Foreign Exchange Intervention: Efficacy and Trade-offs in the Indian Experience

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This study investigates the effectiveness of forex interventions undertaken by the Reserve Bank of India (RBI) and finds that the volatility of portfolio flows, induced by global spillovers, is the main source of exchange rate volatility in India. Foreign exchange interventions, both spot and forward, effectively counter capital flows volatility, with symmetric effects of purchases and sales. The impact of gross spot intervention on exchange rate volatility indicates the existence of threshold effects, explaining the "leaning against the wind" phenomenon.

Introduction

Since the latter half of the 1980s when several emerging market economies (EMEs) dismantled barriers to increasingly engage in international trade and finance, either voluntarily or as a part of structural adjustment programs, a steady accumulation of international reserves has given way to a surge since 2004. Global reserve holdings peaked at US \$ 12.9 trillion by 2021, although bouts of high financial market volatility driven by riskon-risk-off sentiment shifts since then necessitated interventions that have slightly modulated this stock to US \$ 12.7 trillion in September 2024. This phenomenon has quite naturally found resonance with an old stream in the literature dating back to the days of the gold standard that worried about the motives, costs and benefits of reserve accumulation. This paper, by contrast, deals with the motives, costs and benefits of holding foreign exchange positions from an EME perspective, scarred by the experience with spillovers, which can be quite different from what engaged the older strand.

It is important to note the differences. First, this phenomenon is about EMEs, which currently hold roughly three-fifth of international reserves whereas the older literature focused almost exclusively on advanced economies (AEs). Secondly, AEs have almost stopped intervening in foreign exchange markets; EMEs, on the other hand, intervene regularly and have developed institutional formats for it. Thirdly, these interventions tend to impact the path of the exchange rate more than in AEs because (a) they are not routinely sterilized; (b) the size of interventions are significant relative to the level of market turnover and base money; (c) elaborate reporting requirements confer on central banks in EMEs an information advantage in inferring the aggregate order flow in the market; and (d) prudential regulations and operating practices amplify the information advantage and the size of the intervention relative to the market (Canales-Kriljenko, 2003; Filardo et al., 2022; Linde et al., 2024). For EMEs, foreign exchange rate interventions are umbilically linked to the objective, either explicit or implicit, of mitigating volatility and not the level of the exchange rate or any band around it: in short, not the first moment but the second moment.

Against the above backdrop, this paper evaluates the effectiveness of interventions by the Reserve Bank of India (RBI) in the foreign exchange market in India. In the rest of the paper, Section II extracts lessons from the existing literature. Some stylized facts with respect to intervention in India's foreign exchange market are furnished in Section III. Section IV contains empirical results. Concluding perspectives are set out in Section V.

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II. Guideposts from the Literature

advanced economies withdrew from As intervening in foreign exchange markets, the empirical literature imbibed the spirit of this retreat and largely focused on issues relating to its effectiveness - does it work or matter? (Obstfeld, 1990; Dominguez and Frenkel, 1993; Dominguez, 1998; Beattie and Fillion, 1999; Sarno and Taylor, 2002; Ito, 2003; Daude et al., 2016; Menkhoff, 2013: Linde *et al.*, 2024): if it does, what is optimal and under what conditions? - an older strand had grudgingly visualized limiting conditions (Boyer, 1978; Buiter, 1979; Roper and Turnovsky, 1980; Jones, 1984; Blanchard *et al.*, 2015); is it essentially the fear of floating? (Calvo and Reinhart, 2002); and is there room for it under an inflation targeting framework? (Domac and Mendoza, 2002; Adler et al., 2021).

