate determination between the Indian rupee and the US dollar. He observed that the monetary policy intentions depicted by the bank rate of the RBI, the short run and long term domestic interest differentials and interest yield differentials and the rate of change of foreign exchange reserves have a significant impact on the monthly average of the exchange rate between Indian rupee and the US dollar and quite in line with the economic theory.

Martin D.D.Evans and Richard K.Lyons (2008); In their paper addresses whether transaction flow in foreign exchange market convey information about fundamentals..

MD. Nisar Ahmed Shams (2008); In his paper presents findings on the long-run purchasing power parity (PPP) in Bangladesh economy during the period 1971/1972- 2005/2006. The result is deviations in domestic and foreign prices are not reflected in nominal exchange rate changes. Therefore PPP theory should be considered as a short-cut rather than an alternative in finding a complete model of exchange rate determination.

Jeevan Kumar Khundrakpam (2008);in his paper examines 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, he finds a rise in exchange rate pass-through to domestic prices until recent years. Besides economic factors typically associated with economic liberalization, the persistence of higher inflation is an important factor for the rise in pass-through.

C.Veeramani (2008); In his articles explores the relationship between the real effective exchange rate and exports for the period 1960-2007 using world trade organization and reserve bank of India data, He finds that the appreciation of the REER leads to a fall in the dollar value of India's merchandise exports. It also forecasts the growth of merchandise export over the medium term.

#### SECTION-11

#### Historical Perspective of Foreign Exchange Rate In India

The exchange rate regime in India can best be characterized as Intermediate between fully managed and freely - floating regimes. Exchange rate policy is generally viewed as sub serving the monetary policy stance.

It is now common knowledge that:

(1) India in the last decade of twentieth century faced a severe macroeconomic crisis.

(2) One of the problems facing the Indian economy was that the exchange rate was grossly overvalued.

The rupee was historically linked pegged to the pound sterling. Earlier during British regime and till late Sixties, most of India's trade transactions were dominated to pound sterling. Under Bretton Woods System - as a member of IMF Indian declared its per value of rupee in terms of gold. In the post independence period, India's exchange rate policy has seen a shift from a par value system to a basket-peg and further to a managed float exchange rate system. During the period 1947 till 1971, India followed the par value system of the exchange rate whereby the rupee's external par value was fixed at 4.15 grains of fine gold. The RBI maintained the par value of the rupee within the permitted margin of  $\pm 1\%$  using pound sterling as the intervention currency. The devaluation of the rupee in September 1949 and June 1966 in terms of gold resulted in the reduction of the par value of rupee in terms of gold to 2.88 and 1.83 grains of fine gold, respectively. Since 1966, the exchange rate of the rupee remained constant till 1971

After Smithsonian Agreement in Dec. 1971, The Rupee was de-linked from US \$ and again link to pound sterling. This parity was maintained with a band of 2.25%. Due to poor fundamental pound got depreciated by 20%, which cause rupee to depreciate.

, the rupee also remained stable against dollar. In order to overcome the weaknesses associated with a single currency peg and to ensure stability of the exchange rate, the rupee, with effect from September 1975, was pegged to a basket of currencies. The currencies included in the basket as well as their relative weights were kept confidential by the Reserve Bank to discourage speculation.

January 1, 1984 the sterling rate schedule was abolished. The Interest element which was hitherto in Built the exchange rate was also de linked. The Interest was to recovered from the customers separately. This not only allowed transparency in the exchange rate quotation but also was in tune with International practice in this regard.

The liquidity crunch in 1990 and 1991 on foreign exchange only hastened the process. In 1992 New system LERM system announced.

By the late 'eighties and the early 'nineties, it was recognized that both macroeconomic policy and structural factors had contributed to balance of payment difficulties. The current account deficit widened to 3.0 per cent of GDP in 1990-91 and the foreign currency assets depleted to less than a billion dollar by July 1991. It was against this backdrop that India embarked on stabilization and structural reforms to generate impulses for growth.

In March 1992 The Rupee was made partially convertible on the current account. Under the dual exchange

rate system 40% of the export earning were to be surrendered at the official exchange and for the rest of all 60%

SECTION-111

METHODOLGY AND ECONOMETRIC ANALYSIS

The objective of this Section is to present an overview of some of the most relevant models of real exchange Rate Determination. These Include the unit Root test apply (Random walk Model), the Purchasing Power Parity model and the Flexible Price Monetary Model. These models in which the following abbreviations are used and briefly discussed below.

In these models:

- X : Exports
- M : Imports
- FXRe : Foreign Exchange Reserve
- GDS : Gross Domestic Saving
- GNP(FC) : Gross National Product of Factor Cost
- NEER : Nominal Effective Exchange Rate
- REER : Real Effective Exchange Rate
- RM : Reserve Money
- GDP (FC) : Gross Domestic Product at factor cost
- GDCF : Gross Domestic Capital formation
- NNP (FC) : Net National Product at factor cost
- M1,M2, M3, M4 : Money Supply
- Br : bank rate
- FXR : Foreign exchange Rate

MODELS SPECIFICATION OF THE RELEVANT MODELS

ARE DISCUSSED BELOW:

- 1) MODELS- I  

$$FER = bo + b1x + b2M + U \dots\dots\dots(1)$$
- 2) MODELS- II  

$$FER = bo + b1 X + U \dots\dots\dots (2)$$

$$FER = bo + b1 M + U \dots\dots\dots (3)$$
- 3) MODELS - III (High and Positive correlation between all variables and FXR)  

$$FXR: bo + b1x + b2M + b3FXRe + b4M1 + b5M2 + b6M3 + b7M4 + b8GDS + b9GNP(FC) + b10 Gold + b11NEER6 + b12REER6 + b13RM + b14 GDP(FC) + b15 GDCF + b16 NNP FC + ut \dots\dots\dots (4)$$
- 4) MODEL - IV

