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Evaluating India's exchange rate regime under global shocks

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Abstract

The paper assesses the performance of India's managed float with respect to maintaining a real competitive exchange rate, its effect on trade, on stability of currency and financial markets, and on inflation. It also derives the current range that balances these three effects.

Keywords: India; exchange rate regime; trade; stability; capital flows; inflation

JEL Code: F41, F31, E52

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1. Introduction

The Indian exchange rate regime is a managed float, where the Central Bank (CB) allows markets to discover the level but intervenes to prevent excessive volatility. The range of movement shows considerable variation compared to the pre global financial crisis (GFC) period. A watershed for the Indian exchange rate was the reversal of trend nominal depreciation in 2003. After that came the beginnings of two-way movement in the managed float, even while large foreign exchange reserves were accumulated. The latter served an essential precautionary purpose, reducing country risk perceptions. Large global liquidity due to quantitative easing (QE) after the GFC led to risk-on flows to emerging markets (EMs) in a search for yields. During global shocks capital became risk-off and rushed back to safe havens. Outflows, however, tended to reverse quickly.

Risk-off outflows were particularly acute for EMs with large fiscal and current account deficits (CAD). Commodity and asset prices rose with QE. The sharp rise in oil prices widened India's CAD, just as the subsequent fall in 2014 reduced it. Large inflows after 2014, as Indian prospects improved, tended to appreciate the nominal exchange rate, despite additions to reserves.

The paper explores how the Indian exchange rate regime navigated these pulls and pressures. Theory (Corden, 2002) suggests exchange rates have three effects: They affect exports and macroeconomic stabilization, mitigate cross-border inflationary shocks and contribute to financial stability by reducing risk-taking in foreign exchange (FX) markets. We assess the effect of the exchange rate in these areas and reason from data and the Indian context to derive implications for policy.

A relative constancy of the real exchange rate around the real effective exchange rate (REER) established after the double devaluation in the early nineties, had been a feature of post-reform policy, but the period after 2014 saw the longest sustained real appreciation over this level, with only partial reversal in 2018. Export growth has slowed in 2012 and remained low until mid-2018, despite a recovery in world growth.

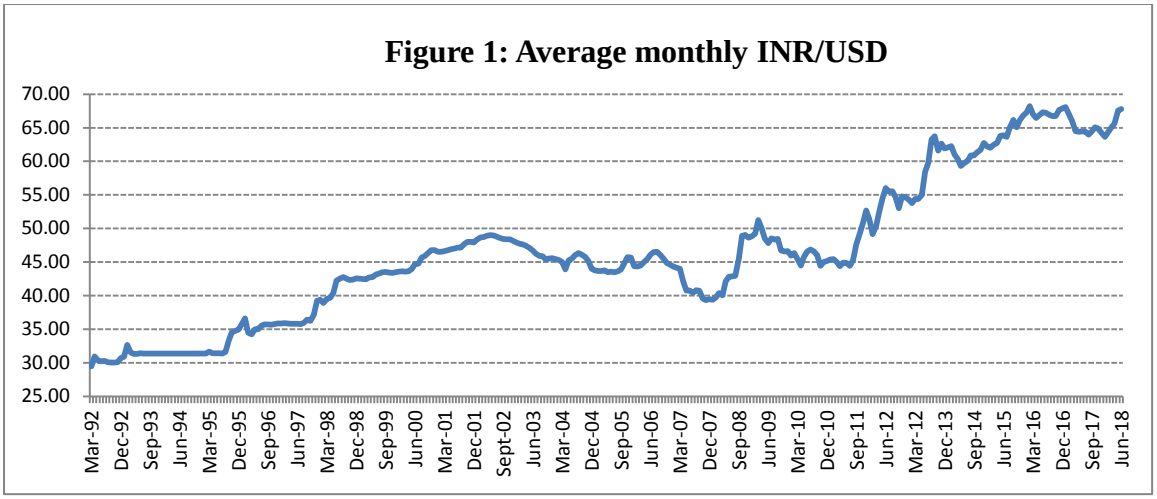
But other factors such as reforms that reduced supply from small firms were also responsible. Assessment of REER impact on export growth taking account of relative Indian productivity improvements, suggests only minor depreciation is required to maintain export competitiveness. With better anchoring of inflation expectations, and an expected stability of commodity prices, the impact of that depreciation on inflation would also be minor. Deeper FX markets imply the daily volatility has risen, but periods of nominal rigidity and sustained over-valuation should be avoided.

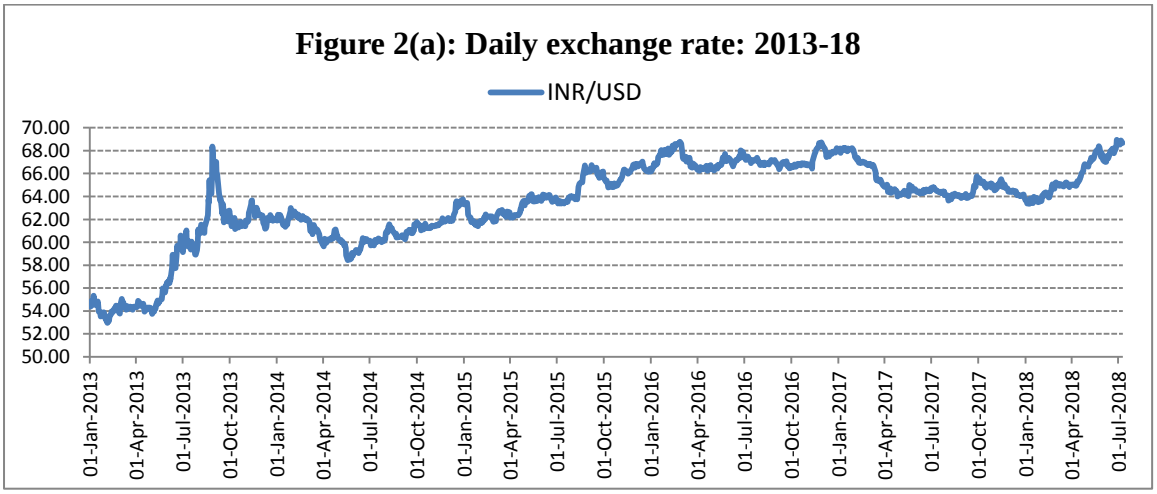
The structure of the paper is as follows: Section 2 presents stylized facts on India's exchange rate fluctuations and on market perceptions; section 3 discusses fundamental determinants of exchange rates; section 4 analyzes the effect of the exchange rate on trade, section 5 volatility section 6 on inflation. Section 7 pulls together the way forward for the exchange rate and concludes with policy implications.

