

Capital Flows and Foreign Exchange Intervention Under India's Inflation Targeting Regime

Yash Khaitan[†] Ashoka University

May 2026

Abstract. *This paper examines whether India's adoption of flexible inflation targeting (FIT) in 2016 altered the dynamic relationship between capital flows and foreign exchange intervention. Using a structural vector autoregressive model on quarterly data from 2002Q1 to 2025Q3, capital flow shocks are identified as the dominant driver of reserve dynamics, explaining over 60% of forecast error variance at the twenty-quarter horizon. The reserve response to capital inflows is positive and persistent while the response to exchange rate depreciation is negligible, confirming asymmetric intervention. A split-sample analysis reveals two structural shifts post-FIT: the capital flow response to interest rate differential shocks reverses sign, consistent with monetary tightening being reinterpreted as a signal of domestic stress rather than a carry opportunity, and the reserve accumulation response to capital flow shocks attenuates markedly, becoming statistically insignificant by the fourth quarter compared to ten quarters pre-FIT. These findings suggest that FIT altered both the external signalling channel of monetary policy and the intensity of reserve intervention in India, consistent with a gradual transition toward greater exchange rate flexibility as the framework has matured.*

JEL Classification: E52, F31, F32, E58

Keywords: Foreign exchange intervention, inflation targeting, capital flows, structural VAR, India, Reserve Bank of India

1 Introduction

Between 2002 and 2025, India's foreign exchange reserves grew from approximately \$60 billion to over \$700 billion, making the Reserve Bank of India one of the largest reserve holders in the world. This accumulation did not happen passively. It was driven by deliberate central bank intervention in the foreign exchange market, with the RBI purchasing foreign currency to manage the rupee, absorb capital inflows, and maintain external stability. This paper investigates whether the nature of this intervention changed when India adopted flexible inflation targeting in 2016, shifting its primary policy mandate toward price stability.

In June 2016, the RBI Act was formally amended to provide a statutory basis for flexible inflation targeting (FIT). Price stability was identified as the primary objective of monetary policy with a CPI inflation target of

4% ($\pm 2\%$) and a six-member Monetary Policy Committee constituted to set the policy repo rate. Before this reform, the RBI operated under a multiple indicator approach in which the exchange rate and capital flows were explicit policy considerations alongside inflation. After 2016, the mandate was legally narrowed to price stability. The exchange rate and capital flows were no longer explicit targets, even while still being monitored. This has a direct and underexplored implication for reserve accumulation. If the RBI is no longer simultaneously targeting the exchange rate and inflation, the intensity with which it intervenes to absorb capital inflows may have changed.

This paper examines whether India's adoption of flexible inflation targeting in 2016 altered the relationship between capital flows and foreign exchange reserve accumulation. Specifically, it asks whether the RBI's response to capital inflow surges involving accumulating reserves to prevent rupee appreciation became less intense and less persistent after price stability replaced exchange rate management as the primary policy mandate. I hypothesize that if FIT narrowed the RBI's objectives, the magnitude and persistence of reserve accumulation in response to capital flow shocks should be smaller after 2016 than before, as the central bank faces less institutional pressure to resist rupee appreciation when the exchange rate is no longer an explicit target.

The analysis yields three main findings. First, over the full sample, capital flow shocks are the dominant driver of reserve interventions, explaining over 60% of forecast error variance in reserves at the twenty-quarter horizon. The reserve response to capital inflow surges is positive and persistent, remaining statistically significant for approximately eight quarters, while the reserve response to exchange rate depreciation shocks is negligible throughout, confirming the asymmetric intervention pattern documented in literature (Adler et al., 2021; Levy-Yeyati and Gómez, 2022b; Ramachandran and Srinivasan, 2007; Ramachandran and Maheswari, 2022) for the first time on data through 2025Q3. Second, the split-sample analysis reveals that the response of capital flows to an interest rate differential shock reverses sign after FIT adoption, turning negative in the post-FIT period, suggesting that monetary tightening under FIT is interpreted by foreign investors as a signal of domestic inflation stress rather than a carry opportunity. Third, and most directly relevant to the paper's hypothesis, the reserve accumulation response to capital flow shocks attenuates post-FIT, with the response becoming statistically indistinguishable from

[†]yash.khaitan.ug2023@ashoka.edu.in

zero by approximately the fourth quarter compared to ten quarters in the pre-FIT period, consistent with the RBI allowing a greater share of capital flow adjustment to occur through the exchange rate under the new framework.