Unit Root SPECIFICATION OF MODEL:

$$VtFxR = Bo + B1Vtx + B2VtM + B3VtBOT + B4VtFXRe + B5VtGold + B6VtSDRs + B7VtM1 + B8VtM2 + B9VtM3 + B10VtM4 + B11VtRM + B12VtWPI + B13VtCPI + B14VtNEER-6 + B15VtREER-6 + B16VtNEER-36 + B17VtREER-36 + B18VtBR. \dots\dots\dots (5)$$

- 5) Model- V (PPP)  

$$FER = bo + b1 + ut \dots\dots\dots (6)$$

Or

$$\text{Log FER} = bo + b1 (\text{Log P} - \text{log p}^*) + ut \dots\dots\dots(7)$$

- 6) Model - VI (Flexible Price Monetary Models)

- 1)  $(Pt - Pt^*) = bo + b1 (mt - mt^*) + b2 (yt - yt^*) + b3 (it - it^*) + ut$
- 2)  $(\text{Log P} - \text{Log P}^*) = bo + b1 (Lm - Lm^*) + b2 (Ly - Ly^*) + b3 (Lr - L^*r) + ut$
- 3)  $\text{Log FXR} = bo + b1 (Lm - Lm^*) + b2 (Ly - Ly^*) + b3 (Lr - L^*r) + ut$

SECTION- IV

AN EMPIRICAL ESTIMATION OF FOREIGN EXCHANGE RATE DETERMINATION IN INDIA SINCE: 1980-2011.

This Section has been devoted to the Estimation the Foreign Exchange Rate determination for the period from 1980-2011. The Foreign Exchange rate is a function of exports, imports, balance of payment, WPI, CPI, Foreign Exchange Reserve, SDR'S , Gold, Money supply BOP, NEER, REER, GDP FC , GDS, GDCF. We have used Secondary time series data on the value of Exchange Rate determination; and Macro economic variables are collected from the hand Book of statistics published by R.B.I

We have also analyzed the impact of economic and monetary variable on foreign exchange Rate determination. The analysis has been made by applying the linear regression equation and unit Root test. The results are presented in table 1.1 to 1.12 in this section.

TABLE:-1.1  
RESULTS OF LINEAR REGRESSION EQUATION  
FXR=B0+B1X+B2M+U SHOWING IMPACT OF EXPORT AND IMPORT ON FOREIGN EXCHANGE RATE: 1980-2011

Time Period	bo	b1	b2	R	R2	F
1980-81 to 2010-2011	22.121 (9.305)*	3.988e-05	(3.402)*	4.661e-06 (1.125)	.718	.516 13.867*
1980-81 to 1989-90	3.892 (2.497)*	-1.84e-04	(-.624)	5.189e-04 (1.953)	.963	.928 44.823*
1990-91 to 1999-2000	16.788 (6.429)*	2.207e-04	(1.481)	-4.20e-05 (-.379)	.943	.890 28.843*
2000-01 to 2010-2011	47.077 (28.072)*	-6.02e-06	(-1.800)	9.654e-07 (1.130)	.632	.400 1.998

t\* - Statistically Significant at 5% Level of Significance

F\* - Statistically Significant at 5% Level of Significance

Degree of Freedom- of F Test K-1 3-1=2

n- k 29-3 =26

Degree of freedom of t Test n-k = 29-3 = 26

At 5% = 2.056

The table 1.1 reveals the impact of Exports and Imports on foreign exchange Rate for the whole Period under study i.e. 1980-81 to 2010-11. In this table, we have analyzed the impact of exports and imports on its foreign Exchange Rate. Empirical results have

been obtained by using regression equation  $FXR = bo + b1X + b2 M + u$ . The result showing the relationship of Export and Import with foreign Exchange Rate.

The above regression analysis clearly indicates that Export are more closely and positively related to Foreign exchange rate; and has a significant impact on foreign exchange Rate of the whole Period under study 1980-81 to 2010-2011. Foreign Exchange have significantly effected by Exports but Imports are not significantly effected to foreign Exchange Rate in whole period. But FXR as the R2 (correlation coefficient) is found to be good. But in the first and second Sub, Periods 1980-81 to 1989-90 and 1990- 2000 correlation between exports and Imports with foreign exchange rate is highly and Positively correlated and correlation coefficient is found to be very good. But the value of t test is not statistically significant this shows that exports and Imports are not effect to foreign ex-

change Rate. But the overall model of F value is Significant in whole time Period and two sub time period. But in 2000-01 to 2010-11 exports and imports are not significantly affective the foreign Exchange Rate. Exports are negatively related and imports are positively related with foreign exchange rate determination

TABLE-1.2

RESULTS OF LINEAR REGRESSION EQUATION.

FXR= bo + b1X + U SHOWING THE IMPACT OF EXPORT ON FOREIGN EXCHANGE RATE: 1980-2011.

Time Period	Bo	b1	R	R2	F Value
1980-81 to 2010-11	.702	.493	21.293 (8.347)*	4.789e-05(5.119)*	
			26.209*		
1980-81 to 1989-90	.940	.888	6.696 (9.502)*	3.865e-04	(7.968)*
			63.496*		
1990-91 to 1999-2000	.942	.887	17.292 (8.138)*	1.648e-04	(7.943)*
			63.093*		
2000-01 to 2010-11	(-1.618)	.522	47.715 (29.642)*	-5.46e-06	
			2.616		

t \*- Statistically significant at 5% Level of significance

F\* - Statistically significant at 5% Level of significance.

