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Abstract

The paper analyzes the changing INR trends over the reform period, in the context of fundamental determinants of exchange rates. In the early reform years the chief concern was to limit appreciation from inflows, and from higher domestic inflation, given the trade deficit. So short-term nominal depreciation maintained a long-term real fix. But with two-way nominal variation, more objectives can be accommodated. We ask how the exchange rate contributed to three possible policy objectives—maintaining a real competitive exchange rate, neutralizing inflationary oil shocks, deepening foreign exchange markets and encouraging hedging. Depreciation allowed just before oil prices crashed compromised the second objective. Inadequate commitment to two-way movement, prior to the crisis, induced firms to take large currency exposures based on expected appreciation. After the crisis, capital flows were allowed to drive the exchange rate, aggravating inflation and acting against macro stabilization. Markets need some guidance to achieve policy objectives.

Keywords:

Exchange rate regimes, stabilization, inflation, markets, capital flows, hedging

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Evolution of India's exchange rate regime

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I. Introduction

There has been considerable evolution in India's exchange rate regime over the reform years[1]. The shift has been from a nominal fix to one-way nominal movement over the nineties to two-way with low volatility implying a tightly managed exchange rate, to greater volatility and nominal movement after the global crisis.

The paper infers the exchange rate regime and the Government's objectives from changing INR trends and volatility over the reform period, in the context of the fundamental determinants of exchange rates. Concerns to prevent appreciation given a trade deficit, large but volatile inflows, and higher Indian inflation led to reserve accumulation, a tendency for nominal depreciation, and relative constancy of the real exchange rate around the real effective exchange rate (REER) established after the double devaluation in the early nineties. A watershed was the reversal of trend nominal depreciation in 2003. Then the beginnings of two-way movement in the managed float, even while large foreign exchange reserves were accumulated. The latter helped reduce risk perceptions and outflows in the period of the global crisis. Outflows did occur although they were quickly reversed. With less intervention, probably due to a precautionary motive to conserve reserves in a time of great uncertainty, there was much more nominal and real exchange rate volatility.

As the RBI Governor during the early reform years, and as a key member of committees that set the reform agenda even before that, Dr. Rangarajan was one of the architects of India's exchange rate policy, as he was of many other aspects of Indian macroeconomic policy. A large part of the international praise for India's calibrated opening and relatively smooth navigation of two major international crises must go to him. The opening of the economy was a period of great learning, for Indian macroeconomists, as key macroeconomic variables began to behave differently.

[1] This article draws on and updates Goyal (2004, 2010a,b).

Scattered quotes from Rangarajan and Prasad (2008) illustrate his deep understanding of the new issues:

"With an open economy and large capital inflows, management of the exchange rate becomes an independent concern. The domestic currency can begin to appreciate (because of nominal appreciation) even with domestic price stability, if there are large capital inflows….Studies suggest that exchange rates are more volatile than can be explained by the macroeconomic fundamentals and moreover this excess volatility has in some cases inhibited international trade ….Arguments in favour of a nominal appreciation of the currency are two-fold. An appreciation will help in the management of inflation and to that extent reduce the burden on policy makers to increase interest rate or tighten fiscal policy to dampen inflationary pressures. An appreciation could help choke off some of the inflows to the extent it fosters two-way rather than one-way bets in the exchange rate, and hence introduces an element of uncertainty in the market…In general, the appropriate response depends on the assessment of whether the inflows will persist. However, in actual practice, it is difficult to assess whether inflows will persist, since it depends not only on domestic fundamentals but also on global developments. The second policy option is to intervene to resist the exchange rate appreciation…. Real exchange rate appreciation through inflation is less desirable than nominal exchange rate appreciation. …..Managed exchange rate system offers an attractive "middle way" between the polar choices of fixed and free floating exchange rates. The element of fixity helps avoid the volatility that might otherwise arise from cyclical and other reversible fluctuations in the current account position. And the safety valve of parity adjustments allows unsustainable disequilibria to be corrected without painful domestic deflation or inflation. Thus, instead of arguing for the exclusive use of any one of the instruments, there must be a judicious mix of all of the three instruments."