The repetitive visitations of crises through the 1990s and 2000s has swung the narrative completely! Modern generations of currency crises seem to be triggered by markets that conduct value at risk assessments of the central bank's balance sheet, including off-balance sheet items, and whenever confidence levels in the central bank's solvency appear likely to be breached, they strike (Blejer and Schumaker, 1998; Zeuli, 2013; Nocetti, 2006). Further, the illiquidity, arising out of shortterm foreign currency debt becoming larger than liquid foreign currency assets, has been a cause of many exchange rate crises (Chang and Velasco, 1999). In these low probability high intensity events, fundamentals do not matter and each country stands alone – the implications of a crisis can be global but the responsibility for financial stability is national. Central banks having strong reserve buffers and institutional character generally come out of financial crises with less loss to their credibility (Bordo and Siklos, 2015).

By the 2000s, the emerging market model of foreign exchange interventions had arrived! The benefits of foreign exchange intervention overwhelmed its costs as managing exchange rates and accumulating reserves became preferred policy options, rather than being stigmatized as in the earlier literature. In fact, high liquidity was increasingly seen as able to offset weak fundamentals and ward off contagion (Mulder and Bussier, 1999; Lai, 2002). Accordingly, attention turned to the market microstructure (Dominguez, et al. 1993; Vitale, 2011; Ormos and Timotity, 2016); instruments (Evans and Lyons, 2002; Galan et al., 1997; Hooyman, 1994; Hung, 1997; IMF, 1998; Mandeng, 2003; Zapatero et al., 2003); issues in transparency – announcement effects; signal to noise ratios - and the management of unavoidable operational risk (Fratzscher et al., 2019); persistence and asymmetric effect of purchase and sales (Blanchard et al., 2015; Adler et al., 2019) and policy framework resilience (Linde et al., 2024).

We argue in this paper that perhaps the analytics of foreign exchange intervention in an EME context are better informed by the positive findings of consensus/central tendencies in a young but incisive stream in the literature that focuses on coalescing the experiences of the practitioners *i.e.*, central banks themselves, through questionnaire-based surveys. It is also informed by progress under the IMF's Integrated Policy Framework (IPF) which has a case study on India (Linde *et al.*, 2024).

This literature offers an interesting study in comparative statics. The starting point of reference becomes the IMF's 2001 survey on foreign exchange market organization and the work spawned by it (Canales-Kriljenko, *et al.*, 2003; Linde *et al.*, 2024). This survey was perhaps the most extensive, with 91 respondents that together accounted for 85-90 per cent of developing countries' GDP, trade and

reserves. Moreover, such detailed information on foreign exchange operations in a broad range of countries had not been previously available (IMF, 2003). In 2013, the BIS sought the views of central banks about intervention for its annual meeting of Deputy Governors through a survey questionnaire. This survey revisited many of the aspects of intervention identified in the 2004 BIS survey (BIS, 2013), especially the role of interventions in reducing financial and monetary stability risks, in provision of liquidity support to the foreign exchange market and in meeting exchange rate objectives. Studies conducted around it, both within the BIS and by participating central banks, yield useful insights and importantly, provide an update on the 2001 IMF survey on operational aspects of intervention that are the centre of interest of this paper¹. In this spirit, attempts have been to empirically estimate equilibrium exchange rates for India (Patra, et al., 2024)

Definitional Issues

In the emerging market context, the narrow definition of intervention in the mainstream literature – central bank foreign exchange operations targeting the exchange rate² - gives way to a broader format encompassing moderating exchange rate fluctuations and correcting misalignments, addressing disorderly market conditions (an objective blessed by the IMF), accumulating reserves and supplying liquidity to the

foreign exchange market (Canales-Kriljenko *et al.*, 2003). Consequently, operational issues – timing; frequency; amounts; instruments/currency pairs; locations; counterparties – are the main decision drivers for central banks. Another major consideration is that interventions effectively turn into monetary policy operations when not fully sterilized and necessitate calibration with the monetary policy stance³. Also, though thinly advocated, interventions provide breathing space for undertaking deeper macroeconomic adjustments if there are structural imbalances impacting the exchange market.