The table 1.2 We have analyzed the impact of only exports on foreign exchange Rate. Empirical result have been obtained by using regression equation "FXR = b0+b1X"

The above regression analysis clearly Indicates that exports are more strongly and positively related to foreign exchange rate determination; and has a significant Impact on exchange Rate in whole Period under study 1980-81 to 2010-2011 and also during the Sub- Periods 1980 to 1990 and 1990 to 2000. The value of R2 is very high. Except during the sub period 2010-2011,when the relation between exports and foreign exchange rate determination is very weak.

TABLE- 1.3

RESULTS OF LINEAR REGRESSION EQUATION FXR =bo+b1M+U

SHOWING THE IMPACT OF IMPORT ON FOREIGN EXCHANGE RATE 1980-2011.

Time Period	Bo	b1	R	R2	F Value
1980-81 to 2010-2011	.548	.301	25.081 (9.403)*	1.322e-05	(3.407)*
			11.609*		
1980-81 to 1989-90	.961	.924	4.730 (6.234)*	3.548e-04	(9.830)*
			96.635*		
1990-91 to 1999-2000	.925	.885	19.183 (8.726)*	1.203e-04	(6.873)*
			47.240*		
2000-01 to 2010-2011	.275	.076	44.704 (37.552)*	7.346e-07	(.757)
			.573		

t \*- Statistically significant at 5% Level of significance

F\* - Statistically significant at 5% Level of significance.

The table 1.3 Shows that the import have a positive impact on Foreign Exchange Rate during whole Period 1980 to 2011 and the sub Period 1980 to 1990 and 1990 to 2000. In this Sub Period, correlation between foreign Exchange Rate and Imports is very high. Correlation coefficient (R2) also very high and better goodness of fit. But in the Sub period 2000-2001 to 2010-2011 correlation; and correlation coefficient is very low and also the value of t is not statistically significant.

TABLE- 1.4  
MODELS - III - CORRELATION MATRIX  
ANNUAL DATA - 1980 TO 2011

We have estimated correlation Matrix between exchange rate and 16 relevant economic variables expected to be linked. The result are presented in table 1.4. Correlation is Significant at the 0.01 level (2.tailed)

Variables	Correlation between foreign Exchange Rate and variable
Exports	.702**
Imports	.548**
fx Reserves	.633**
M1	.747**
M2	.748**
M3	.729**
M4	.732**
GDP(FC)	.813**
GDCF	.704**
GDS	.718**
GNP(FC)	.514**
GOLD	.783**
Reserve M	.749**
REER- 6	.910**
NEER-6	.849**
NNP(FC)	.799**

\*\* . Correlation is Significant at the 0.01 level (2 tailed)

In this table 1.4 show the correlation Matrix between foreign exchange rate and all of these variable. The correlation between FXR and all these variable is high and Positive. The table shows that all variables are highly linked with the foreign Exchange Rate determination.

TABLE-1.5

RESULTS OF LINEAR REGRESSION EQUATION THE IMPACT OF HIGH CORRELATED VARIABLES ON FXR: 1980-2011

Variables	bs value	t value
Constant (bo)	5.013	4.776*
Export	-427e-05	-1.190
Import	4.155e-07	.579
FX R all	-4.90e-05	-2.558*
M1	-7.32e-05	-1.978
GDP (FC)	4.156e-05	6.580*
GDCF	-7.21e-05	-2.516*
GDS	8.801e-05	-2.239*
GNP(FC)	-1.56e-07	-.977
GOLD	5.949e-04	3.354*
NEER - 6	.324	1.869
REER - 6	-.309	-1.882
Res m	-9.87e-06	-.288
M2	40.507	1.201
M3	-3.915	-1.767
M4	-3.636	-1.528
NNP(FC)	-4.327	-1.646
R = .997	D.W = 2.264	

R2 = .993  
F value = 191.682\*  
adjusted R2 = .988

t\* - Statistically significant at 5% Level of significance

F\* - Statistically significant at 5% Level of significance.

In the Table- 1.5 we have analyzed the impact of highly correlated variables Export, Import, Foreign Exchange Reserve all, M1, M2, M3, M4, Gross Domestic Product at factor Cost (GDPFC), Gross Domestic capital formulation (GDCF), Gross Domestic Saving (GDS) Gross National Product at factor cost (GNPFC), Gold, Reserve money, NEER-6, REER-6, Net National product at factor cost (NNPFC) on foreign Exchange Rate.

Empirical results have been obtained by using multiple regression equation.

$FXR = B_0 + b_1X + b_2M + b_3FXRS + b_4M_1 + b_5 GDPFC + b_6 GDCF + b_7 GDS + b_8 GNPFC + b_9 Gold + b_{10} NEER_6 + b_{11} REER_6 + b_{12} RM + b_{13} M_2 + b_{14} M_3 + b_{15} M_4 + b_{16} NNPFC$ .