The remainder of the paper is structured as follows. Section 2 reviews the existing literature on foreign exchange intervention behaviour in emerging markets, asymmetric intervention in India, and the implications of inflation targeting adoption for exchange rate management and monetary policy transmission. Section 3 describes the data, variable construction, and econometric methodology, including the specification and identification of the structural VAR. Section 4 presents the baseline results from the full-sample estimation, discussing the impulse response functions and variance decomposition. Section 5 examines the impact of India's adoption of flexible inflation targeting by comparing pre- and post-2016 impulse responses. Section 6 concludes and outlines directions for future research.

2 Literature Review

Although conventional wisdom originally suggested that a free-floating exchange rate is a prerequisite for a full-fledged inflation targeting regime, emerging market central banks continue to intervene heavily in foreign exchange markets, a phenomenon Calvo and Reinhart (2002) term the fear of floating. Foreign exchange intervention remains pervasive across emerging market and developing economies, with central banks actively managing exchange rates even after adopting formal inflation targeting frameworks (Hofman et al., 2020). This persistent intervention is driven by identifiable macroeconomic objectives, primarily managing exchange rate volatility, absorbing surges in cross-border capital flows, preventing currency appreciation that could undermine export competitiveness, and safeguarding domestic financial stability against external shocks (Hofman et al., 2020). The literature consistently documents that this intervention behaviour is asymmetric. Central banks in emerging markets lean more forcefully against currency appreciation than depreciation, aggressively purchasing foreign exchange to absorb capital inflows while responding more passively to depreciation pressure (Adler et al., 2021; Levy-Yeyati and Gómez, 2022a). This asymmetric pattern is particularly pronounced in India, where the scale of reserve accumulation and the managed exchange rate framework make the RBI's intervention behaviour a central question for understanding external macroeconomic adjustment.

The India-specific literature confirms this behavioural bias. Studies investigating the RBI's intervention behaviour, such as Ramachandran and Srinivasan (2007) and Ramachandran and Maheswari (2022), consistently reveal an asymmetric intervention pattern where the RBI accumulates reserves aggressively in response to appreciation pressures on the rupee but responds passively or

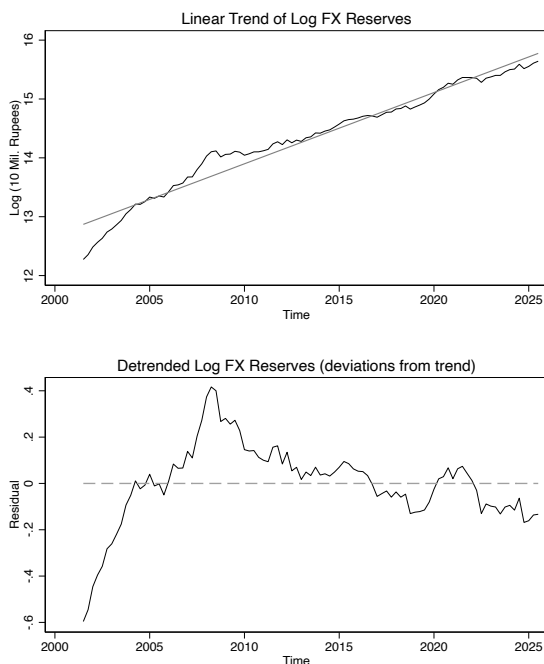
insignificantly to depreciation pressure of comparable magnitude. While these studies effectively establish the pre-existing pattern of asymmetric intervention in India, two key limitations remain. First, they rely on single-equation frameworks that cannot structurally identify and separate the interconnected capital flow and exchange rate channels. Second, and most directly relevant to this paper, none of these studies examine whether India's adoption of flexible inflation targeting in 2016 altered this established intervention behaviour. Both limitations are explicitly addressed by the structural framework and split-sample analysis employed in this paper.