The microstructure approach (Lyons, 2001; Evans and Lyons, 2002) shines light on this operational view. The balance between buyer-initiated and sellerinitiated orders is a measure of the net exchange market pressure. Interventions cause changes in expectations on future exchange rates, triggering modifications in open positions, especially by noise traders chasing trends. The result is a tide of buy/ sell orders well in excess of the central bank's initial intervention. Furthermore, market participants may regard these operations as central banks exploiting superior or privy information and order flows generated in response to "impound information into prices" (Lyons, 2001). The microstructure approach also emphasizes the size of intervention relative to market turnover - the larger the intervention, the higher is its impact on the price, thus potentially more effective in emerging markets that have relatively low market turnover and are less liquid, including due to exchange control and other regulations (Canales-Kriljenko et al., 2003). The IMF's quantitative

¹ A freestanding, non-institutional study (Neely, 2001) examined foreign exchange intervention practices of a sample of 22 countries, of which nine were emerging markets, and mainly addressed the effectiveness of intervention. An update is found in a subsequent survey (Neely, 2008) which concluded that the surveyed central banks were not pursuaded by most of the common arguments against intervention.

² That exchange rates violate the parity conditions and deviate substantially from fundamentals even in deep and liquid markets, and with reasonable capital mobility, seems to have become a settled position in the literature (Rogoff, 1999; Mark, 2001; Sarno and taylor, 2002). Moreover, interventions can occur in response to exchange rate changes but also have an effect on exchange rates – the simultaneity problem which is empirically difficult to disentangle

³ It is debatable, however, if fully sterilized interventions are free from this overlap – they may restore base money to initial levels, but open market operations could bid up/ down interest rates and alter monetary conditions. Under the signaling channel, interventions are perceived as indicating a change in the future stance of monetary policy (Sarno and Taylor, 2002). This is strengthened by agents regarding assets/currencies as imperfect substitutes, triggering portfolio rebalancing that changes monetary conditions – the portfolio balance channel.

integrated policy framework (IPF) shows that even though India's FX market has been mostly deep, it could become shallow in certain periods, including during the GFC and COVID-19 (Linde *et al.*, 2024).

Operational Priors

The intervention strategy involves as a first step the setting up of management tolerance thresholds.

- (a) Defining the metric which exchange rate measure *i.e.*, nominal/real; effective/bilateral; the extent of movement to be tolerated; and over what specified period. The overwhelming choice among surveyed central banks is a currency pair(s), a tight band in basis points around it that defines authorities' tolerance during a trading day (Goldstein, 2002).
- (b) *Amount and timing* clearly an area in which the optimal intervention literature fails the practitioner⁴. Determining the amount is usually highly subjective, shaped by trial and error, and suffused with central banks' judgment honed by unique experiences and countryspecific circumstances. Central banks also report extensive reliance on assessments of market intelligence, observable market indicators and the level of reserves. In terms of first principles, the size of the intervention is usually a multiple of the typical market order and technically as large as necessary to achieve the exchange rate metric. Size constraints apply less to purchases than to sales, since the former can be financed by printing domestic currency and sterilized to insulate the inflation objective. The timing of

intervention, on the other hand, is typically a function of the central bank's 'scenting' of the presence of misalignment/disorderly conditions. Proximate indicators of market conditions turning disorderly are cited as accelerated changes in the exchange rate potentially driven by oneway bets; widening bid-offer spreads signaling heightened uncertainty; the composition of turnover - a rising ratio of interbank trades relative to customer-related turnover or 'hot potato' trading; volatility measured in several ways, including implied volatility and GARCH, though some tolerance to volatility is warranted if it co-exists with price discovery. Generally, these indicators are viewed in conjunction rather than in isolation. The central bank may set benchmarks for these indicators to enhance its capacity to respond. Considerable discretion is widely practiced on revealing intervention operations, with tactical ambiguity being the revealed preference among emerging markets (Chiu. 2003).