The result shows that the relationship between Different variable and foreign Exchange Rate. The above regression analysis clearly indicates that correlation(R) between all these variable and FXR is .997 and correlation coefficient (R2) is .993. This shows that better goodness of fit of this model. All variable are Important for foreign exchange Rate determination. The foreign exchange reserves, GDCF, GDPFC, GDS and gold variables is significant result and these variable is play a significant role in determining foreign exchange rate. In this table export, FXRe, M1, M3, M4, GDCF, GDS, GNP(FC), Reer6 RM, NNP(FC), have a negative impact on FXR; but Import, GDP(FC), GOLD, NEER-6, M2, have a positive impact of FXR. but FXRe all, GDP(FC),GDCF,GDS and GOLD are Statistically significant at 5% Level of significance

TABLE- 1.6

LOW CORRELATION BETWEEN FOREIGN EXCHANGE RATE AND OVER ALL BALANCE, TOTAL CAPITAL ACCOUNT AND REAL GROSS DOMESTIC PRODUCT AT FACTOR COST: 1980-2011

Variable	Foreign Exchange Rate
Over All Balance.	.414*
Total Capital Account	.465*
Real Gross Domestic Product at Factor Cost	.297

\* - Correlation is significant at the 0.05 Level (2 tailed)

TABLE- 1.7

VERY LOW AND NEGATIVE CORRELATION BETWEEN FOREIGN EXCHANGE RATE AND CPI,WPI,BOP,BOT AND SDR'S: 1980-2011

Variable	Foreign Exchange Rate
CPI	-.343
WPI	-.647
BOP	-.205
BOT	-.491
SDR'S	-.769

Table -1.6 Shows that the low correlation between foreign Exchange Rate and over all Balance, Total capital Ac-

count and Real gross Domestic Product of factor cost is low. These variable do not influence the determination of foreign exchange rate in India

Table 1.7 shows that the correlation between foreign Exchange Rate and CPI (Consumer Price Index ) WPI (Whole sale Price Index), Balance of Payment, Balance of Trade and SDRS is negative and very low, except WPI AND SDRs where it (correlation) is -0.647 and -0.769 respectively, these negative signs are expected and influence with theory of exchange rate determination. All other variable have little or no impact on foreign Exchange Rate determination.

The table 1.8 shows the impact of all these variables on Foreign Exchange Rate determination with over the whole time period 1980-2011. The above Regression Results clearly Indicate that Export, Import, Foreign exchange Reserve, Gold M1, M2, M3, M4, Reserve money, . Gross National Product at factor cost, NNPFC, GDPFC, GDS, GDCF, overall Balance, NEER-6 REER6 these variable are closely related to India's Foreign Exchange Rate determination; and these have a Significant impact on FXR. The regression coefficient B is Statistically Significant which implies that these variables play a significant role in foreign Exchange Rate determination, Except BOT, SDR's CPI, WPI these are Negative relation with FXR and the regression coefficient BS of CPI is not Significant and the variable does but not play a significant role in determining foreign exchange Rate.

TABLE 1.8

RESULTS OF LINEAR REGRESSION EQUATION SHOWING THE IMPACT OF MONETARY AN ECONOMIC VARIABLES ON FXR: 1980-2011

Variable	Time period	bo	b1	R2
	adjustedR 2	R	F- Value	
1.Export	1980-2011	21.293 (8.347)*	4.789e-05(5.1194)*	0.4925
2.Import	1980-2011	25.081 (9.403)*	1.322e-05(3.4073)*	.4737
3.Balance of Trade	1980-2011	25.553(9.209)*	-5.87e-05(-2.9314)*	.2747
4.Foreign in exchange Reserve in Total	1980-2011	23.325(8.992)*	2.572e-05(4.2504)*	.548
5.GOLD	1980-2011	17.99(7.288)*	9.446e-04(6.5344)*	.633
6.SDRS	1980-2011	40.435 (16.089)*	-8.13e.02(-6.2420)*	.5982
7.M1	1980-2011	19.371 (7.632)*	3.177e-05(5.8354)*	.5755
8.M2	1980-2011	19.233(7.554)*	3.177e-05(5.8591)*	.783
9.M3	1980-2011	20.324(8.049)*	8.526e-06(5.539)*	.5906
10.M4	1980-2011	20.153(7.969)*	8.528e06(5.587)*	.5755
11.Reserve money	1980-2011	18.921 (7.342)*	4.176e-05(5.8757)*	.56

12.NNP at factor cost	1980-2011	17.231(7.049)*		
		9.588e-06(6.89281)*	.63	.62 .779
		47.51*		
13.GDP at factor cost	1980-2011	16.767(7.025)*		
		8.906e-06(7.2631)*	.66	.64 .813
		52.75*		
14.Gross Domestic Saving	1980-2011			
		20.365(7.897)*	2.004e-05(5.3654)*	.51 .49
		.718	28.78*	
15.Gross Domestic Capital formulation	1980-2011			
		20.584(7.839)*	1.896e-05(5.1571)*	.49 .47
		.704	26.59*	
16.WPI	1980-2011	55.100(8.900)*		-1.18
		(-4.41137)*	.41 .39	-.647 19.48*
17.CPI	1980-2011	40.932 (6.201)*		-2.81e-02
		(-1.8991)	.11 .08	-.343 3.60
18.Overall balance	1980-2011	26.91(9.743)*		
		7.416e-05(2.3661)*	.17	.14 .414*
		5.59*		
19.NEER 6- currency	1980-2011	15.975(7.294)*		
		.310(8.339)*	.72 .71	.849 69.546*
20.REER 6-currency	1980-2011	14.775(8.533)*		
		.259(11.407)*	.82 .822	.910 130.118*

t\* - Statistically significant at 5% level of significance  
F\* - Statistically significant at 5% level of significance

#### MODELING PURCHASING POWER PARITY

The Purchasing power (PPP) Model asserts that the exchange Rate between two currencies over any period of time is determined by the change in the two countries Price levels. However an exchange rate in the short run would deviate from PPP mainly due to three disturbances:- actual and expected inflation, Barriers to trade, and shifts in International movements of capital. A fourth factor, the productivity bias occurring when there is relatively faster productivity growth in the tradable sector than in the Non- tradable sector. will also result in a systematic deviation of the Domestic Price.