2. Facts and perceptions

The year 2018 was full of dramatic newspaper headlines. For example the rupee was said to have reached a lifetime low when it sank to 68.9 INR/USD on 28th June. But the rupee had been at 68 twice before. On 22nd Feb 2016 it had depreciated to 68.8 from a high of 58.5 in May 2014. By 28th Aug 2013 it had depreciated sharply to 68.4 from 53.7 on May 3. But in each case, as in July 2018, it appreciated again. There is substantial two-way movement. The second half of the post-reform period shows more volatility compared to the first half (Figure 1). The depreciation over January-July 2018 was 8 per cent.

But markets do get excited when there is volatility after a period of stability, and especially so if there is a reversal in a sustained past direction. After the double depreciation associated with the reforms, the next major disturbance for markets was the summer of 2003 when there was a reversal of the long trend of depreciation through the nineties (Figure 1). Two-way movement due to mild depreciation within sustained trend appreciation also reversed the relative stability of the earlier period. Sharp appreciation in 2007 and even sharper periodic depreciations after the GFC increased volatility.





Comparatively, therefore, the period after 2014 was one of relative calm. This is clearer in Figure 2, which focuses on this period. The year 2017 was especially stable. The relatively greater depreciation in INR/USD compared to EURO/INR points towards reserve accumulation and more Reserve Bank of India (RBI) intervention in dollars. Larger depreciation against the dollar in 2018 was also partially driven by post-Trump dollar strengthening—that is by global, rather than domestic factors. Table 1 shows year-on-year changes to be very low over 2014-2017 especially compared to the large fluctuations in the post-GFC periods. In 2017 there was even an overall nominal appreciation.

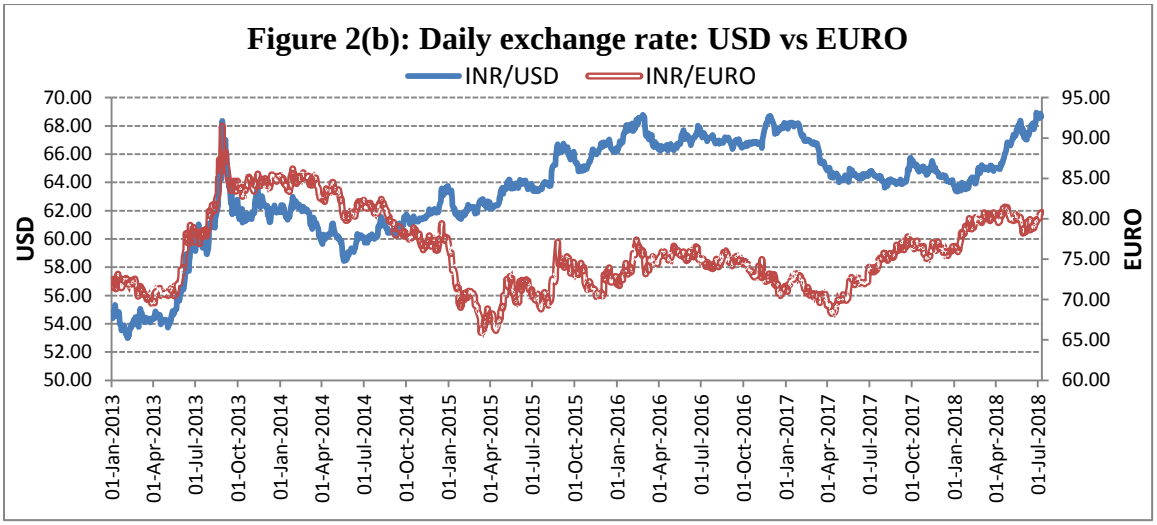


Table 1: Nominal exchange rate end December: depreciation (+) or appreciation (-)

Year	% Change
2005	3.4
2006	-1.8
2007	-10.9
2008	22.9
2009	-3.7
2010	-4.0
2011	18.9
2012	2.8
2013	13.0
2014	2.3
2015	0.0
2016	7.3
2017	-5.9

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

The year 2018 was therefore especially dramatic because of rupee volatility after 4 years of relative stability, and because of a reversal of the trend appreciation of 2017. In Section 5 we will examine why the appreciation occurred. But first we ask if the rupee had deviated from its equilibrium value, and what this value is.

3. Determinants of the exchange rate

Since the nominal exchange rate is the price of money, its fundamental determinants are relative money supplies, prices, output, and interest rates. More broadly they are the 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 for a full float. It should not be possible to predict a currency value if markets are efficient so neither systemic factors nor past variables affect it. Market participants, however, still make short-term forecasts based on news and on spotting trends and patterns.

Over the longer term macroeconomic fundamentals including relative productivity and real wages determine the real equilibrium rate. 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 an economy undergoing structural transformation.

Moreover, ways in which the FX market is not like any other limit price discovery. Market players are not equal. The CB 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 aids monetary policy effectiveness 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[1]. Since uncertainties are pervasive in emerging markets, communication can have a larger effect in such markets[2].

Uncertainty surrounding equilibrium values means market participants can follow each other to sustain one-way movements. In situations where fundamentals are not strong, or some shocks have occurred, so market participants are nervous and trying

[1] Blinder et. al. (2008) offer a survey of concepts and tests. Goyal and Arora (2012) show empirically that CB communication has a large potential in India that was underutilized.
[2] Goyal (2017) demonstrates this both theoretically and empirically.

to guess what the other is going to do, credible public announcements from the Central Banks can help focus expectations. The RBI used these effectively, for example, during excess market volatility after the 2004 election results, but market perceptions in 2011 and in 2013 that the RBI did not want to intervene, heightened speculation against the Rupee.