Technical Aspects

Surveys also offer valuable glimpses at various technical issues embedded in implementing the decision to intervene or not. They relate to the choice of markets, onshore or offshore, the intervention currency, choice of counterparties, and administration and governance aspects. A summary of central bank responses is set out below.

Interventions generally take place in the spot market to benefit from liquid conditions and obtain direct effects on the spot exchange rate; forward markets involve transmission mechanisms that are affected by monetary conditions, whereas using derivatives could result in leveraged net open positions and margin calls can disrupt cash flows.

⁴ Opinion. in fact, veers to the other extreme: "The amount of foreign exchange intervention should not be determined from a policy rule" (Canales-Kriljenko, *et al.*, 2003). This view has been reinforced by the observed demise of rule-based intervention more generally, as demonstrated in the case of Canada in the 1990s and Brazil in the 2000s.

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- Onshore markets where the bulk of trading takes place are normally preferred for intervention operations so as to directly impact order flows and exploit market intelligence as well; offshore interventions are undertaken only where the local currency trades significantly or beyond working hours offshore.
- Intervention is generally conducted in the most widely traded currency pair to reduce costs and facilitate settlement. The US dollar was reported as the most favoured intervention currency (AREAER, IMF, 2022)⁵.
- Typically, central banks prefer the wholesale market to the retail cash market for intervention operations to reap economies of scale that work towards reducing transaction costs.
- As regards counterparties, the choice is generally of financial institutions and authorized dealers which (a) are solvent, (b) provide competitive two-way quotes and are market makers, and (c) provide information on market developments.
- Close coordination between the foreign exchange market and money market desks is considered essential, with a clear decision-making hierarchy. The chain of command (it may involve a small committee, or a chief dealer being delegated decisions on amount of intervention subject to thresholds, consistent with the management tolerance limits, provided there are no principalagent problems), with the front office separated from middle/back offices.

III. Some Stylised Facts

Exchange rate management in India has undergone a major transformation since the

implementation of structural reforms starting 1991. A brief transitional dual exchange rate arrangement instituted in March 1992 was followed by a market determined exchange rate system in March 1993, current account convertibility in August 1994 under Article VIII of the Articles of Agreement of the IMF, development of the forex market from the second half of the 1990s based on recommendations made by Sodhani Committee (1994) and Expert Group on the Foreign Exchange Markets (2005), and a gradual liberalisation of the capital account based on the recommendations of the Committee on Capital Account Convertibility (1997) and Committee on Fuller Capital Account Convertibility (2006). As a result, trading volumes have picked up, adding structure, depth and liquidity to the forex market. Subsequently, the derivatives segment has been deepened by removing segmentation between onshore and offshore markets for the INR. Indian banks have been allowed to undertake nondeliverable derivative contracts with each other as well as with customers. Non-residents have been given access to the INR Non-Deliverable Foreign Exchange Derivative Contract (NDDC) segment, irrespective of purpose. Market makers in India can now deal in forex market on a 24x5 basis. In fact, all regulatory barriers based on residence, entity, product, venue, and type of exposure have been removed to enable every economic entity to hedge its forex risks flexibily and efficiently.

The size of the forex market has increased substantially over the years (chart 1). The RBI's intervention in the foreign exchange market has been two-sided, driven by the objectives of smoothing excessive volatility, irrespective of its source (Table 1&2). It is observed that demand and supply conditions witness abrupt swings because of sudden and excessive movements in foreign

⁵ In 2000, the Reserve Bank of India included the euro as an intervention currency but has not used it in that role since.



portfolio investment (FPI). This is corroborated by a strong co-movement between FPI flows and the RBI's interventions (Chart 2).