In the absolute version of PPP, the share of domestic and foreign Prices determines the nominal exchange Rate,

$$FXR =$$

Where FXR = is the exchange rate Measured as the domestic currency price of a unit of foreign currency. Here P and P\* are the domestic and foreign Price level.

By taking logarithms the absolute PPP model is written as:

$$\log FXR = \log P_t - \log P_t^*$$

MONETARY MODEL:-

The concept of the Monetary Model of exchange Rate determination begins with the assumption of ideal capital Mobility. These monetary Model(s) are focused on the "Flexible Price Monetary (FPM).

The Logarithm of the demand for money is assumed to depend on the logarithm of real Income (y) and the logarithm of Price level (P) and the level of Nominal Interest rate (r). An identical demand for Money can also be assumed for the foreign country.

#### TESTING THE PPP AND MONETARY MODELS

Annual data are extracted from RBI and International Financial Statistics (IFS) For a period of 1980 to 2011 with a

total 29 data points. The M2 is used as the proxy for money supply and Income is represented by the real GDP of India and U.S.A. The Bank Rate represent the Interest Rates in India and EURO- Dollar-3 month for Interest Rates in U.S.A. Consumer Price Index. (CPI) is used for Price in both country. The exchange rate expressed in rupee per US\$ unit. The Time series are first examined for stationarity; and then followed by the Results of the Augmented Dickey- fuller (ADF) test for a single unit Root. The Non- Stationary exchange Rate suggests that a long Run PPP between US \$ and (₹) Rupee does not exist. If data is not stationary the second order difference must be tested.

TABLE 1.9(A)  
RESULTS OF UNIT ROOT TEST FOR PPP WITH DICKY FULLER TEST: 1980-2011

Variables	Unit Root Test	D.F. Test	Bo	B1
B2T	Durbin	Watson Test	Conclusion	
1) Log FXR I(o)				
2) Without trend	.105	-5.63e.02(-2.357)	1.518	Non Stationary
with Trend	.7586e-02			-2.16e-02(-.277)
I(1) First difference				
Without trend			1.777e-02	-.675(-3.561)*
with Trend		1.917		Stationary
I(1) First difference				
Without trend			4.589e-02	-.840 (-3.902)*
with Trend		-1.48e-03 (-1.498)	1.834	Stationary
3) Log P I(o)				
Without trend	.707			-.281(-1.825)
with Trend	.984			-.353 (-2.212)
I(1) First difference			1.830	Non Stationary
Without trend	-1.95e-02			-1.072(-5.377)*
with Trend	2.016**			Stationary
I(1) First difference				
Without trend	2.736e-02			-1.092 (-5.344)*
with Trend	-2.95e-03 (-.631)	2.013**		Stationary
3) Log P* I(o)				
Without trend	7.340e-02			-2.78e-02 (-3.523) *
with Trend	1.469			Stationary
I(1) First difference				
Without trend	.246			-.116(-1.589)
with Trend	1.187e-03 (1.216)	1.440		Non Stationary
I(1) First difference				
Without trend	8.073e-03			-.656(-3.282)*
with Trend	1.488			Stationary
I(1) First difference				
Without trend	1.484e-02			-.856 (-4.024)*
with Trend	-2.49e-04 (-2.027)	1.510		Stationary

\* - Indicate the stationery series

\*\* - Indicate the No Autocorrelation Problem

Critical Value of Tau Test is 10% (-2.5844),  
5% (-2.8951), 1% (-3.5073)

Table 1.9 (A) shows that unit Root Test is used for check the stationarity. In unit Root test, two tests are very useful Dickey fuller and augmented Dickey Fuller Test.

Dickey fuller Test Show that all variable are Non- Stationary in level I(0) Series. But in the Integrated level one with I (1) First Difference of time series data of all variable is Stationary But this result show that all variables take Autocorre-



lation Problem; for the solution of this problem; we take Augmented Dickey fuller test.

TABLE 1.9(B)  
RESULTS OF AUGMENTED DICKEY FULLER TEST ON PPP: 1980-2011

Variable	Bo	Yt-1	T	$\Delta$ yt-1	D.W
Log FXR	.103(1.281)		-6.58e.02(-.734)		8.356e-04
(.252)	.253 (1.004)	1.889**	Non stationary		
Log P	1.154(2.214)		-.418(-1.186)		-5.92e-03 (-
1.298)	.148 (.673)	2.034**	Non stationary		
LogP*	.145(.911)		-6.61e-02(-.818)		6.093e-04
(.576)	.130 (.605)	1.474	Non stationary		

\*\* - Indicate the No Auto Correlation Problem.

Critical value of ADF Test 10% (-3.13), 5% (-3.41), 1% (-3.96)

Table 1.9(B) Shows the Durbin Watson d has Increased. But notice that T tau value show that log FXR, log P, Log P\* time Series is Non stationary. This table results of regression show that there is no Autocorrelation Problem. The problem has been solved by Durbin Watson Test. The results of the ADF test show that there is unit root. The non stationary exchange rate suggests that a long run PPP between USD and Rupee does not exist.