Whether and how inflation targeting changes this intervention behaviour is a question the cross-country literature has begun to answer. The adoption of an inflation targeting framework is theoretically expected to alter how central banks respond to capital flows, typically leading to greater exchange rate flexibility over time. Cross-country empirical evidence confirms that emerging markets adopting inflation targeting transition toward more flexible exchange rate regimes compared to their non-targeting peers (Ebeke and Fouejieu, 2015). This shift is shaped by the constraints of the impossible trinity (Mundell, 1963), which posits that a country seeking to fully leverage an independent monetary policy alongside free capital mobility cannot simultaneously manage the nominal exchange rate through sustained foreign exchange intervention. However, this transition is rarely instantaneous. Because many emerging markets do not meet all necessary macroeconomic preconditions at the inception of their inflation targeting regimes, they often initially maintain heavily managed exchange rates. As the policy framework matures and credibility is established, central banks exhibit a learning-by-doing effect, gradually reducing their reliance on foreign exchange intervention and allowing the exchange rate to absorb a greater share of external pressure (Ebeke and Fouejieu, 2015). Despite this expectation of greater flexibility, empirical evidence shows that asymmetric foreign exchange intervention often persists in emerging markets even after inflation targeting adoption (Adler et al., 2021), consistent with the continued positive reserve response observed in the post-FIT period in this paper. While this cross-country literature generates a clear prediction that the intensity and persistence of foreign exchange intervention should attenuate as an inflation targeting regime matures, whether this holds for India's specific institutional context remains an open question.

Turning to the evidence on monetary policy transmission under the FIT framework in India, the existing literature suggests that the 2016 regime change did alter the external transmission of monetary policy in ways consistent with the patterns documented in this paper. The implementation of flexible inflation targeting structurally altered the monetary policy transmission mechanism in

India, particularly regarding its external dimensions (Alex, 2025). By shifting its mandate away from direct exchange rate management toward price stability, the RBI adopted a less interventionist stance, with monetary policy shocks exerting a substantially diminished influence on the exchange rate compared to the pre-targeting era. Despite improved domestic transmission and the disappearance of the historical price puzzle (Alex, 2025; Phul, 2024), the external transmission of monetary policy under the FIT regime exhibits anomalous patterns. Empirical evaluations document a persistent exchange rate puzzle during the FIT period, wherein an unexpected contractionary monetary policy shock leads to a significant depreciation of the Indian rupee rather than the theoretically predicted appreciation (Alex, 2025; Phul, 2024). Furthermore, global factors such as the US federal funds rate continue to account for a sizable portion of fluctuations in India’s policy rate, demonstrating that the Indian economy remains highly susceptible to external spillovers (Phul, 2024). While the existing literature successfully identifies these anomalous external transmission dynamics under the FIT framework, it does not examine how the RBI’s foreign exchange intervention behaviour has structurally adapted to the constraints of the new inflation targeting mandate. This paper fills that gap by providing the first split-sample structural evidence on how the transmission from interest rate differentials through capital flows to foreign exchange intervention changed following India’s 2016 regime shift.

Figure 1: Log FX Reserves Trend and Deviations



3 Data and Methodology

The empirical analysis uses quarterly data for India spanning 2002Q1 to 2025Q3. The period encompasses major episodes of global financial stress, including the 2008 Global Financial Crisis, the 2013 taper tantrum, the 2016 adoption of flexible inflation targeting, the COVID-19 shock of 2020, and the global monetary tightening cycle of 2022, each of which generated significant variation in capital flows and exchange rate pressures in India.