This paper tries to make precise that judicious mix, argues that increasing sophistication of markets and policy makes it possible to achieve more objectives through exchange rate policy, but Indian policy has yet to do so. Theory suggests (Corden, 2002) exchange rate regimes can aid three policy objectives: encouraging exports and contributing to macroeconomic stabilization; neutralizing inflationary commodity shocks; deepening foreign exchange markets and reducing risk taking. We

examine the contribution of the Indian regime to each of these objectives. Depreciation allowed just before oil prices crashed in 2008 compromised the second objective. Similarly, in 2010, depreciation due to outflows after the Greek government debt scare added to already acute inflationary pressures. After the global crisis, since inflows were just sufficient to cover the current account deficit, intervention was minimal. The capital flows that drove the exchange rate aggravated inflation and acting against macrostabilization. Inadequate commitment to two-way movement, prior to the crisis, induced firms to take large currency exposures based on expected appreciation. Some intervention and market guidance is required to achieve more objectives.

The structure of the paper is as follows: Section 2 presents trends in India's exchange rate; section 3 discusses the fundamental determinants of exchange rates; section 4 analyzes the policy stance towards the exchange rate. The effect of the exchange rate on inflation is taken up in section 5, and on risk taking in section 6. Section 7 pulls together implications for exchange rate regimes, before section 8 concludes with current challenges.

II. Trends

After the excitement of the double depreciation associated with the reforms, the next turning point in the summer of 2003 was the definitive reversal of the long trend of depreciation through the nineties. Figure 1 shows the consistent negative signs denoting rupee depreciation, all through the nineties. It also shows a reversal beginning in 2002, the possibility of two-way movement due to mild depreciation within sustained trend appreciation, sharp appreciation in 2007 and an even sharper depreciation in the next crisis year, followed by volatility (Table 1).

Figure 1 gives yearly changes. But reversals can occur within a year while a one-way trend continues. Such reversals were common after 2004. Table 1 uses the highest and lowest daily exchange rate within a month to calculate the percentage change between the highest and the lowest exchange rate within a year, and its standard deviation.

Figure 1: Depreciation (-) or appreciation (+) end December values

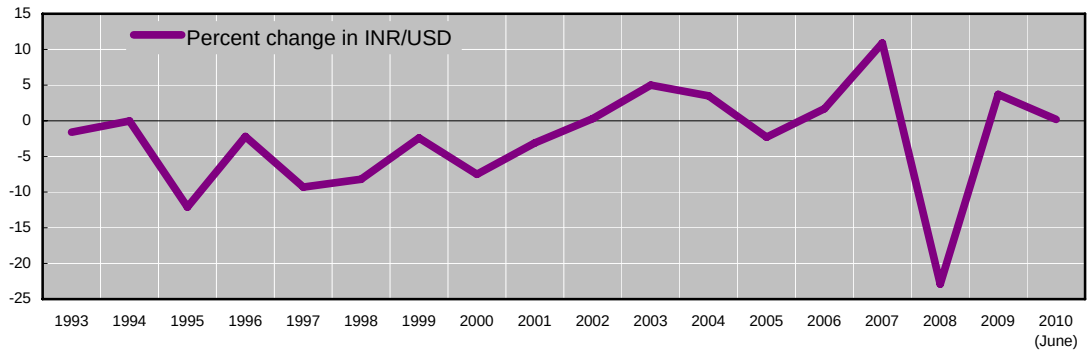

Table 1: Yearly volatility of the exchange rate

Years	Monthly high-low % change	Standard Deviation
1993	0.9	0.2
1994	0.2	0.05
1995	12.2	2.7
1996	11.6	2.8
1997	11.3	2.9
1998	11.6	3.2
1999	2.8	0.9
2000	7.8	2.4
2001	4.3	1.4
2002	2.3	0.8
2003	5.3	1.7
2004	6.9	2.1
Feb-June05	1.3	0.4
2005	6.9	2.1
2006	6.6	2.1
Feb-March06	1.3	0.4
2007	12.8	3. 6
2008	26.5	7.4
2009	9.6	3.2
2010 (June)	4.9	1.5
Nov09- April10	1.9	0.6

Source: calculated with data from www.rbi.org.in

Table 1 suggests that intrinsic volatility in Indian FX markets has increased from the very low levels in the fixed exchange rate regime immediately after the nineties reforms. The earlier episodes of volatility had been associated with depreciation; in

2003 for the first time volatility accompanied appreciation. But periods of high volatility tend to be associated with external shocks such as the East Asian crisis (1995-98), the dot com bust and dollar decline in the new century, and the sub-prime and global economic crisis since 2007.

In between there were large stretches of time with low volatility. The standard deviation of the exchange rate was only 0.4 over many months in 2005 and 2006. It was just 0.6 even during the calm after the peak global crisis, and before the Greek debt crisis again led to a flight to safety on the part of foreign portfolio flows. But movements are due to shifts in foreign capital, and changes in the dollar value, not to discovery of fundamental value in domestic markets. Even so there was steady deepening of domestic foreign exchange (FX) markets, albeit from very low levels. The average daily turnover in Indian FX markets grew at the fastest rate of growth among world markets from about USD 3.0 billion in 2001 to USD $34 billion in 2007 (BIS, 2007).