Table	2:	Nature	of	Monthly	Forex	Intervention	
		by RBI	(Ja	an 2006 -	Sept 2	024)	

	Net Intervention (Purchase +/ Sales -)	Purchase	Sale
Total Sample Months	225	225	225
Months of Intervention	202	198	180
% Intervention Months	90	88	80
Average Monthly Intervention (US\$ mn)	1569	7160	6115
Max Intervention (US\$ mn)	18633	36650	38770
Min Intervention (US\$ mn)	-20101	25	25

Source: RBL

Episodes of heightened volatility have been observed during the global financial crisis of 2008-09, the taper tantrums of 2013, the (ILFS) crisis of 2018,

Table 1. Indian Rupee-ob Bonar Exchange Nate and Rb1's Forex intervention								
Period	Exchange Rate at the end of the Period	Appreciation (-) /Depreciation (+) in per cent during the period	Volatility (Standard Deviation)	Net Forex Intervention (Purchase +/ Sales -) (US\$ Bn)	Forex Purchase (US\$ Bn)	Forex Sales (US\$ Bn)		
Jan 2006 –Aug 2008	43.3	-1.64	2.43	110	132	22		
Sep 2008 -Oct 2009	46.9	7.78	1.37	-32	15	47		
Jan 2010 -Dec 2010	44.8	-3.57	0.94	1.8	3.3	1.5		
Jan 2011 -Dec 2011	53.0	15.49	3.11	-13	0	13		
Jan 2012-Dec 2012	54.9	3.37	2.47	-11	7	18		
Jan 2013 -Dec 2013	61.9	11.40	4.22	4	51	47		
Jan 2014-Dec 2014	63.0	1.78	1.20	32	98	66		
Jan 2015-Dec 2015	66.2	4.76	1.72	37	84	48		
Jan 2016 -Dec 2016	67.9	2.55	0.76	9	78	69		
Jan 2017 -Dec 2017	63.8	-6.41	1.10	28	46	18		
Jan 2018-Dec 2018	69.6	8.26	3.11	-16	42	58		
Jan 2019-Dec 2019	71.4	2.49	1.05	40	60	19		
Jan 2020-Dec 2020	73.0	2.26	1.32	88	127	39		
Jan 2021-Dec 2021	74.4	1.86	0.86	33	159	126		
Jan 2022-Dec 2022	82.7	10.07	2.85	-46	180	226		
Jan 2023-Dec 2023	83.2	0.56	0.57	18	185	167		
Jan 2024 -Sep 2024	83.8	0.68	0.33	32	150	118		

Table 1: Indian Rupee-US Dollar Exchange Rate and RBI's Forex Intervention	Table	1: Indian	Rupee-US	Dollar Excha	ange Rate and	l RBI's Forex	Intervention
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Source: CEIC and RBI.



then COVID-19 pandemic, the Russia-Ukraine conflict and more recently, from early 2022 to late 2023 due to spillovers from synchronised monetary tightening around the world, the banking crisis of March 2023, the unwinding of yen-carry trade in August 2024 and fears of recession in September 2024. In the second half of 2024, judicious interventions have ensured that the Indian Rupee (INR) has experienced less volatility than other major currencies, despite the unrelenting pressure from a surging US dollar (Chart 3) and sustained outward flights of FPIs.

IV. Empirical Results

Since our objective is to investigate the efficacy of RBI's interventions, we carry out two sets of analyses using monthly data from January 2014 till



September 2024. First, we examine the impact of interventions in countering the impact of capital flows in an auto regressive distributed lag (ARDL) model that is specified in terms of the changes in the level of the INR/USD:

$$der_t = constant + \beta_0 der_{t-1} + \beta_1 der_{t-2} + BX + \varepsilon_t \dots (1)$$

where, der is monthly change in the INR/USD exchange rate (in per cent). A positive value of der is synonymous with depreciation of INR/USD and vice versa. Since the exchange rate changes are expected to exhibit persistence due to hysteresis (Baldwin, 1988; Campa, 2004), the lagged values of der are included in (1). *X* is a vector of explanatory variables controlling for (i) net FPI flows (debt and equity are also examined separately); (ii) an interaction term - Net FPI x Net interventions (spot and forward interventions are considered separately, as also spot purchases and sales); (iii) inflation differentials (CPI headline inflation in India minus CPI headline inflation in the US), assuming purchasing power parity or PPP; and (iv) the difference between the weighted average call money rate in India and the effective US Fed Fund rate to represent uncovered interest parity (UIP).