The system comprises four variables. The *interest rate differential* (IRD) is defined as the spread between India’s policy repo rate and the United States federal funds rate, sourced from the Reserve Bank of India (2024b) and the Bank for International Settlements (2024), respectively. It captures the relative attractiveness of domestic financial assets compared to US assets as a driver of capital flows. *Net capital flows* (CF) are measured as the financial account balance from India’s balance of payments, expressed as a percentage of GDP, and are sourced from the RBI’s balance of payments statistics¹ and the Central Statistics Office (CSO) national accounts². The *nominal exchange rate* (ER) is measured as the bilateral USD/INR rate, sourced from the RBI, and captures the domestic currency value in terms of the US dollar. *Foreign exchange reserves* (RES) are measured in nominal rupee terms and sourced from the RBI, serving as a proxy for central bank intervention in the foreign exchange market.

All variables are transformed prior to estimation to ensure stationarity. The exchange rate and interest rate differential are used in first differences, capital flows are stationary in levels, and foreign exchange reserves are expressed in natural logarithm and detrended by regressing the log series on a linear time trend and retaining the residuals. This removes the secular upward trend associated with long-run reserve accumulation while preserving variation around the trend path.

3.1 Unit Root Tests

Table 1: Augmented Dickey–Fuller Unit Root Test

Variables	In Levels		In Differences	
	$Z(t)$	p -val	$Z(t)$	p -val
IRD	-1.309	0.6252	-3.921	0.01
Log ER	0.448	0.9832	-4.639	0.01
CF	-4.047	0.01	—	—
Log RES	-2.154	0.2233	—	—
Log RES (D)	-2.712	0.0720	—	—

Note: All tests specify a random walk without drift as the null hypothesis. Lag length is set to 4. (D) Indicates that the variable has been detrended by regressing on a linear time trend and then considering the residuals.

¹Reserve Bank of India (2024a)

²National Statistical Office (2024)

The time-series properties of all variables are examined using Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) unit root tests. The results for the ADF test, reported in Table 1, indicate that the log of nominal exchange rate and the interest rate differential are integrated of order one, $I(1)$, becoming stationary upon first differencing. Net capital flows are stationary in levels, $I(0)$. Foreign exchange reserves are non-stationary in logs but stationary after de-trending (Figure 1). Accordingly, the empirical analysis proceeds using the stationary transformations described above.

3.2 Co-Integration Tests

Prior to estimating the VAR, the possibility of a long-run co-integrating relationship among the non-stationary variables is examined using the Engle–Granger two-step test (Engle and Granger, 1987). The test is applied to the interest rate differential (IRD) and the log nominal exchange rate (Log ER), the two variables found to be integrated of order one in the unit root analysis.

The results are reported in Table 2. The test statistic is $Z(t) = -0.845$, which falls well above the 10% critical value of -3.089 . The null hypothesis of no co-integration cannot be rejected at any conventional significance level. This result indicates that IRD and Log ER do not share a long-run equilibrium relationship over the sample period, and no error correction mechanism need be incorporated into the model. Accordingly, the empirical analysis proceeds with a VAR estimated in stationary form using the variable transformations described above.

Table 2: Engle–Granger Co-Integration Test

Variables	$Z(t)$	Critical Values		
		1%	5%	10%
IRD–Log ER	−0.845	−4.013	−3.401	−3.089

Note: H_0 : No co-integration. Test statistic fails to reject H_0 at all conventional significance levels. Critical values from MacKinnon (1990, 2010). $N = 96$.

3.3 Vector Autoregressive Model

To capture the dynamic interactions among the variables, a vector autoregressive (VAR) model is employed. Unlike single-equation regression models, which treat one variable as the outcome and the rest as explanatory variables, the VAR framework treats all variables as jointly endogenous. This means each variable is allowed to influence, and be influenced by, every other variable in the system over time. This is well motivated in our setting, since the relationships among interest rate differentials, capital flows, exchange rate movements, and reserve accumulation are unlikely to run in a single direction. A rise in the interest rate differential may attract capital inflows, which in turn appreciate the exchange rate, which then triggers

central bank intervention to accumulate reserves, all of which may feed back into future interest rate and capital flow dynamics.