TABLE- 1.10

RESTULS OF PURCHASING POWER PARITY:- ANNUAL DATA 1980 TO 2011

1. OLS

$$FXR = b_0 + b_1 + u$$

$$FXR = 46.797 - 5.768$$

$$t = (11.696)^* \quad (-5.022)^*$$

$$R^2 = .483$$

$$R^2 = .464$$

$$R = .695 \quad F \text{ value:- } 25.217^*$$

2. OLS

$$LFXR = b_0 + b_1 (LP - LP^*) + u$$

$$LFXR \quad b_0 \quad b_1 (LP - LP^*) \quad t \text{-value}$$

$$1.635 (24.479)^* \quad -.599(-4.374)^* (LP - LP^*)$$

$$R^2 = .415 \quad \text{adjusted} R^2 = .393$$

$$R = .644 \quad F\text{-value :- } 19.130^*$$

Note: t\* = Indicate the statistically significant at 5% level a Significance

F\* = Indicate the statistically significant at 5% level a significance

Table 1.10 result show that the equation 1 is FXR is dependent variable and Ratio of Domestic Price to Foreign Price is an explanatory variable. The coefficient of shows the Negative relation between and FXR. But t value of this equation is statistically significant at 5% level and F value show the over all equation is significant.

In equation - 2 Show the negative relationship of log FXR and logP- log P\*. But the coefficient of log P - log P\* is Negative this is Negatively Related with log FXR. But t value and F value are statistically significant in 5% level. The Corre-

lation and correlation coefficient is high which show the better goodness of fit. The study reveals that purchasing power parity theory(PPP theory) explain the determination of foreign exchange rate in India during 1980-2011 to a reasonable extant.

Table 1.11 (A) show the result A Dickey Fuller Test. In the result FXR and price, rate of interest is stationary in first difference I(1) of integration. But Money supply and income, (GDP subtract Domestic and Foreign country) is Non- Stationary. So in this model price ,rate of interest and FXR is very important factor.

TABLE 1.11 (A)  
RESULTS OF UNIT ROOT TEST FOR STATIONARY IN FLEXIBLE PRICE MONETARY MODEL (FPMM) WITH DICKY FULLER TEST: 1980-2011

Variables	Unit Root Test (D.F. Test)	Bo	B1	Yt-1
1) FXR I(o)	Without trend	2.231	-3.03e -02	(-.962)
	with Trend	1.682	-1.05 (-.962)	.140(.716)
I(1)	Without trend	1.223	-.879 (-4.140)*	_____
	with Trend	1.853	-1.918 (-4.100)*	- 4.05e-02
2) Pt-Pt* I(o)	Without trend	49.760	-.235	
	with Trend	(-1.659)	1.835	Non-stationary
I(1)	Without trend	182.612	-.365 (-2.340)	-6.314
	with Trend	(-1.725)	1.811	Non stationary
3) mt-mt*I(o)	Without trend	-16.471	-1.053(-5.283)*	_____
	with Trend	2.014**	17.155	-1.069(-5.235)*
I(1)	Without trend	2.011**	2.011**	stationary
	with Trend	(-1.551)	2.011**	stationary
4) Yt-Yt*I(o)	Without trend	18.103	.527	Non stationary
	with Trend	6.230e02(6.013)	.113(2.612)	
I(1)	Without trend	10.641(1.206)	.566	Non stationary
	with Trend	-8.480	3.762e-02(.339)	_____
5) rt-rt*	Without trend	1.750	-1.137(-.964)	-3.897
	with Trend	(-1.846)	1.706	Non stationary
I(1)	Without trend	9.727e03(.880)	-.652	Non stationary
	with Trend	-527.357	-.173(-2.065)	-71.559
	with Trend	(-2.198)	.746	Non Stationary
	with Trend	-69.190	-.221(-1.077)	_____
	with Trend	.948	4.443e-02(.180)	
	with Trend	-92.903	7.731(1.780)	1.237
	with Trend	1.338	-.320 (-3.475)*	
	with Trend	1.321	1.321	Stationary
	with Trend	1.593	-.303(-3.051)*	
	with Trend	-1.95e-02 (-.488)	1.351	Stationary

Without trend	.184	-.674(-3.743)*
_____	1.971	Stationary
with Trend	.423	-.696(-3.546)*
-1.45e-02 (-.312)	1.941	Stationary

\* - Indicate the stationery series  
\*\* - Indicate the No Autocorrelation Problem  
Critical Value of Tau Test is 10% (-2.5844)  
5% (-2.8951) 1% (-3.5073)

TABLE 1.11(B)  
RESULTS OF AUGMENTED DICKEY FULLER TEST IN  
FLEXIBLE PRICE MONETARY MODEL: 1980-2011

Variable	Bo	B1 Yt-1	B2 T value	B3 Yt -1
DW	Conclusion			
1) FXR	1.762(1.440)	1.969**	-.183(-1.357)	.293(1.154)
	.285 (1.070)		No Auto Correlation	
2) (Pt-P*)	210.438(2.044)	2.043**	-.430(-2.357)	-6.79(1.681)
	.158(.752)		No Auto Correlation	
3) (mt-mt*)	27.593(674)	1.680	1.569e-02(.424)	-1.11(-.161)
	.826(4.905)		Auto Correlation	
4) (yt-yt*)	-307.170(-2.685)	1.385	-.165(-2.431)	-56.77(-2.116)
	1.048(4.662)		Auto Correlation	
5) (rt-rt*)	1.028(1.325)	1.903**	-.311(-2.759)	9.843e-03 (.234)
	.332(1.910)		No Auto Correlation	

Note: critical value of ADF test 10% (-3.13) 5% (-3.41) 1% = (-3.96)

\*\* - Indicate the no Auto correlation problem.

