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REAL EXCHANGE RATE STABILISATION AND MANAGED FLOATING: EXCHANGE RATE POLICY IN INDIA, 1993-99

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Foreword

The role of exchange rate and monetary policies has undergone a qualitative change since 1993, underscoring the need for fresh academic enquiries on these issues. This study, part of the larger project at ICRIER on Capital Account Convertibility and Macroeconomic Management, is an attempt to address this gap. It examines the exchange rate management strategy of the Reserve Bank of India after the floating of the rupee in 1993. A policy reaction function is modelled to test for central bank response to contemporary exchange rate movements and its deviation from purchasing power parity. The impact of exchange rate changes upon foreign exchange reserves is thereafter traced within a vector auto-regression framework.

The study finds empirical support for a significant intervention response to contemporary changes in the nominal rupee-dollar spot rate and its deviation from relative Indo-US prices. The results suggest that the central bank stabilised the real exchange rate during 1993-99 along with moderating market pressures upon the exchange rate.

I hope that the empirical analysis in this study will help throw some light on the exchange rate policy in India and contribute to a larger understanding of its links with monetary policy in the evolving financial sector environment.

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Appendix I

Monetary Measures used by RBI to Counter Exchange Rate Movements: 1994-98

	Cash Reserve/Statutory Liquidity Ratio Changes	Interest Rate changes	Other Direct Measures
Oct. 1995	Increases in NRER, NR(NR)RD a/cs over their outstanding levels on Oct. 27, 1995 exempted from CRR requirements.	Rise in interest rate on NRER deposits; interest surcharge on import finance; reduction in interest rate concessions on export finance between 3-6 months	
Jan-Feb 1996	CRR requirements for all FCNR (B) and NR(NR) Deposits relaxed; average CRR on NRER liabilities reduced from 14 to 12 per cent.	Interest rate surcharge on import finance raised from 15 to 25 per cent; interest rates on post-shipment export credit freed to expedite exports payments into the country.	
Apr 1996	NRER deposits exempted from CRR requirements; SLR on NRER reduced from 30 to 25 %.	Interest rates on NRER term deposits over two years freed.	
Nov-Dec 1997	CRR increased by 0.5 %; incremental CRR of 10 % on NR(E)RA and NR(NR) removed;	Interest rate on post-shipment export credit increased from 13 to 15 %; interest rate on fixed rate repos increased by 0.5 %;	
Jan. 1998	Bank rate raised from 9 to 11 %; CRR raised from 10 to 10.5 %; general refinance limit reduced from 1 to 0.25 % of fortnightly average outstanding aggregate deposits; export refinance limit reduced from 100 to 50 % of the increase in outstanding export credit eligible for such refinance over the level of such credit as on Jan 16, 1996;	Interest rate on fixed rate repos increased from 7 to 9 %;	Banks barred from offering forward contracts based on past performance; declaration of exposure suspended;
June 1998		Lowering of interest rate on export credit on 'incremental exports' over the base year level of exports in 1997-98;	Merchants advised to monitor credit utilisation to meet genuine foreign exchange demand but not unanticipated import requirements beyond a reasonable period to discourage inventory build-up; domestic financial intermediaries to buy back their won debt or other Indian paper from the international market; Banks acting on behalf of FIIs allowed to but foreign exchange directly from the RBI at the prevailing market rate.
Aug 1998	CRR maintained by banks raised from 10 to 11 %; CRR – cash reserve ratio; NRER, NR(NR)RD, FCNR(B) etc. –various categories of Non-resident accounts ADs – authorised dealers	Interest rate on fixed rate repos hiked from 5 to 8 %;	ADs allowed to offer forward cover directly to FIIs upto 15 % of their investment as on June 11, 1998; rebooking of cancelled import contracts forbidden; facility for splitting forward and spot leg for a commitment withdrawn; extension of time limit for realisation of export payments allowed only in exceptional circumstances; ADs advised to report their peak intra-day positions.