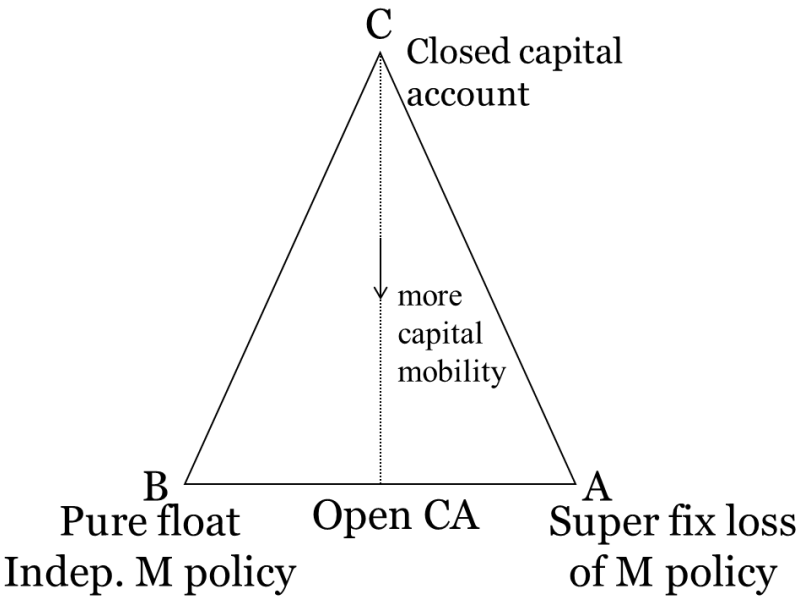
A CB does, however, have a healthy respect for the market because of the sheer volume of FX transactions, and the size of resources market players command. Reserves can be wiped out in minutes if a CB tries to defend a particular value of the exchange rate against market perceptions. So the CB watches the market and the market watches the CB 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 from them. Unannounced interventions also communicate intent, and can be complemented with announcements that reveal varying degrees of information as required.

In India the RBI has the added advantage of the absence of full capital account convertibility. There are quantitative restrictions of various kinds on the FX exposures allowed for different kinds of transactions, which give it additional levers of control. These can be implemented without materially raising transaction costs, in an age of ubiquitous electronic trails. Focused market friendly controls have also gained more acceptability after the GFC and excessive capital movements that followed. The second advantage is the large stock of reserves the RBI has built up, so that its market interventions command respect.

But can the RBI affect exchange rates? In the triangle diagram (Figure 3), originally due to Frankel, the top point represents a closed capital account, gradually opening towards the base. The two points of the base represent a pure float and pure exchange rate fix respectively. Only at the point B of a pure float with a fully open capital account is there no effect on the exchange rate from RBI interventions. The economy, however, is not at point B, but is somewhere in the interior of the triangle, since even capital account convertibility is not complete. The RBI therefore has a large scope for intervention. It can affect exchange rate levels, although this is not officially acknowledged, in order to avoid political pressures. The official RBI line is

intervention is to lower volatility in the market while the level of the exchange rate is market determined.

Figure 3: Why the impossible trinity does not exist



Intervention is helpful if it corrects market-overshooting, but harmful if it contributes to sustained deviations from equilibrium values. It can be either too little or too much. It seems to have veered from too little after the GFC to too much after 2014. For example, after the GFC, as volatility shot up, RBI first did nothing, and then shut down the markets that were supposed to determine exchange rates. Market freedoms were gradually restored after 2014 but the exchange rate was now tightly managed within a low range of motion. But large inflows made intervention necessary—otherwise more appreciation and higher over-valuation would have resulted.

Intervention is also consistent with international laws and conventions. After the US abrogated the Bretton Woods agreement on fixed exchange rates, article IV of the IMF's Articles of Agreement was amended in 1976 to allow countries to adopt any exchange rate regime. The only constraints were policies had to be such as to promote stability and growth, with no manipulation of exchange rates to gain an unfair advantage. But there is no agreed definition of what constitutes manipulation.

While current account restrictions have to be approved by the IMF, it does not have jurisdiction over the capital account. Article VI gives countries the right to impose

capital controls if necessary. After the GFC, although the legal framework could not be changed it was enhanced by making Article IV consultations a vehicle for multilateral as well as bilateral surveillance, to also cover spillovers from member countries' policies that may impact global stability, thus allowing more peer pressure.

There is international pressure, therefore, against attempts to intervene in markets. For example G-20 communiques of finance ministers and CB governors have reiterated their commitment to move toward more *market-determined exchange rate systems* and *exchange rate flexibility* to reflect underlying fundamentals, *avoid persistent exchange rate misalignments* and *refrain from competitive devaluations*. There are no restrictions on interest rate or liquidity boosting policy in response to domestic needs, which AEs typically use, although they affect exchange rate. But EMs with less developed markets are forced to use intervention and controls, in response to capital flow surges and stops arising from AE policies. These defensive needs are disregarded. The onus is entirely on EMs not on source countries. Post GFC financial regulation focused too much on banks leading to arbitrage towards under-regulated fund-based flows.

The US Treasury goes furthest in threatening to label a country as a 'currency manipulator' and pressurize it to appreciate its currency. A prior step is putting it on a watch-list based on 3 criteria: a bilateral trade surplus with US of at least $20bn, CA surplus of at least 3% of GDP, persistent one-sided FX intervention of at least 2% of GDP over 12 months. These grounds are flimsy since bilateral surpluses are inadequate measures of trade distortion since they could be arising from value-added chains, and intervention must be conditioned on excess volatility of capital flows. But treasury is determined "to watch very closely for any unfair currency practice that creates a burden for US workers and US companies."

It has not yet named any country a currency manipulator although among its major trading partners six countries were on the April 2018 Monitoring List: China, Japan, Korea, Germany, and Switzerland with India as a new addition. The dominant criteria used to put a country on the monitoring list, even if it does not meet the other two criteria, is accounting for a large and disproportionate share of the overall US Trade Deficit. India normally has a current account deficit, suggesting the exchange rate is

over- not under-valued. It has a trade surplus in goods and services with the US, however, which was 27 bn USD in 2017. Even so it is small compared to China's 335.7 bn (Source: United States Census Bureau). Intervention has been two-sided and normally less than 2 per cent of its GDP. It has rarely led to persistent deviations from equilibrium values, except after 2014 when the rupee has appreciated not depreciated. The US is concerned about the latter. In 2017, however, purchase of foreign exchange was USD 56bn coming to 2.2 per cent of India's GDP. The US Treasury (2018) points to this and the bilateral goods trade surplus of USD 23 bn. But it also notes India's overall CAD and that its currency is not deemed under-valued by the IMF. In Treasury's view, however, India does not need more foreign exchange reserves since it still has some capital controls. But India needed to intervene more precisely because it relaxed capital controls as we will see in Section 5. And Treasury has a bias towards more appreciation and less reserves in order to benefit US exporters.

In the sections to follow we examine successively how the exchange rate regime affected first, net exports and aggregate demand, second financial stability, and third imported costs and inflation.