Table 2: Comparing volatilities during two external crises

Year	FPI (USDb)	CMR	Change in reserves (- increase) (USDb)	Rate of Growth (GDP)
1994-95	3.8	15.32	-4.6	6.4
1995-96	2.8	34.83	2.9	7.3
1998-99	-0.1	10.04	-3.8	6.7
2007-08	29.4	8.33	-92.2	9.0
2008-09	-13.9	10.62	20.1	6.7

Deepening helped the economy absorb much larger movements in capital and in reserves during the global crisis compared to the East Asian crisis with continued positive growth rates (Table 2). The interest defense used periodically over 1996-2001 kept growth low. Growth recovered as interest rates fell after that. But a steep rise in policy rates occurred in response to inflation induced by the 2008 international peak in food and oil prices. Industrial output, which had been softening, crashed. A different combination of interest and exchange rate changes could have reduced output loss. In 2010 the interest rate defense was not used—more exchange rate flexibility was accepted. Growth loss was lower, but inflation remained high.

Until 2008 nominal changes kept the real effective exchange rate (REER) more or less constant. But the guiding hand behind markets seems to have become weaker in the past two years. Swings in nominal and real exchange rates have exceeded ten percent. If earlier the exchange rate was fixed now there seemed to be a reluctance to let reserves fall below levels achieved after peak inflows in 2007. Exchange rate policy was still not optimal.

The exchange rate affects the growing set of people with some foreign transactions. There are others whose sentiments it affects. There is scope for conflict because what benefits the one can harm the other. Each brings a different perspective to bear on what the value of the rupee should be. The exporter gains from a rupee depreciation, at the cost of the importer and the consumer. There are nationalists who want the rupee to be strong irrespective of the economic costs of overvaluation. After the global crisis developed countries are keen to export their way out of recession and want their currencies to appreciate against emerging market currencies. There is talk of currency wars. Are there objective determinants of a currency to settle these debates?

III. What determines a currency value?

Since the nominal exchange rate is the price of money, fundamental determinants are relative money supplies, prices, output, and interest rates. More broadly they are all factors affecting the demand and supply of foreign exchange now and in the future. But research shows the random walk to outperform all fundamental based short-term forecasts of a full float. If no systemic factors or past variables affect it, it should not be possible to predict a currency value. But market participants still make short-term forecasts based on news and on spotting trends and patterns.

Over the longer term the real equilibrium rate is determined by macroeconomic fundamentals including relative productivity and real wages. Although in the short-term market perceptions and policy can affect the exchange rate, long-term departures from equilibrium levels cannot be sustained. But uncertainty surrounds this

equilibrium level, especially in a rapidly developing country. Major ways in which the forex market is not like any other limit price discovery.

First is the role of the Central Bank (CB). Market players are not equal. The Central Bank has more information and ammunition than any other market participant. Therefore its policy with respect to the exchange rate, including intervention and communication, affects outcomes. When the economic environment is changing so there is learning communication makes monetary policy more effective either by creating news, or by reducing noise. Conventional wisdom in CB circles has changed from saying as little as possible to the importance and the art of managing market expectations. The empirical literature studying CB communication has grown rapidly[2]. Since uncertainties are pervasive in emerging markets, communication should have a larger effect there. Uncertainty surrounding equilibrium values means market participants can follow each other in unstoppable one-way movements. If I believe you are going to sell the rupee I will also want to sell it before it depreciates. This is herd behaviour.

In1997 the *Financial Times* had organised a contest designed by behavioural theorists. Contestants had to choose a whole number between 0 and 100. The winner would be the one whose entry was closest to two-thirds of the average entry. Two-thirds of this range is 20, and reasoning to get two-thirds of this would give 14; but reasoning that others would be thinking like this should lead to successively lower numbers and the rational winning entry should be 1. But the winning choice was 13, implying that the winner had to factor in that people make mistakes in reasoning, and had to have a sense of the errors that they make. In FX markets, in times of trouble, market participants are not thinking about what the correct value of the exchange rate is; but are worrying about guessing correctly what other people think it is. X needs to know not only what Y thinks, and the mistakes he makes, but also what Y is thinking about X's thinking process.