In the second stage, the impact of forex interventions on exchange rate volatility is examined. The mean equation in (1) is augmented with volatility equations (2) and (3) – a GARCH model with different specifications (Dominguez, 1993 and Broto, 2013):

$$\varepsilon_{t} = \varepsilon_{t}^{f} h_{t}^{1/2} \qquad \dots (2)$$

$$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 h_{t-1} + \Gamma Y$$
 ... (3)

where, ε_t denotes the error term of the mean equation (1). ε_t is split into a white noise (ε_t^{f}) component and a time-dependent standard deviation segment ($h_t^{1/2}$). h_t is determined by (a) lagged squared error terms (ARCH), (b) its own lagged values (GARCH), and (c) a set of explanatory variables (Y), *i.e.*, US VIX as a measure of global uncertainty;

gross forex intervention (purchases *plus* sales) in a month, which captures the volume affect; and the nonlinear effects of gross interventions in the form of a squared term.

The results indicate that an increase in net FPI inflows leads to INR appreciation and vice versa. Both debt and equity portfolio flows are found to be statistically significant in the same direction . Inflation differentials and interest rate differentials are not statistically significant (Table 3) - neither PPP nor UIP holds in short-run in Indian conditions. The coefficient of the interaction term (net FPI *x net Intervention*)⁶ is positive and statistically significant, opposing the negative and significant impact of net FPI flows term and indicating that forex intervention, both purchases and sales, effectively weaken the impact of capital flows on the exchange rate. These coefficients are also found to be statistically not different from one another⁷, which suggests no asymmetry in the impact of forex purchases and sales on the exchange rate. The coefficient of the interaction term between forward market interventions and net FPI is also positive and statistically significant, indicating that forward market interventions⁸ also reduce the impact of FPI flows on exchange rate changes .

The US VIX has a positive and statistically significant impact on exchange rate volatility, indicating that heightened global uncertainty accentuates exchange rate volatility in India. The impact of the gross spot intervention, on the other hand, is statistically significant and negative,

 $^{^6}$ The interaction term is supposed to be positive always, as the purchases (+) happens when net inflows (+) occurs and sales (-) happens when net outflows (-) occurs. Hence the results can be interpreted in terms of the absolute size of the intervention.

 $^{^7\,}$ Wald test for equality of coefficients of (Net FPI x purchases) and (Net FPI x sales) in Model 3 (Table 3): chi-square p-value = 0.184.

⁸ As against spot market intervention for which the effect on INR/USD is contemporaneous only, forward market intervention is supposed to affect the exchange rate contemporaneously and over a period. The outstanding amount represents the cumulative action taken so for, and the elasticity represents the impact of current and previous actions.