4. Macroeconomic stabilization and trade

The exchange rate affects the growing set of people with some foreign transactions. There is scope for conflict because what benefits one can harm the other. The exporter gains from a real rupee depreciation, but at the cost of the importer and the consumer. Small firms are the largest exporters and source of employment. They operate on thin margins, however, and need help from a cheap rupee. But only firms with large value added (such as textiles and agriculture) gain substantially from depreciation. Firms with high import dependence see their costs rise, and those with foreign currency debt also lose from depreciation.

The exchange rate affects the real sector not only from the impact of the real exchange rate on net exports, but also the effect of the exchange rate on the interest rate. Raising interest rates in response to outflows that could have depreciated the rupee in 2011, 2013 and 2018 went counter to the needs of the domestic cycle. In contrast in 2001 when there were no disturbances in the exchange rate and the policy rate was steadily brought down from 7.5 percent, an industrial revival occurred.

Indian exchange rate management deserves praise for avoiding contagion from global crises and managing the pressures of gradually opening the economy without major trauma. But growth sacrifice was higher and more prolonged than necessary after 2011.

Table 2: Taking account of the trade basket & inflation: % variation 36 country export weights (appreciation +) (Base: 2004-05 = 100)

Year	REER	NEER
2006-07	-1.5 (100.47)	-4.1
2007-08	8.7 (109.23)	7.8
2008-09	-8.7 (99.72)	-11.0
2009-10	5.3 (104.97)	-2.7
2010-11	9.6 (115.02)	3.6
2011-12	-1.6 (113.18)	-5.9
2012-13	-4.0 (108.71)	-10.2
2013-14	-3.0 (105.48)	-8.1
2014-15	5.5 (111.24)	2.3
2015-16	2.9 (114.44)	1.6
2016-17	1.8 (116.44)	-0.1
2017-18	4.7 (121.93)	3.3

Note: Figures in brackets are the index figures
Source: Calculated with data from www.rbi.org.in

The real effective exchange rate (REER) gives weights to bilateral real exchange rates according to major trading partners thus correcting for relative inflation. The way it is calculated, a rise in the NEER or the REER is an appreciation, and vice-versa. Table 3 shows two-way movements in the REER (base 2004-05 = 100) after 2007, while the nominal effective exchange rate (NEER) largely depreciated since Indian inflation was relatively higher. In 2004-05 when the index base was changed its level was almost the same as it was after the double depreciation following the early nineties liberalization—this was regarded as the competitive or fair-valued exchange rate since

it had sustained good export growth. Even in 2007 it was at this level. Depreciation had corrected for India's higher inflation.

India's large trade deficit ruled out sustained appreciation as a means of absorbing foreign inflows. But the guiding hand behind markets weakened after the GFC. Swings in nominal and real exchange rates exceeded ten percent, corresponding to surges and outflows of foreign capital. Sharp fluctuations suggest the REER overshot equilibrium values and then corrected. After 2014, however, there was sustained real appreciation.

But 100 may not still be the equilibrium or fair value of the REER: Other factors, apart from relative inflation, affect equilibrium real exchange rates. The REER gives the Indian basket a foreign basket can command. A rise in the relative supply of Indian products, perhaps due to a rise in productivity, would lower the relative value of Indian goods through a real depreciation of the rupee. But in an EM real wages and the price level are lower so the purchasing power parity exchange rate exceeds unity. As wages and non-traded goods prices rise with development there is a real appreciation. This is the Balassa-Samuelson effect.

Table 3: Productivity growth during catch-up

	Growth rate of output per worker		**Contribution of factor productivity in %**
	1980-90	**1990-2000**	
India	3.91	3.22	57
China	6.86	8.85	60
Industrial Countries	1.54	1.47	40

Source: Rodrik and Subramanium (2005)

Table 3 shows that productivity growth in EMs, especially those well-established on a transition path, is much higher than in AEs. IMF (2017, Chapter 2) finds productivity growth slowed in Asia after the global financial crisis, but it has continued in India, perhaps since aging is not a problem here. India does have a long way to go from its

current levels of about 45 to reach the US frontier at 100, but the catch-up is proceeding, even in the unorganized sector. CSO (2017) shows unorganized sector compound annual productivity growth (7.2 per cent) over 2011-2016 much exceeded that in the organized sector (3.2 per cent). There was high real wage growth in non-tradable sectors, such as construction, in the 2000s. EM real wage growth requires some real appreciation.

Apart from other factors affecting the equilibrium real rate, problems in the construction of the REER make it a flawed indicator of competitiveness. First, in 2014 the consumer price index began to be used for India's price level as a new broad-based index became available. But since consumer price inflation exceeded wholesale price inflation over 2007-15, the REER calculated using CPI was more appreciated. The CPI is more relevant for the REER as a measure of the purchasing power of a currency, but WPI with a larger share of traded goods, is more relevant to measure trade competitiveness.

Second, the dollar has a weight of about 8 per cent in the REER (following that of the US) but about 80 per cent of India's trade (including in oil) is settled in dollars. If the rupee depreciated relatively more against the dollar (Figure 2b) as currently it meant the relevant real exchange rate was more depreciated than the REER. These issues imply the rupee may not be overvalued by the 20 per cent REER at 120 would suggest.

Since exact valuation is difficult, another approach is to ask what past levels of REER were compatible with good export growth and a sustainable CAD, in order to arrive at the possible current REER equilibrium value. The majority of research studies show Indian export growth is normally more sensitive to world growth and demand than to the real exchange rate (see for example, Veeramani 2012).