In such situations where fundamentals are not strong, or some shocks have occurred, market participants are nervous and trying to guess what the other is going to do,

[2] Blinder et. al. (2008) offer a survey of concepts and tests. Goyal and Arora (2010) show empirically that CB communication has a large potential in India but was not used optimally.

credible public announcements from the Central Banks can help to focus expectations. The RBI used these effectively during excess market volatility after the 2004 election results, but in general chooses to say as little as possible about the exchange rate. It underutilizes the communication channel. Making public announcements sometimes does not preclude secret interventions in circumstances when those might be more productive.

The CB has a healthy respect for the market because of the sheer volume of forex transactions, and the size of resources individual transactors command. A CB's reserves can be wiped out in minutes if it tries to defend a particular value of the exchange rate against market perceptions. So the Central Bank watches the market and the market watches the Central Bank in a guessing game. Each wants to know what the other thinks. Communication is safer if it reduces uncertainty and guides markets in the direction of fundamentals when markets tend to deviate.

In India the Reserve Bank has the added advantage over the market of the absence of full capital account convertibility. There are quantitative restrictions of various kinds on the FX exposures allowed to different kinds of transactors, which give it additional levers of control. These can be implemented with minimum rise in transaction costs, in an age of information and detailed electronic trails. Focused market friendly controls are also gaining more acceptability after the global crisis and excessive capital movements that followed. The second advantage is the large stock of reserves it has built up, so that its market interventions command respect.

All this clout implies that the policy stance has a large impact on the Indian exchange rate. So what is the Reserve Bank's exchange rate policy?

IV. Policy stance

There is a gap, which has been closing, between what the Reserve Bank of India (RBI) says and what it does. After the reforms and devaluation of the early nineties the nominal exchange rate was kept more or less fixed; but the RBI would say it was a market determined rate even as it kept buying FX to keep the Rupee from appreciating as foreign inflows began to flood in. After the volatility in the mid-nineties, the story was it was intervening in order to lower volatility in the market

while the level of the exchange rate was market determined. Only in 2004 did the Policy Statement declare officially that India had a managed float.

The RBI had largely sterilized domestic liquidity created through reserve accumulation by selling government bonds or raising CRR. Its standard response to periods of exchange rate volatility, following the East Asian crisis, was to raise short-term interest rates. This prevented the smooth lowering of the domestic interest rate structure. Only after February 2001, when the Bank Rate was steadily brought down from 7.5 percent, there were no disturbances in the exchange rate, and the nominal interest rates fell smoothly, did the industrial revival occur. Foreign inflows flooded in and reserves rose to more than 200 billion dollars. The monetary sterilization scheme (MSS) was launched, with a special category of Government bonds, to make continued sterilization possible. As inflows dried up in 2008, unwinding these sterilization balances helped accommodate increased government spending under the macroeconomic stimulus.

Indian exchange rate management earned high praise for avoiding the fallout from global crises and managing the pressures of gradually opening the economy without major trauma. But macroeconomic policy was not able to prevent volatility in growth and episodes of high inflation. For example, the industrial slowdown of the late nineties continued longer than it should have. Domestic policy prior to the global crash aggravated the contraction in 2010. Could something have been done differently?

If it is possible to avoid using the interest rate to smooth the exchange rate, the interest rate can instead be aligned to the requirements of the domestic macroeconomic cycle. In a trade off between nominal exchange and interest rate volatility, some positive but controlled exchange rate volatility allows a smoother interest rate.

Table 3: Percentage variation in average annual exchange rates (weights exports to 36 countries, 1993-94=100, appreciation +)

Year	REER	NEER
1994	3.5	-0.3
1995	-1.0	-5.9
1996	-4.9	-5.6
1997	5.2	4.0
1998	-6.1	-1.6
1999	-1.6	0.4
2000	3.4	-0
2001	0.8	-1.5
2002	-2.5	-1.9
2003	1.8	0.1
2004	0.1	0.2
2005	2.2	3.3
2006	-2.9	-3
2007	5.9 (103.2)	6.8
2008	-5.4 (97.7)	-6.6
2009 (P)	-8 (89.9)	-7.4
2010 (P)	11 (99.8)	5.53

Source: www.rbi.org.in
Note: P: provisional

The trend movement over the nineties was one way, as policy makers corrected for India's higher inflation. The successful East Asian and Chinese growth strategy demonstrated that a competitive exchange rate was important for export growth. This ruled out sustained appreciation as a means of absorbing foreign exchange reserves through cheapening and encouraging imports. It is also the correct long-term strategy as long as the trade deficit is large, and low real wages limit real exchange rate appreciation.