Tables 1.11(B) show the result of Durbin Watson test and the Augmented Dickey fuller test. In the result show that the FXR, Price, rate of Interest there is no Auto correlation Problem. But in the equation, Money supply and GDP are take Auto correlation Problem. But t tau test value show the Non-stationary time series.

TABLE - 1.12  
RESULTS OF THE FLEXIBLE- PRICE MONETARY MODEL ANNUAL DATA- 1980-2011

1. OLS  
(P-P\*) = bo+b1 (mt-mt\*) +b2 (yt-yt\*) +b3(rt-rt\*)+u

bo	b1 (mt-mt*)	b2 (yt-yt*)	b3(rt-rt*)	T value
508.820(6.152)*	1.751e-02(.179)	1.712e-02(.315)	-16.475(-1.578)	

R = .573 R2 = .328 adjustedR2 = .248  
F value = 4.076\*

2.) OLS  
(Log P- Log P\*) = bo+b1 (Lm -Lm\*) + b2 (Ly -Ly\*) +b3 (lr-Lr\*)+ui

bo	b1 (Lm -Lm*)	b2 (Ly -Ly*)	b3 (lr-Lr*)
(Log P- Log P*) t value = -1.825(-3.039)*	-2.573(-3.808)*		
1.747(1.881)	-.405(-2.427)		

R = .768 R2 = .59 adjustedR2 = .541  
Fvalue = 12.012\*

3.) OLS  
Log FXR = bo+b1 (Lm -Lm\*) + b2 (L4 -L4\*) +b3 (lr-Lr\*)+ui

bo	b1(Lm -Lm*)	b2 (Ly -Ly*)	b3 (lr-Lr*)
L FXR			
t value	2.468(6.779)*	3.180(7.763)*	-3.510
(-6.236)*	.441(4.362)*		
R = .909	R2 = .826		
adjustedR2 = .805	F-value = 39.629*		

Note: t\* = Indicate the statistically significant at 5% level a Significance  
F\* = Indicate the statistically significant at 5% level a significance

In table 1.12 show the result of flexible monetary theory. In equation 1 show the Negative coefficient of subtract of rate of Interest Domestic country and rate of Interest of foreign country. It is Negatively related with (P-P\*). T value are not statistically significant; but F value is statistically significant at 5% level.

the equation - 2 show that Intercept ,log of money supply and log of rate of Interest are Negative related with (Log P- Log P\*). T value is not statistically significant; but F value 12.012 is significant at 5% level. Where as the log level of money supply of domestic and foreign is statistically significant at 5% level.

The equations -3 show that the money supply, Income and rate of Interest seem to determine the FXR. In India revealed by the value of  $\beta_0$  coefficient is (2.468),  $\beta_1$  (lm-lm\*) coefficient is (3.180),  $\beta_2$  (ly-ly\*) coefficient is (-3.510) and  $\beta_3$  (lr-lr\*) coefficient is (.441) and there t-test value is  $\beta_0$  (6.779)\*,  $\beta_1$  (7.763)\*,  $\beta_2$  (-6.236)\* and  $\beta_3$  (4.362)\* these value of t-statistics is statistically significant at 5% level of significance. The coefficient of R2 is very high and F value is (39.62)\* income (Log Y- Log Y\*) coefficient is Negative and it is Negatively related with Log FXR; But t value of all variable is Statistically significant and F value of all variable is 39.629 which is Significant at 5% level. R value is .90% and R2 value is .82%.This shows the Better goodness of fit of this model. Log value of Money supply and rate of interest is positively related with log value of FXR.

SECTION-V  
CONCLUSIONS & POLICY IMPLICATIONS:

Conclusion

The important conclusions emerging from our study are The Historical perspective of foreign exchange Rate determination in India concludes that the Par value system of Exchange Rate was fixed at 4.15 grains in terms of gold with the pound sterling as the intervention- currency under the time period 1947-1971 in India. In 1998 foreign exchange management ACT (FEMA) was enacted which takes into account improved economic liberalization and improved foreign exchange Reserve position during the period (1980-2011). Indian exchange Rate policy has seen a "gradual shift" from a par value system to basket-peg exchange rate system; and further to a managed floating exchange rate system in India.

The exchange rate in Indian has not been fully floating until the financial year 1992-93 the R.B.I. intervened the exchange rate market by selling U.S. dollar in the spot and forward

markets.

The results based on six models of estimation show that all explanatory variables affect the foreign exchange Rate determination. Prominent among these variables are: exports, imports, rate of interest, money supply, GDP in the determination of foreign exchange rate. The first model explains the effects of exports and imports on foreign exchange rate during the whole time period 1980-2011. The equations have shown a positive relation between exports and imports with foreign exchange rate. The contribution of imports seems to be weak in the determination of exchange rate. In the second model described by table (1.2), (1.3) which we have taken separately exports and imports in the equations. In India's exports and imports which might have increased the share of other currency in the basket of currency through which Indian exchange Rate is being determined since 2000-2011.