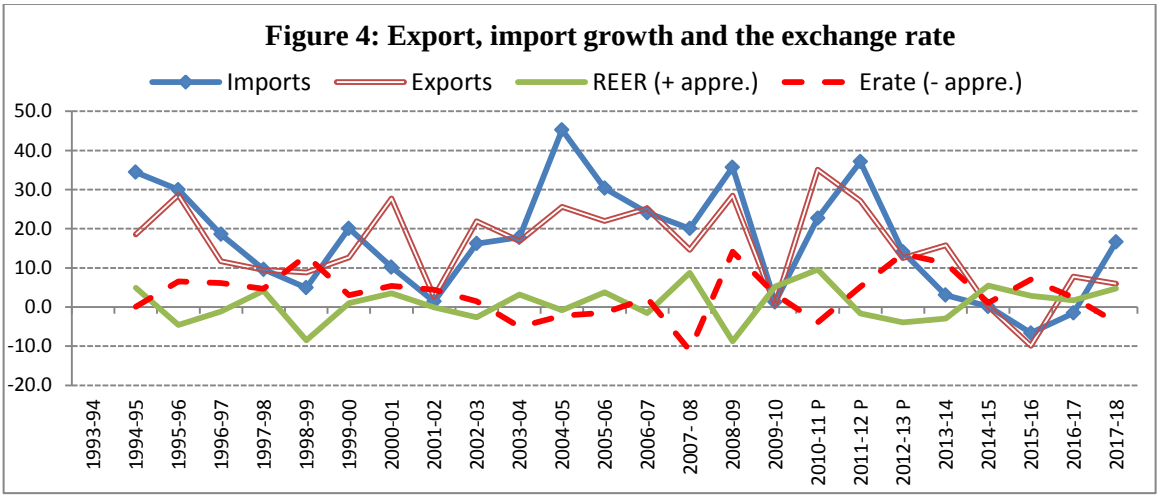
Table 4: Real exchange rates, trade growth, CAD, and oil price shocks

	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Apr-18	May-18	Jun-18
REER- 36 – X	-1.5 (100.47)	8.7 (109.23)	-8.7 (99.72)	5.3 (104.97)	9.6 (115.02)	-1.6 (113.18)	-4.0 (108.71)	-3.0 (105.48)	5.5 (111.24)	2.9 (114.44)	1.8 (116.44)	4.7 (121.93)	-2.7 (118.45)	-3.7 (116.93)	-3.2 (117.52)
REER- 36 – trade	-1.6	8.4	-8.7	4.2	8.5	-2.1	-4.3	-2.2	5.5	2.9	2.2	4.5	-3.1	-4.0	-3.2
Export growth	25.15	14.61	28.44	0.62	35.03	27.18	12.49	15.79	0.16	-9.87	7.78	5.99	7.0	20.2	17.6
Import growth	24.08	20.03	35.7	1.27	22.69	37.14	14.1	3.07	0.15	-8.06	1.56	14.8	6.4	20.4	
CAD/GDP	-1	-1.3	-2.3	-2.8	-2.8	-4.3	-4.8	-1.7	-1.3	-1	-0.6	-1.9	-2.5*		
$ Brent crude oil prices	63.99	80.70	85.25	67.68	86.08	114.65	111.33	107.63	87.15	47.96	47.75	57.07	72.11	76.98	74.41

Source: Calculated from RBI, Economic Survey and reports; Crude oil calculated from https://www.eia.gov/dnav/pet/pet_pri_spt_s1_a.htm
Note: *Expected 2018-19 value; Depreciation (-) or appreciation (+) for REER

The REER export index at 115-113 over 2010-12 was consistent with high export growth in a period of low world export growth (Table 4). But at the same 114 level export growth was negative in 2015-16. World exports were booming before 2007 and then finally recovered in 2017, but Indian export growth remained low. The REER had also peaked at almost 122 in 2017-18. But, as Figure 4 shows, the fall in export and import growth was much steeper than the exchange rate changes. The sharp fall and recovery in export growth may have been due to the reversal of the global credit squeeze following the Lehman crash. But after the 2011 Eurodebt crisis, continuing slow world demand pulled down Indian export growth regardless of REER depreciation.

Figure 4: Export, import growth and the exchange rate



Apart from low world demand, the collapse in oil prices in 2014 also reduced demand for Indian exports, even as it sharply reduced the value of Indian imports and therefore reduced the CAD. In 2016 and 2017 as world export demand recovered, first demonetization and then the implementation of GST hurt supply, especially from small firms that are the backbone of exports. Signs of recovery in export growth by May 2018 suggest these supply issues were getting resolved. The REER had also depreciated to 116. Since 115 was consistent with strong double digit export growth even during the global slowdown further real depreciation may not be required. But sustained appreciation above this level should be avoided. Goyal and Kumar (2018) find a real appreciation sustained over two years or more hurts export growth. The Rupee also cannot appreciate

substantially unless the Renminbi does so, since China is a major trade competitor and partner.

There are those who believe India should go in for a strongly under-valued currency in order to follow China's export-led growth path. But the current climate of trade wars makes this infeasible. Large competitive depreciations will not allow real depreciation. Moreover, depreciation will only increase costs and inflation given India's dependence on imported inputs. Indian export growth is better supported by removing supply side obstacles, improving logistics, trade standards, and ease of doing business. Active diversification of export destinations can build on the 'look South' policy East Asia is adopting in order to counter US trade disruption. Regional trade blocks have the potential to compensate for US anti-trade measures. A fair-valued REER, supply-side and marketing measures should ensure the CAD remains sustainable.

5. Capital flows and exchange rate volatility

Table 5 uses the highest and lowest monthly exchange rate within a year to calculate the yearly volatility (percentage change between the highest and the lowest exchange rate within a year), and its standard deviation. External shocks such as the East Asian crisis (1995-98), the GFC, the Euro-debt crisis of 2011, the Fed taper-on of 2013 and its moves to normalize monetary policy in 2018, are associated with higher volatility. The latter is due, therefore, to risk-on risk-off shifts in foreign capital, and changes in the dollar value, not to discovery of fundamental value in domestic markets.

In between there were large stretches of time with low volatility. The yearly standard deviation was just 2.5 even during the calm after the GFC and only 1.8 even in 2016. Daily exchange rate volatility did however increase from very low levels in the relatively fixed exchange rate regime immediately after the nineties reforms (Figures 1-3), in line with steady deepening of domestic FX markets[3]. The monthly volatility (based on high low days within a month) was 0.81 over 2015-16. It was still higher than the pre-GFC

[3] The average daily turnover in Indian FX markets grew at the fastest world rate of growth from about USD 3.0 billion in 2001 to USD $34 billion in 2007 (BIS, 2007), albeit from very low levels. The rate of growth slowed after the crisis.