The real effective exchange rate (REER) gives weights according to major trading partners and corrects for relative inflation. Table 3 shows the movements in the REER, while the nominal effective exchange rate (NEER) largely depreciated since our inflation rates were higher than those of our trading partners.

Table 3 shows larger fluctuations in both REER and NEER in the past few years. This need not signal a reversal of the export promotion policy. First, the appreciation was

not large enough to imply an appreciation over the 1993-94 base year; second it was short-term: in 2007-08 the index reached 103.2, but this was reversed by the steep depreciation over 2008-09, only to be followed by a steep appreciation again as outflows reversed. Even so, in June 2010 the index was only 101.8; third insofar as productivity improvements were taking place in Indian industry and in exports some appreciation could occur without making exports costlier.

Export growth remained impressive in double digits despite rupee fluctuations. Even companies like Infosys and Wipro, whose exports are largely invoiced in the dollar, did well in periods of appreciation. Export growth fell steeply with the credit squeeze after the Lehman crash but recovered towards the latter half of 2009.

But just exchange rate flexibility is not enough. It has to be used effectively. Two-way movement makes it possible to achieve another objective of exchange rate policy: inflation control.

V. Inflation

An appreciation is an antidote to temporary commodity price shocks coming from food, oil and other intermediate inputs, for which pass through of border prices is high. An appreciation, under high inflation, is in line with the stabilization stance of raising interest rates, but helps to reduce inflation with a lower rise in interest rates. To the extent nominal exchange rate changes reduce inflation, sharp peaks in interest rates can be avoided. A more flexible exchange rate supports a countercyclical interest rate. An appreciation reduces export demand but reduced intermediate import prices support domestic demand and supply. Also non-price factors are important for exports. So if there is a conflict, the inflation effect of the nominal exchange rate can be given precedence over its demand effect. Thus multiple policy instruments can be aligned to give markets a clear signal on the stance.

After outflows began during the global crisis, the RBI has been intervening less, letting capital flows affect the exchange rate. But the resulting changes in the exchange rate were often opposite to what was required for macro stabilization. Figure 2 shows monthly changes in WPI, CPI, and the exchange rate. In 2007 an appreciating exchange rate helped keep inflation low although oil and food prices

were firming up internationally. An unprecedented 10 percent appreciation, largely over March-May 2007, helped stabilize inflation, which had risen over 6 percent in January 2007, to 4.5 percent by June.

International food prices rose steeply in 2006-07 (12.5 percent) and 2007-08 (45.28 percent). Crude oil prices had been rising since 2002, but the rise was particularly sharp over 2007-08—from an average value of $ 67.93 per barrel in 2007 to a peak of $147 on July 11, 2008. Administered prices kept Indian commodity inflation much lower, but given the magnitude of shocks, Indian steel, food and non-administered fuel prices were raised and drove a sharp jump in WPI inflation to 7.3 percent in March 2008. But outflows began just as cost shocks rose sharply. The exchange rate had been stable at around 40 all this time, but it depreciated to 42 in May. The government raised the prices of four administered fuel categories on June 4. Another sharp jump in the WPI index between May and June followed; annual inflation rates crossed 12 percent.

The depreciation in May contributed to the WPI peak in August. The supply shocks turned out to be temporary, as oil prices crashed in September, so avoiding depreciation could have softened inflation. Instead policy rates were raised sharply to control inflation. Industrial growth collapsed.

Despite the negative WPI due to the slump in world oil prices outflows and depreciation contributed to high CPI inflation. The exchange rate fluctuated, reached its lowest level, falling below 51 in March 2009, and began sustained appreciation after that as inflows revived with Indian growth. The appreciation countered the macroeconomic stimulus, occurring much before export growth recovered, and also before Industry began to show good growth in June 2009. It could not reduce the CPI inflation because of the effect of failed monsoons in raising food prices, which have a large weight in the CPI. CPI finally fell in February 2010, but outflows due to the Greek crisis depreciated the exchange rate and both WPI and CPI rose again.