Formally, the reduced-form VAR of order p specifies each variable at time t as a linear function of the past p values of all variables in the system, plus an error term. The system can be written compactly as:

$$Y_t = c + \sum_{i=1}^p \Gamma_i Y_{t-i} + \mu_t \quad (1)$$

$$E(\mu_t \mu_t^\top) = \Omega \quad (2)$$

where Y_t is the $k \times 1$ vector of endogenous variables at time t :

$$Y_t = [\Delta \text{IRD}_t, \text{CF}_t, \Delta \text{ER}_t, \text{RES}_t]^\top$$

Here c is a $k \times 1$ vector of constants, Γ_i is the $k \times k$ matrix of coefficients on the i -th lag of Y_t , and μ_t is the $k \times 1$ vector of reduced-form innovations. The $k \times k$ matrix $\Omega = E(\mu_t \mu_t^\top)$ is the variance–covariance matrix of these innovations, which captures how the unexplained components of the variables move together contemporaneously.

Optimal lag length p is selected using the Akaike Information Criterion (AIC) and the Final Prediction Error criterion (FPE), both of which select a lag order of two (Table 3). The Hannan–Quinn Information Criterion (HQIC) and the Schwarz Bayesian Information Criterion (SBIC) favour a lag order of one; however, these criteria impose a heavier penalty on additional parameters and are known to underselect in small samples (Stock and Watson, 2015). The lag-two specification is additionally supported by the likelihood ratio test, which rejects the null of lag one against lag two at the 1% significance level ($\text{LR} = 34.643$, $p = 0.004$). A lag order of two is therefore adopted for the baseline estimation, implying that each variable depends on its own values and those of all other variables up to two quarters prior.

Table 3: Optimum Lag Length Selection Criteria

SBIC(n)	HQIC(n)	AIC(n)	FPE(n)
1	1	2	2

3.4 Structural VAR Identification

While the reduced-form VAR is useful for characterising the joint dynamics of the variables, its innovations μ_t are mutually correlated and therefore cannot be assigned a structural economic interpretation. For example, a shock to the exchange rate equation in the reduced form will in general reflect a mixture of a pure exchange rate shock, a capital flow shock, and a monetary policy shock simultaneously. To isolate distinct, economically meaningful

shocks that originate purely from a single variable, the reduced-form VAR is transformed into a structural VAR (SVAR) using the AB-model representation. The structural form is given by:

$$A_0 Y_t = d + \sum_{i=1}^p A_i Y_{t-i} + B \varepsilon_t \quad (3)$$

$$E(\varepsilon_t \varepsilon_t^\top) = I_k \quad (4)$$

where A_0 is the $k \times k$ matrix of contemporaneous relationships among the variables, capturing how each variable responds to the others within the same time period. A_i are structural lag coefficient matrices, B is a diagonal matrix whose elements scale the structural shocks, and ε_t is the vector of mutually uncorrelated structural disturbances with covariance matrix I_k .

Pre-multiplying equation (3) by A_0^{-1} recovers the reduced form, establishing the following mappings between structural and reduced-form parameters:

$$\Gamma_i = A_0^{-1} A_i, \quad \mu_t = A_0^{-1} B \varepsilon_t \quad (5)$$

It follows that the reduced-form variance–covariance matrix satisfies:

$$\Omega = A_0^{-1} B B^\top (A_0^{-1})^\top \quad (6)$$

The challenge in structural identification is that Ω is an observable symmetric matrix providing $k(k+1)/2$ unique pieces of information, while the matrices A_0 and B together contain more free parameters than this. Additional restrictions are therefore required to achieve identification.