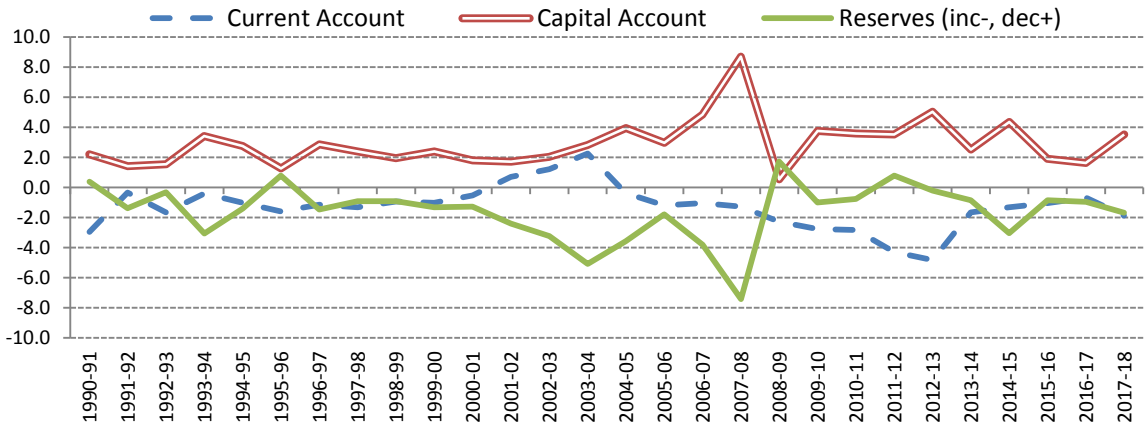
2005-06 average of 0.49, since in the later period there was more market activity despite nominal rate stability.

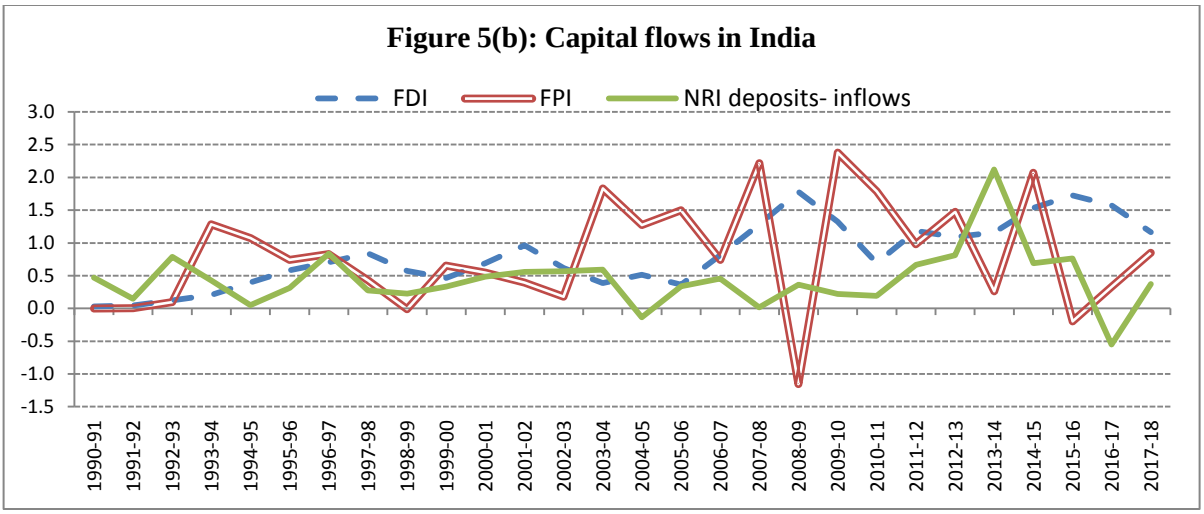
Table 5: Yearly volatility of the exchange rate

Years	Monthly high-low % change	Standard Deviation
2005	6.9	2.1
2006	6.6	2.1
2007	12.8	3. 6
2008	26.5	7.4
2009	12.6	4.1
2010	8.0	2.5
2011	23.4	7.3
2012	17.5	6.0
2013	29.1	10.9
2014	9.1	3.8
2015	9.2	4.0
2016	3.9	1.8
2017	7.2	3.3
2018 June	8.8	4.0

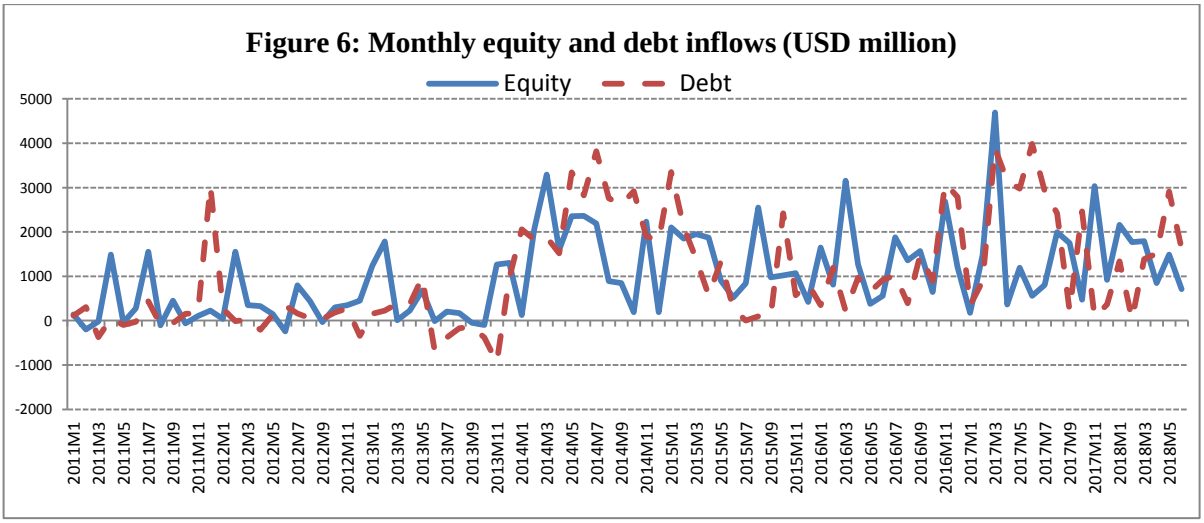
Source: Calculated with data from www.rbi.org.in

Figure 5(a):India's balance of payments (ratio to GDP)





Figures 5 and 6 show the different type of capital flows (5b and 6), and their reflection in the capital account (5a) of the balance of payments. Figs. 5a and 5b graph components of the balance of payments in INR billion as a percentage of GDP at market prices. Fig. 5b shows the steady increase in foreign direct investment (FDI) and the fluctuations in foreign portfolio investment (FPI). A given percentage of GDP implies very different absolute levels of inflows in the later periods when GDP was much larger. The absorptive capacity of the economy had risen.