Figure 2: Monthly change inWPI, CPI, INR/USD

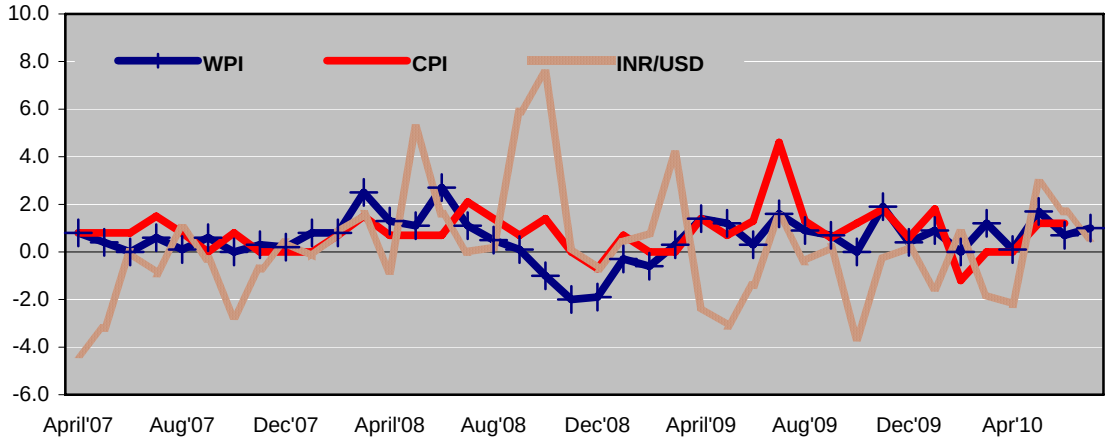

Figure 2 shows changes in the exchange rate are larger than in inflation, but depreciation tends to pull up inflation, while it is low in periods of appreciation. Since goods prices are sticky, large variations in the nominal exchange rate will not be passed through. Pass through is higher for commodities. But the contribution of the exchange rate to inflation is broader than just goods or commodity price pass through. Most important political bargaining over wages and prices is aborted. Border prices now affect vital intermediate goods and components of the food basket, the latter affect wages. The price of Washington apples determines that of Indian apples today. Shifting to winter daylight savings time in the US saves thousands of firms from having to change their working hours. Just so changing one exchange rate prevents thousands of nominal price changes that then become sticky and persist, requiring painful prolonged adjustment. If a nominal appreciation prevents inflation from setting in after a temporary supply shock, it prevents the real appreciation inflation results in.

A permanent supply shock, however, requires real adjustments. If real wage demands are higher than productivity inflation will continue, since only real appreciation can deliver higher real wages. But real appreciation reduces export competitiveness. This cannot be ignored when the trade deficit is large. So the only solution is to raise productivity.

The depreciations in May 2008 and May 2010 due to external events and a resulting flight to safety were against the needs of the Indian domestic cycle. It may have been

perceived to be difficult to further appreciate the exchange rate given FPI outflows and large dollar demand for oil imports. The commodity shocks were feared to be permanent, and depreciation diagnosed for the rising current account deficit. There may have been a fear also of continuing outflows, and a decision to secure currency reserves for such an eventuality. But the FPI outflow of about 14 billion dollars was marginal in the context of the accumulation exceeding USD 200 billion, and was soon reversed. Inflows of FDI continued to be robust. The peak in 2010 exceeded that in 2007.

A flexible exchange rate can moderate the interest rate response. It can reduce inflation. It can also decrease the likelihood of a currency crisis. This is the third major objective two-way movement of the exchange rate can achieve.

VI. Reducing risk: Hedging

The RBI had been holding the exchange rate fixed and then reacting to market volatility if it occurred. Sustained one-way movement encourages market players to speculate. That is, bet on that movement and enhance it further. After 2003 the RBI allowed homeopathic doses of volatility to develop foreign exchange (FX) markets, even while continuing to prevent excess volatility.

Excessive inflows, large FX transactions and the tendency for market participants to follow each other tend to make FX markets unstable. Limited two-way movement can contribute to stability by inducing hedging and therefore reducing the number of transactors affected by a change in the nominal exchange rate. Hedging removes the effect of currency movement in any one direction on profits by creating exposure in the opposite direction. For example, to the degree an exporter is also an importer, his loss due to rupee appreciation is reduced. Apart from informal ways of hedging risk it is possible to buy cover, using derivatives. Usually either importers or exporters cover their currency exposure; with two-way movement both would have an incentive to do so. During the period of steady depreciation only importers used to buy the FX they needed at a fixed price in the future. After 2003, as the rupee steadily appreciated, only exporters were hedging, for example, by buying rupees forward. Importers also rushed for cover when the rupee started depreciating in May 2004. There were reports that Infosys and Wipro would not be able to gain from the depreciation because of the

forward cover they had taken. The point is precisely that with hedging they can stop worrying about the impact of the rupee on their profits, and trying to make money by placing one-way bets on rupee movements. Instead they can concentrate on what they are good at—producing better and more productive software.