Identification is achieved through the AB-model with a recursive (Cholesky) ordering. The matrix A_0 is restricted to be lower triangular with ones on the diagonal, and B is restricted to be diagonal with free positive elements. Specifically:

$$A_0 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 \\ a_{41} & a_{42} & a_{43} & 1 \end{bmatrix} \quad (7)$$

$$B = \begin{bmatrix} b_{11} & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 \\ 0 & 0 & b_{33} & 0 \\ 0 & 0 & 0 & b_{44} \end{bmatrix} \quad (8)$$

where the rows and columns of A_0 correspond to Δ IRD, CF, Δ ER, and RES respectively. The zeros above the diagonal of A_0 are the identifying restrictions: they impose that a variable ordered later in the system has no contemporaneous effect on variables ordered before it. The free elements a_{ij} below the diagonal capture the within-period

impact of earlier variables on later ones, and are estimated from the data. The diagonal elements of B are the standard deviations of the structural shocks and are also freely estimated.

The ordering adopted is:

$$\Delta$$
IRD \rightarrow CF \rightarrow Δ ER \rightarrow RES

The economic justification for this ordering is as follows. The interest rate differential is treated as the most exogenous variable, as monetary policy adjustments in India and the United States are made at discrete intervals and respond to domestic macroeconomic conditions rather than to contemporaneous movements in capital flows or the exchange rate within the same quarter. Net capital flows are placed second, as portfolio investors respond within the quarter to changes in relative returns across countries. The exchange rate adjusts third, responding contemporaneously to capital flow pressures: net inflows exert upward pressure on the rupee while outflows are associated with depreciation. Foreign exchange reserves are placed last, based on the assumption that the Reserve Bank of India observes all contemporaneous developments in monetary conditions, capital flows, and the exchange rate before deciding on the scale of intervention which is consistent with the managed exchange rate framework prevailing in India over the sample period.

3.5 Split-Sample Design

To test the hypothesis, the SVAR is estimated on three samples: the full period (2002Q1–2025Q3), the pre-FIT period (2002Q1–2016Q1), and the post-FIT period (2016Q2–2025Q3). The full-sample estimation establishes the baseline dynamic relationships. The split-sample estimation compares structural impulse response functions across the two subsamples to assess whether the CF \rightarrow RES transmission attenuated after the regime change. Given the shorter post-FIT sample of 37 quarters, both subsamples are estimated with a lag order of one to preserve degrees of freedom; the Cholesky ordering is maintained throughout.

3.6 Impulse Response Functions and Variance Decomposition

The dynamic effects of structural shocks are analysed using orthogonal impulse response functions (IRFs), which trace the response of each variable to a one-standard-deviation structural innovation in another variable over a horizon of twenty quarters.

Forecast error variance decomposition (FEVD) is used to assess the relative importance of each structural shock in explaining the variation in each endogenous variable. FEVD decomposes the h -step-ahead forecast error variance of a given variable into contributions from its own innovations and those of the remaining variables in the sys-

tem. Together, the IRFs and FEVD characterize the transmission mechanism linking monetary conditions, capital flows, exchange rate adjustment, and central bank reserve intervention in India.

4 Baseline Results

4.1 SVAR Estimation

The baseline SVAR specification is estimated over 2002Q1–2025Q3 with a lag order of two.³ Table 4 reports the correlation matrix of reduced-form residuals. Several off-diagonal elements are economically large and suggest meaningful contemporaneous co-movement among the variables. The correlation between capital flows and the exchange rate is -0.458 , indicating that quarters with stronger capital inflows tend to coincide with rupee appreciation. The correlation between capital flows and reserves is 0.541 , consistent with the RBI absorbing excess foreign currency inflows through reserve accumulation within the same quarter.

These non-trivial contemporaneous correlations confirm that a structural identification scheme is necessary to recover orthogonal shocks, and motivate the recursive Cholesky ordering described in the methodology. The dynamic responses of each variable to a one-standard-deviation structural shock, traced using structural impulse response functions (SIRFs) over a horizon of 20 quarters, are discussed next.