The change in reserves was almost a mirror image of the capital account—capital flows were largely absorbed in reserves. The capital account surplus was as large as 9.2 per cent

of GDP in 2007-08. The current account was largely negative (in deficit) except for a small positive hump in the early 2000s. It was, however, relatively stable in the post reform period, varying between –3 and +2.3 as a ratio of GDP (at market prices measured in USD billion), except for a brief dip to - 4 in 2012-13, linked to high oil prices. The trade deficit was very large, but was partially compensated by a surplus on invisible items (net services and net income flows from abroad).

Indian reform liberalized portfolio investment by foreign institutional investors (FIIs) more, in line with its vision of developing domestic markets, even while retaining graduated restrictions on debt, especially short-term debt, inflows[4]. The rationale was that even though equity flows are volatile they are at least risk sharing, while debt outflows impose a greater burden in downturns. Short-term debt especially is difficult and expensive to roll it over at crises times, as asset values fall and the currency depreciates. Moreover, higher growth attracts equity flows, and lower interest rates encourage growth, while debt outflows can force a rise in interest rates and hurt domestic growth, since they seek to earn an interest differential. Depreciation also reduces returns for foreign capital. Research (IMF 2014) showing bond mutual funds, especially retail funds, are twice as sensitive as equity mutual funds to global sentiment, underlines the wisdom of the sequencing.

Restrictions were tightened when there was a surge in aggregate capital inflows, and relaxed when inflows slowed. Controls on outflows by residents were relaxed only very gradually, initially only for current account transactions. While external commercial borrowings (ECBs) were expanded to facilitate domestic firms borrowing abroad, limited automatic approval served to cap these reducing domestic firms' currency risk.

At first, equity inflows dominated because of caps on debt inflows. Post 2011 imperatives of financing the CAD lead to relaxations in debt flows[5]. A record $19 billion came in the

[4] In 2011, for example, an FII could invest up to 10% of the total issued capital of an Indian company. The cap on aggregate debt flows from all FIIs together was only 1.55 billion USD.
[5] By 2013 caps on government debt for foreign investors had been raised to USD 30 billion (overall debt limit including corporate bonds at 81 billion). In October 2015 bi-annual increases in limits were

year ended March 2018, taking up all space available. As caps on debt flows were lifted they flooded in, because they gained both from India's much higher interest rates and from currency appreciation. These inflows did not, however, reduce the cost of government borrowing since the RBI was forced to buy US treasuries at zero interest from the excess inflows it accumulated as reserves rather than buying Indian G-Secs (Government securities) through open market operations. These had injected Rs 1811 billion in 2016 but withdrew long-term liquidity of 900 crores in 2017. Indian G-Sec yields shot up to 8 per cent.

There were also periods of sudden stops and outflows. So they did not provide security in CAD financing either. Figure 6 shows sustained outflows in 2013 and slowdowns in late 2017 were largely in the debt component. Outflows occurred because of an expected strengthening of US bond yields. In both periods Indian market positions were largely long in government debt as interest rates were in a downward phase. As policy raised rates partly to mitigate debt outflows, bond values fell creating large domestic market losses, and shrinking domestic institutional and retail participation in debt, further raising G-sec rates. As the policy repo rate is forced to more closely follow the rise in US Fed rates, it can hurt the domestic cycle.

In September 2013, even after relaxation in debt caps, the share of debt securities was still small at 36 per cent of equity securities and 6 per cent of total liabilities. The rise in yields was driven more by unnecessary policy tightening, not the debt outflows, in the Indian context[6]. But in March 2018 these numbers had increased to 75.5 and 11 per cent respectively. Debt security liabilities now totaled USD 117bn compared to reserves at

announced to reach upto 5 percent of government bonds by March 2108. This cap was fully utilized at 1.91 lakh crores by that date. In April it was raised to 5.5 per cent in two tranches and to go upto 6 per cent in 2019-20. The limit in corporate bonds was raised to 9 per cent of the stock (https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=10059&Mode=0)

[6] Debt outflows over May 22-August 26th in 2013 were 868 USD million for Indonesia, where foreign funding of domestic currency sovereign bonds had been liberalized considerably, compared to 35 USD million for India. So Indonesia had to raise policy rates 175 basis posts post taper-on. IMF (2013) in a regression of domestic on US yields finds a significant coefficient (1.1) for Indonesia compared to insignificant (-0.3) for India.

425bn. Thus a low cap of 5 per cent of domestic debt leads to debt stocks being too large a share of foreign liabilities. This share should also be capped.

Even so, Indian reserves still satisfied various criteria of reserve adequacy used such as comparing them to the sum of short-term external debt plus CAD, or CAD minus FDI inflows and are still large compared to volatile components such as foreign liabilities, debt and equity securities. The IMF and US treasury regard them as too large.

The RBI will be able to do more OMOs, exit the US watch list, avoid real appreciation, better suit the domestic cycle, lower interest rates and reduce the cost of government borrowing if there are fewer inflows this year. A real exchange rate stable at 114-16 will stimulate exports. If oil prices remain stable, as expected, the gap in BOP financing will be minor and can easily be financed through reserves. Markets must get used to two-way movement in reserves as well as in exchange rates. Reserves dipped in 2008 and 2011, and were more than made up later. FPI outflows of about 14 billion dollars just after the GFC was marginal in the context of the accumulation exceeding USD 200 billion, and was soon reversed. Inflows of FDI continued to be robust.

The pace of capital account liberalization, therefore, must slow. Caps on debt inflows must not be lifted so fast. Their contribution to market development is adequate at lower caps. More stable forms of inflows should be encouraged, instead.

Fluctuations in the rupee can absorb some capital flow volatility. Variation of a managed float in a band not less than ten per cent, prevents riskless "puts" against the CB, since then there is a substantial risk of loss if the expected movement does not materialize. But intervention when the market-determined level deviates from fundamentals aids market and real stability. Some exchange rate flexibility deepens markets and encourages hedging, but high volatility hurts the real sector. Swings beyond a plus minus five percent invite excessive entry of uninformed traders. Under large outflows the CB typically comes in after the market bottoms out so portfolio investors share currency risk. The band may, therefore, occasionally be breached but should soon revert.

Intervention must not be one-sided and has to be strategic. It can be based on domestic context. For example, one of the most effective rupee stabilizing measures was the FX swap window announced for oil marketing companies in end August 2013, since it took a large chunk of dollar demand out of the market. Since capital flows do not always match the net import gap, the RBI should be ready to close any short-term demand supply mismatch. Timing is very important and must be based on market intelligence covering net open positions, order flow, bid-ask spreads (when one-sided positions dominate dealers withdraw from supplying liquidity and spreads rise), turnover, and share of interbank trades.