Earlier policy sought to limit hedging tools to entities with direct underlying foreign exchange exposures. However, since a larger set of economic agents now had foreign exchange risk there was a shift to "economic exposure" (the effect of exchange rates on a firm's value), to allow flexibility in managing FX risk. Gradual reforms followed comprehensive blueprints set by various government committees starting in 1995. As elsewhere, FX transactions are mostly over-the-counter structured by banks. The most widely used derivative instruments are the forwards and foreign exchange swaps (rupee-dollar). But because of user demand for liquid and transparent exchange traded hedging products, currency futures were started in 2008 and later extended to multiple currencies. Even so, Indian derivative trading remains a small fraction of that in other emerging markets (EMs) such as Mexico or South Korea. In futures markets intra-day trades dominate, and open interest that denotes hedging activity is low. Liquidity and robustness of volatility is far from that in the US market. Short-term instruments with maturities of less than one year dominate, and activity is concentrated among a few banks.

Even with more derivatives available, incentives from two-way movement are a prerequisite to reduce speculation. Incentives have to be created to hedge. Otherwise derivatives enable speculation by adding leverage. Just the instruments are inadequate; two-way movement gives players the correct incentives. Derivatives alone, together with the motivated advice accompanying them, actually add risk. Complex derivatives lead to poorly understood exposures. In early 2008 many companies found themselves saddled with large losses from derivative positions based on predicted movement in foreign currencies or interest rates that fell through. This was speculative betting on future rates, rather than hedging. Therefore simple instruments should be used, and exposures thoroughly understood. It is also necessary to consult experts, apart from interested parties selling the derivatives.

Moreover, the moderate two-way movement within an implicit 5 percent band seen over 2004-06 was not sufficient to overcome strong expectations of medium term

appreciation given India's high growth rate. In 2007, market expectations of the Rupee-USD rate had even reached Rs32 per dollar. Many corporates were borrowing abroad based on such expectations, subjecting themselves to currency risk. The decline to below 50 in 2008 was a reminder of the importance of hedging. About ten percent variation in the nominal exchange rate increases the risks to one-way bets. But volatility above that attracts more uninformed traders, and hurts the real sector. In deep mature markets volatility seldom is so high, but in EMs the CB has to manage volatility. Limited volatility, however, induces hedging and limits the impact of exchange rate on profits.

VII. Exchange rate regime

The Indian exchange rate regime has evolved from an extreme fix to a middle position, but is not yet a full float. The academic literature has shifted away from advocating corner regimes of a full float or tight fix for merging markets towards middling regimes. Much market development is required before a full float becomes feasible. An exchange rate regime must mature and follow a well-sequenced transition path.

The crisis demonstrated that capital flows in response to external events created perverse movements in the exchange rate. So a full float with free capital movements need not suit the domestic cycle. If capital flows out during a downturn the exchange rate depreciates increasing export demand and output; as capital flows in during an upturn the exchange rate appreciation will reduce output thus contributing to stabilization. But capital moves due to external shocks that may be totally unrelated to domestic conditions. Moreover, capital movements can be unrelated to fundamentals, sentiment driven, and excessive.

Despite considerable development, FX markets continue to be thin. So large foreign capital movements can cause excessive exchange rate fluctuations. If a central bank does not buy/sell a currency that is not freely traded internationally, sharp spikes occur.

Export competitiveness cannot be ignored when the trade deficit is large. Letting the exchange rate be driven entirely by volatile capital flows, is dangerous. Full capital

account convertibility and float at the present juncture would be fundamentally unsound.

But the exchange rate's potential to reverse their effects on inflation should be acted upon, since temporary supply shocks occur so often. In general, the exchange rate channel of monetary policy transmission has the shortest lag. Even if several policy instruments are used they can be aligned so the markets get a clear signal on the policy stance. In India convergence of CPI to WPI inflation is slow. Their differing composition implies a very different impact on each of food price and oil shocks. So engineered policy shocks to the exchange rate, can aid convergence.

The past few years have given ample evidence of the impact of the interest rate on aggregate demand. The steep rise in policy rates prior to Lehman helped cause the crash in industrial output just as the steep cut post Lehman led to an unexpectedly fast revival. Since the interest rate is effective so the exchange rate regime must support a countercyclical interest rate.

Some exchange rate flexibility deepens market and encourages hedging, but excessive change hurts the real sector. So there should be limits to exchange rate flexibility. Swings beyond a plus minus five percent invite excessive entry of uninformed traders. But below that level, speculative one-way bets on the exchange rate rise, since the risk in such bets falls. So a ten percent band is the volatility level a managed float should aim at. There are other factors that have to be kept in mind. The Rupee cannot appreciate substantially unless the Renminbi does so, since China is a major trade competitor and partner. The RBI also has to control for the US factor that can influence world macroeconomic variables.