The third model explains by table (1.4),(1.5). The third model explains the correlation matrix of foreign exchange rate determination in India including all economic and monetary variables. Some of these variables are highly correlated with Foreign exchange Rate (FXR) such as- Exports(EX), Imports (IM), Foreign Exchange Reserve (FXRe), Money supply (M1, M2, M3, M4), Gross domestic Product of Factor Cost (GDP (FC)), Gross Domestic Capital formation (GDCF), Gross Domestic Saving (GDS), Gross National Product of Factor Cost (GNP (FC)), Gold, Reserve Money (RM), Net National Product at factor cost (NNP (FC)). Out of these variables, only five variables are statistically significant at 5% level of significance. These t-tests and F-values are also significant. These variables are foreign exchange reserves including the SDR'S and gold, gross domestic Product of Factor Cost [GDP (FC)], Gross Domestic Capital formation [GDCF], Gross Domestic Saving [GDS], and Gold. The Foreign Exchange Reserve [FXRe], Gross Domestic Capital formation [GDCF] and Gross Domestic Saving [GDS] are negatively related with FXR; and Gross domestic Product of Factor Cost [GDP at (FC)] and Gold are positively related with FXR. During the whole time period under study i.e. 1980-2011.

The fourth model explains by table 1.9(a),1.9(b) the condition of stationary and Non-stationary with the help of unit Root test. Unit Root- Test apply on PPP and Monetary Model. It is generally found that exchange Rate are Non-Stationary under a system of fully floating exchange rate and normal inflationary condition. The random walk Model Provides that best forecasts in the short Run But in the long Run its path is determined by economic fundamentals. It is further revealed in the literature that the forecasting power of the Random walk model can be improved by Including a lagged dependent variable as an explanatory variables

In the present study, two models are tested with annual data. These models are Purchasing Power Parity (PPP) and Flexible price monetary Model (FPMM). During the study the Annual data from 1980-2011 have been taken. When, we estimate the annual data under the study with the help of PPP model. The results show that FXR are determined by the Ratio of Domestic price level and foreign price level. The coefficient of Ratio  $p/p^*$  have negative sign which is statistically significant at 5% level. This shows that depreciation of rupee

Vis-A-Vis US \$. It has been due to the declining PPP of Indian Rupee.

The result arrived with the help of annual data present a clear picture of Exchange Rate determination in India under the period of the study. This implies that PPP theory holds in India in the long run

When we estimate the annual data with flexible monetary model during the period under the study; the results show that FXR is determined by the difference between Money supply ( $m-m^*$ ), rate of Interest ( $r-r^*$ ), Income ( $y-y^*$ ) and Price ( $p-p^*$ ) of domestic and foreign country (such as Indian and USA). In the FPPM we also take double log transformation on both sides of the equation. We estimate the Annual data in FPPM, in this model money supply and rate of interest are positively related with FXR But income is negatively related with FXR. All these variables are statistically significant at 5% level of significance. Money supply is related to FXR with negative sign due to R.B.I. intervention in the money market by buying U.S.D. and selling rupee in order to bring liquidity back in the system. R.B.I. lost control of Money Supply. Because it is endogenously determined. It is also likely that there may be financial shocks that affect the demand for USD during the period 1990-2000.

The PPP and FPPM models provide the best fit of exchange rate determination in India during the period 1980-2011. The monetary model traces moments in the foreign exchange rate (FXR) by examining the monetary variables with the critical assumption that FPPM is maintained between countries and the appreciation of Rupee is related to monetary variables such as money supply, rate of interest, income (GDP at (FC))

#### POLICY IMPLICATIONS:-

The study of foreign exchange Rate determination in case of India reveals some important policy implications. The policy implications for India should relate to the exchange Rate Regime and the determination of Exchange Rate. The results of the analysis show the effects of all variables of economic and Monetary on foreign exchange Rate determination.

Empirical evidence indicates that there is a strong correlation between an exchange Rate Policy and its implications on the whole financial Market. An exchange Rate policy should take into account main consideration. This research has produced results relevant to future research on the foreign Exchange determination and its associated regime particularly for developing countries such as India, where there are significant levels of market distortions that affect the Supply and Demand in the currency Market.

The study of foreign exchange Rate determination in India reveals some important policy implications for India should relate to the exchange Rate Regime and the determination of Exchange Rate. The study shows that the effects of economic and Monetary variables on foreign exchange Rate determination. These are significant in case the impact of all these variables on Foreign Exchange Rate determination with over the whole time period 1980-2011. The above Regression Results clearly indicate that Export, Import, Foreign exchange Reserve, Gold M1, M2, M3, M4, Reserve money, Gross National Product at factor cost, NNPF, GDPFC, GDS, GDCF, overall

Balance, NEER-6 REER6 these variable are closely related to India's Foreign Exchange Rate determination; and these have a Significant impact on FXR. The regression coefficient B is Statistically Significant which implies that these variables play a significant role in foreign Exchange Rate determination, Therefore, the policy makers take into account these variables while framing a exchange rate policy/economic policy

The study reveals that a stable exchange Rate may be maintained in the market. For this situation Necessary for the macro economic stability of the economy. The experience in foreign exchange management in the post reforms years the policy of maintain the flexibility of the exchange Rate in avoidance with market forces of Demand and Supply without undue volatility as adopted by the RBI, has stood the test of time in case of India. Exchange Rate Management policy of the RBI supported with sterilization Intervention in the face of Heavy capital inflows in the recent year also considerably served to the bias in current account besides limiting undue volatility in the exchange Rate. For ensuring Economic Stability, we have to remove the temporary shocks, increase capital mobility and control the Inflation in the economy. The exchange Rate Policy should also facilitate the convertibility of Rupee in the Market. Any economic enterprise or person should be able to convert their holdings of Rupee into any foreign currencies

The result arrived with the help of annual data present a clear picture of Exchange Rate determination in India under the period of the study. This implies that PPP theory in India in the long run.

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