EMs typically have less information and more uncertainty, so signaling can also be effective. Signals that the RBI was unable to intervene and the INR should be left to the markets had a large but counter-productive impact in 2011, while reassurance calmed markets in 2013. Overshooting from fundamental currency values and one-way feedback trading hurts markets also. The market is much larger, however, so the RBI can influence expectations but cannot now act totally against them. A variety of signals can be used. Interventions themselves convey a strong signal, even without committing to a specific target exchange rate or deviating from the announced position of intervening only to prevent excess volatility. The central value need not be announced and can change with inflation differentials in order to prevent real over- or under- valuation.

RBI gains from selling dollars when the rupee has fallen against them (as long as it does not fall further) and buying dollars when the rupee has risen. Exchange rate overshooting is required to impose loss on outflows, but as domestic markets deepen and are not in stretched positions, deviations from equilibrium values should not persist.

Deep markets and hedging reduce this stretch while restricting domestic markets to damp volatility only encourages one-way positions to migrate abroad, where they are not

regulated. There is evidence the non-deliverable forward market grew[7] over 2010-13 when restrictions were imposed.

With all these measures available the interest rate defense is not required, and the policy rate can adjust to the needs of the domestic cycle. Its use in July 2013 was a total failure.

Two-way nominal movement makes it possible for the exchange rate to also contribute to reducing inflation.

6. Inflation

An appreciation can be an antidote to temporary commodity price shocks coming from food, oil and other intermediate inputs, for which pass through of border prices is high. Since demand for these is inelastic in the short-run depreciation can also widen the CAD. Pass through is higher for commodities. Since temporary supply shocks occur so often, the exchange rate's potential to reverse their effects on inflation should be acted upon. Reducing aggregate demand in response to a temporary supply shock creates unnecessary output sacrifice. The exchange rate channel of monetary policy transmission has the shortest lag.

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 restrained. Border prices now affect vital intermediate goods and components of the food basket, and the latter affect wages. If a nominal appreciation prevents inflation from setting in after a temporary supply shock, it prevents the real appreciation inflation results in.

Depreciation corrects for inflation differentials but itself contributes to inflation, as imports and import substitutes become costly, so real depreciation is much lower. Instead a vicious cycle of higher inflation, real appreciation requiring more depreciation can set

[7] OTC FX turnover outside the country rose from 50 (20.8 USD bn) to 59 (36.3USD bn) per cent of the total (Goyal, 2015).

in. Repeated bouts of sharp depreciation in 2008, 2011 and 2013 contributed to sticky Indian inflation, and hardened inflation expectations. After 2011 growth fell while inflation remained high and sticky following the policy combination of a sharp rise in policy rates and sharp depreciation. In 2018 the temptation to follow such a combination should be resisted. High volatility, even if it is a sharp depreciation, does not help exporters. Over 2011 to 2013 the nominal exchange rate depreciated from 45 to 60, but persistent inflation had converted the real depreciation (REER index 105) in 2013 into a real appreciation (REER index 111) the very next year. 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.

Since Indian inflation range of 4-5 is higher than that of the rest of the world (range 1-3) the rupee has to depreciate to the extent a higher productivity differential does not compensate. The problem was too little nominal depreciation and real appreciation in 2017 as a steady nominal rupee and large interest differentials invited too much of debt inflows.

The mild depreciation required to maintain the REER at 115 need not be inflationary, however, especially if inflation targeting is able to keep expectations anchored. There is some evidence of this in other countries. In India, oil and food prices have a large impact on these expectations. Oil prices had risen in 2017 but fell after peaking at $77 in May 2018, so inflation expectations may not become unhinged. Oil prices at between $60-75 are probably the best in terms of maintaining smooth supply and export growth while balancing the interests of exporters and importers. Geo-political forces are likely to keep them in this range.

Indian agriculture has entered a new era of food surpluses. This will keep prices soft despite increase in minimum prices. At the same time new non-market distorting mechanisms are being explored to deliver farmer subsidies. Exports can be further stimulated, if a fall in costs keeps rupee profits high even if the dollar price is fixed.

7. Conclusion and implications for policy

Our analysis suggests for optimizing the three effects in the Indian context, mild depreciation should keep the REER at about115. This would be non-inflationary, but correct for real appreciation. Export competitiveness cannot be neglected when the trade deficit is large. Maintaining yet limiting nominal volatility in a10 per cent band, can help markets find this fair value, while reducing risks. Some exchange rate flexibility deepens market and encourages hedging, but excessive volatility hurts the real sector. So there should be limits to exchange rate flexibility. The academic literature has also shifted away from advocating corner regimes of a full float or tight fix for EMs towards middling regimes.

But slower sequencing of capital account convertibility, and varieties of intervention, are required in the face of surges and stops in capital flows. If a central bank does not buy/sell a currency that is not freely traded internationally, sharp spikes occur.

There was sustained real appreciation after 2014. Although daily volatility rose with market development, there was too little change in the nominal rate. As Indian interest rates were much higher than international while QE created global liquidity in search of yield, debt inflows came in to the full extent that caps were relaxed. Interest differentials must be such as avoid such arbitrage. Relaxation of controls must be careful not to let interest-sensitive components become a large share of foreign liabilities. Excessive debt inflows in 2017 have neither reduced the cost of government borrowing nor provided security in CAD financing, even as outflows threaten a growth recovery.

Large reserves, a flexible nominal exchange rate, the absence of full capital account convertibility, use of signals and strategic intervention can help avoid the interest rate defense, or mismatch of the policy rate from the needs of the domestic cycle. Reducing domestic demand is a costly and inefficient way to respond to the threat of outflows.

The post GFC period made it clear the impact of global shock led capital flows on the exchange rate does not match the requirements of the domestic cycle. If foreign capital responds to the domestic cycle, however, it can be stabilizing. For example, outflows during a downturn depreciate the exchange rate increasing export demand and output; inflows during an upturn appreciate the exchange rate reducing growth thus contributing to stabilization. But large risk-on inflows of capital can appreciate the currency during a downturn, as happened during 2017; while risk-off outflows that depreciate the currency result in a rising domestic interest rates that threaten to subdue a budding upturn.

A larger tool box is an essential defense to continuing global fragilities. But these tools work best with markets if they help them find and maintain the fair value of the currency.

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