A managed float is the best alternative in current Indian conditions, not a full float.

VIII Conclusion

The analysis can help analyze the consequences of policy choices, and suggest the course of action in the current troubled international waters. Points of RBI intervention during crisis outflows in 2008 slowed the depreciation, but it abstained from the large-scale sale of dollars that could have moderated the depreciation. Such

sale was feasible given that outflows were much lower than the huge reserves. It was an opportunity to reduce costs of carrying reserves and to reverse sterilization. In hindsight sustaining appreciation for the duration of the supply shocks would have been the correct choice since the shocks turned out to be temporary. Two-way movement should apply to reserves also—the latest level should not be seen as a threshold below, which they should not fall. Since the exchange rate channel to reduce inflation was underutilized, excessive reliance was placed on the interest rate channel, which deepened the industrial slowdown. Reducing demand is a costly and inefficient way to respond to external cost shocks.

In the post crisis exit countries are competing to gain market shares through cheapening their currencies. But a contrarian position is currently in our interest. A country that does not join a currency war will get the cheapest imports. The cost of India's ongoing investment would fall; rising international commodity prices would be offset. The current account deficit is widening, but it is also determined by the excess of investment over savings, and should fall as firms' cash balances and government revenues recover with growth.

The nominal exchange rate has limited influence on the real exchange rate, which matters for exports. High domestic inflation appreciates the real exchange rate despite a nominal depreciation. If a nominal appreciation reduces inflation it may reduce real appreciation, and abort real appreciation if it comes from an external price shock.

A short-term nominal appreciation need not harm exporters. A large percentage of exporters are naturally hedged against an appreciating rupee since they import intermediate goods. Software exporters, who do not have this advantage, actively hedge currency risk in markets.

In the longer-run, the real exchange rate must be competitive. India's 36-country real effective rate has not appreciated much compared to its level in the early nineties. But if the rise in average wages exceeds that in productivity, the level of the real exchange rate consistent with low inflation may be more appreciated. Otherwise a nominal depreciation will raise imported and domestic food prices, and lower real wages. Since food is a large share of the domestic consumption basket, nominal wages will

rise. This will raise prices and appreciate the real exchange rate. Only accepting the real appreciation or raising productivity could break the price-wage cycle. The issue is important given India's two- year battle with high food prices, rising average wages, and an expected rise in international food prices.

Nominal overshooting will also reduce the pull of the interest differential, which is contributing to a dangerous rise in India's short-term debt. If the exchange rate overshoots, it is expected to depreciate lowering arbitrage flows. Of course, this needs to be complemented by strategic use of controls since higher growth in emerging markets and continued accommodated in the West will send large inflows into India.

All instruments must be used in the middling through approach Dr.Rangarajan recommends. Exchange rate policy can accomplish more objectives. This and use of controls, intervention, and communication can free the interest rate for the domestic cycle, even while ensuring the real exchange rate is not over- or under-valued.

References

BIS (Bank of International Settlements). 2007. Foreign Exchange and Derivatives Market Activity in 2007, *Triennial Central Bank Survey,* December. http://www.bis.org/publ/rpfxf07t.htm.

Blinder, A. S., Ehrmann, M., Fratzscher, M., Haan, J. D., and Jansen, D.-J. 2008. Central Bank Communication and Monetary Policy: A Survey of Theory and Evidence. *Journal of Economic Literature*, 46(4): 910-945.

Corden, W.M. 2002. *Too Sensational: On the Choice of Exchange Rate Regimes.* Cambridge MA: MIT Press.

Goyal, A. 2010a. How to manage a rupee float. *The Hindu Business Line,* September 9.

Goyal, A. 2010b. Dynamics of inflation and output.*The Hindu Business Line*, November 11.

Goyal, A. 2004. Rupee: changing trends. *Economic and Political Weekly*. 39 (23): 2335-2337, June 5.

Goyal, A. and S. Arora. 2010. The Indian Exchange Rate and Central Bank Action: A GARCH Analysis, IGIDR WP-2010-009. Available at http://www.igidr.ac.in/pdf/publication/WP-2010-009.pdf

Rangarajan C. and A. Prasad. 2008. Capital Flows, Exchange Rate Management, Monetary Policy. *Macroeconomics and Finance in Emerging Market Economies*, 1 (1): 135-150.