Table 3: Regression Estimates: Dependent Variable is Changes in INR/USD								
Exogenous Variables	(1)	(2)	(3)	(4)	(5)	(6)		
		1	Mean H	Equation				
Inflation differential (-1)	0.023 (0.672)	0.003 (0.965)	0.015 (0.765)	0.049 (0.387)	(-) 0.024 (0.734)	-0.023 (0.748)		
Interest rate differential (-1)	0.001 (0.975)	0.017 (0.722)	0.032 (0.448)	(-) 0.020 (0.652)	0.010 (0.830)	0.013 (0.771)		
Net FPI inflows	(-) 0.151*** (0.000)		(-) 0.206*** (0.000)	(-) 0.121*** (0.000)	(-) 0.108*** (0.000)	(-) 0.112*** (0.000)		
Net FPI inflows (Equity)		(-) 0.119*** (0.002)						
Net FPI inflows (Debt)		(-) 0.209*** (0.002)						
Net FPI x Net Intervention Spot	0.007** (0.023)	0.007** (0.018)						
Net FPI x Spot Purchases [#]			0.005** (0.047)					
Net FPI x Spot Sales [^]			0.008*** (0.001)					
Net FPI x Outstanding Forwards				0.015*** (0.000)				
Constant	0.281 (0.130)	0.276 (0.144)	0.194 (0.259)	0.291* (0.091)	0.433** (0.014)	0.412** (0.020)		
AR (-1)	0.030 (0.721)	0.039 (0.670)	(-) 0.027 (0.764)	0.121 (0.220)	(-) 0.009 (0.925)	(-) 0.032 (0.740)		
AR (-2)	(-) 0.066 (0.516)	(-) 0.048 (0.668)	(-) 0.091 (0.359)	(-) 0.137 (0.198)	(-) 0.075 (0.436)	(-) 0.099 (0.290)		
		Volatility E	quation					
ARCH (-1)					(-) 0.088* (0.054)	(-) 0.114** (0.017)		
ARCH (-2)					0.036 (0.826)	0.073 (0.626)		
GARCH (-1)					0.239 (0.388)	0.319** (0.034)		
US VIX					0.052** (0.042)	0.050** (0.034)		
Gross Intervention Spot					(-) 0.569*** (0.009)	(-) 4.690*** (0.000)		
Gross Intervention Spot ²						0.219*** (0.000)		
Constant					4.142** (0.028)	23.318*** (0.000)		
Portmanteau test for white noise of residuals (p-value)	0.243	0.166	0.792	0.517	0.486	0.510		

 residuals (p-value)
 Note:

 Note: p-values in parentheses are based on robust standard errors; *p<0.1, ** p < 0.05, *** p < 0.01; AR: Auto Regressive; ARCH: Auto Regressive</td>

Conditional Heteroscedastic; GARCH: Generalized ARCH.

#: The interaction term is generated in those months where there are net purchases, otherwise kept zero.>: The interaction term is generated in those months where there are net sales, otherwise kept zero.

Source: Authors' estimates

implying that interventions curb exchange rate volatility, confirming the results from (1) to (4) in Table 3. The relationship is non-linear as shown by the positive and statistically significant impact of the squared term, suggesting the existence of threshold effects and explaining the "leaning against the wind" phenomenon.

V. Conclusion

Several emerging market economies (EMEs) have opted for market-determined exchange rates - broadly classified as managed floats in de jure terms - to reap the equilibrating properties of freer exchange rates movements in the context of balance of payments disquilibria. The experience with floating exchange rates the world over has, however, been quite the converse, marked by idiosyncratic movements, overshoots hysteresis and several generations of currency crises, with adverse implications for domestic real economic activity. Hence, EMEs and even several advanced economies (AEs) have employed foreign exchange interventions to curb excessive exchange rate volatility and thereby prevent macroeconomic and financial stability risks from materialising. These interventions assume policy relevance, especially when net international investment positions are negative and when imports are a significant component of consumer prices. In this context, it has been acknowledged that marrying foreign exchange interventions with inflation targeting has significantly strengthened EMEs macroeconomic policy framework (BIS, 2019). This has also led to the recognition of such interventions as a legitimate instrument in the macroeconomic toolkit of EMEs [IMF, 2016; Adler et al., (2016)].

The results of the empirical analysis presented here shows that with the progressive liberalisation of current and capital transactions, the Indian economy has experienced bouts of exchange rate volatility, with destabilising consequences for real activity. It is the volatility of portfolio flows induced by risk-on-risk-off sentiments, mainly on account of global spillovers, that is the source of exchange rate volatility rather than differentials in inflation or interest rates. Foreign exchange interventions, both spot and forward, effectively counter capital flows volatility, with symmetric effects of purchases and sales. We also detect threshold effects of forex interventions. Throwing sand in the wheels to dampen the exchange rate volatility is more effective than attempts to influence the level of the exchange through large interventions. This finding has important implications for the conduct of exchange rate policy in countries like India.

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