Appendix II

Two-stage least squares estimation

Estimates of equations 1-3 in Table 5 were obtained using 2SLS with LIBOR, redemption yield rate on government securities (Indian), the money market rate (Indian), industrial production index (India and US) serving as first-stage instruments for the endogenous nominal exchange rate. Plots of the autocorrelation and partial autocorrelation functions of the residuals, together with the Ljung-Box Q-statistics were used to test for the presence of significant serial correlation. All equations showed a significant low-order autoregressive error process. The data was then transformed to correct for AR (1) error process in all three equations. The equations were found to have no significant serial correlation once the data had been transformed

VAR estimation

The ADF regressions assumed a random walk process with a drift and a deterministic time trend. Specification tests for order of the VAR suggested a VAR (16, 11, 16) process for the three respective specifications. Tests for the presence of an intercept term in the data generating process of all models showed an insignificant c^2 test statistic, justifying the presence of an intercept in the cointegrating vector. Testing for a long-run equilibrium relationship, i.e. cointegration, amongst the I (1) variables was done using the econometric methodology due to Johansen and Juselius (1990). Table 3 presents the results of the cointegration analysis along with the trace statistic (l_{trace}) for these three models.

Table 1
Cointegration Analysis of models 1-3

		Model 1(F_t, S_t)	**Model 2**($F_t, , S^*$)	**Model 3**($F_t, , S^{*93}$)
H_0	H_1	l_{trace}	l_{trace}	l_{trace}
R=0	r>0	16.65*	49.44	35.65
R=1	r>1	0.18	20.80	20.04
R=2	r>2	-	4.96	6.65

*** and * indicate significance at 1 and 5 per cent levels respectively.*

The results indicate that the hypothesis of one cointegrating rank of the matrix is accepted (r>1 rejected) at the 1 per cent level, but r=0 is clearly rejected, leading to the conclusion of one cointegrating vector in a stationary VAR process of models 1 and 3. For model 3, the hypothesis of r=1 and r>2 is rejected at one per cent level of significance, pointing to the existence of two cointegrating vectors in the data generating process. The maximum likelihood estimation of the cointegrated system was done in the next stage in an error correction model

(ECM) format. The long-run relationship was imposed as a restriction upon the VAR, so that the system was just identified.

PPP Tests

PPP was tested using monthly data for 1993:03-99:12, choosing the United States as the base country. Absolute purchasing power parity requires that the exchange rate equalise the price level in the two countries. Table 2 presents the results of tests for absolute purchasing power parity.

Table 2
Tests for Absolute PPP

$s_t = b\left(p_t - p_t^*\right) + u_t$

Series	CointegratingVector	CPI	WPI	WPI/CPI	Adjustment Coefficient
S	Yes	-0.478 (0.043)			-0.203 (0.087)
S	Yes		1.048* (0.370)		0.016 (0.092)
S	Yes*			1.662* (0.518)	-0-009 (0.105)

*All variables are in logarithms. Figures in parentheses are standard errors. * indicates significance at 1%.*

Column 2 of the table reports that the null of no cointegration is rejected significantly in all the cases confirming an equilibrium relationship between the price of foreign exchange and the foreign and domestic price levels, i.e. PPP holds in the long run. The estimated long-run equilibrium relationships, which test for absolute PPP, are reported in the next three columns. PPP requires that the coefficient on $b = 1$. The value of the coefficient with respect to the ratio of wholesale prices validates PPP for the 1993-99 period. Consistent with empirical evidence on PPP from numerous other studies, the results are sensitive to choice of price index. When the log of nominal spot rate is regressed on the relative ratios of wholesale/consumer price levels in India and US respectively, we find a positive and statistically significant exchange rate response to this variable. The ratio of wholesale to consumer price levels proxies for the hypothesis that only the prices of tradable goods should be equalised across the two countries The magnitude of the coefficient on this price variable exceeds its predicted value of unity though. The data thus provides support for the hypothesis that parity with foreign price level holds for a more aggregate class of goods and to a large extent, for tradable goods.