Table 4: Correlation Matrix of Reduced-Form Residuals

	ΔIRD	CF	ΔER	RES
ΔIRD	1.000			
CF	0.193	1.000		
ΔER	-0.047	-0.458	1.000	
RES	0.084	0.541	-0.114	1.000

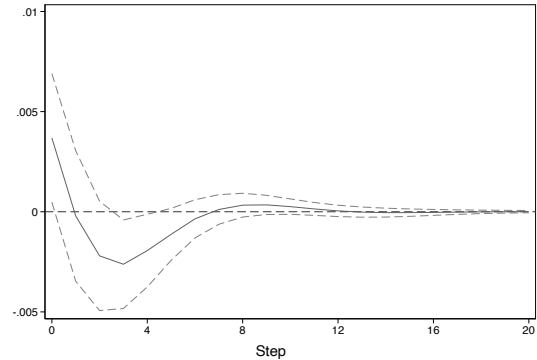
Note: Residuals obtained from the reduced-form VAR estimated with lag order two. Sample: 2002Q1–2025Q3. $N = 94$.

4.2 Impulse response functions

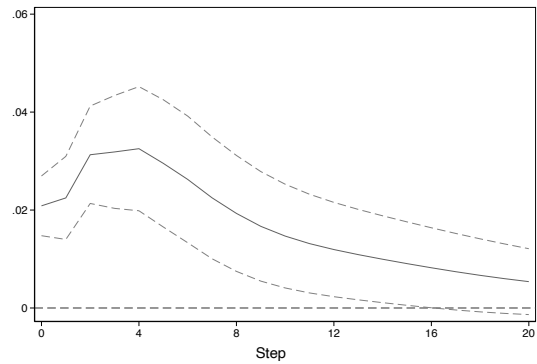
The complete grid of all sixteen structural IRFs is presented in Appendix Figure A1. The discussion focuses on the four responses most central to the paper’s research question: the transmission from the interest rate differential to capital flows and reserves, and the response of reserves to capital flow and exchange rate shocks. Each IRF traces the dynamic response of a variable to a one-standard-deviation structural shock over a horizon of 20 quarters.

Over the full sample, a positive shock to the interest rate differential generates a positive and statistically significant response in net capital flows in the first two to three quarters before the effect dissipates (Figure 2a). This is

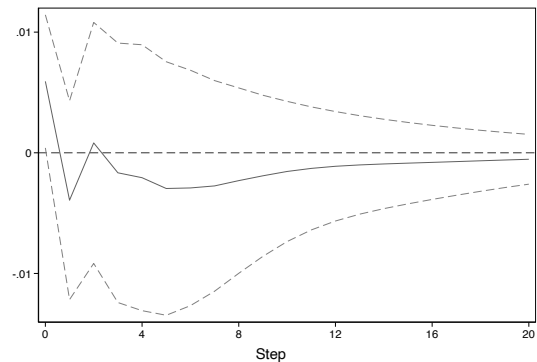
consistent with the standard interest parity mechanism where relative returns on domestic financial assets attract portfolio investment from abroad, generating net inflows in the short run. This full-sample result, however, masks the potential heterogeneity across the pre- and post-FIT periods.



(a) Interest Rate Differential → Capital Flows



(b) Capital Flows → Reserves



(c) ER → Reserves

Figure 2: Key impulse response functions (SVAR, 90% CIs)

³The Lagrange multiplier test for serial correlation fails to reject the null of no serial correlation at the 5% level.

The response of foreign exchange reserves to a positive capital flow shock is positive on impact, rises to a peak around the third to fourth quarter, and remains statistically significant for approximately eight quarters before gradually returning to zero (Figure 2b). The magnitude and persistence of this response indicates that the RBI systematically intervenes to accumulate reserves when capital inflows are strong, rather than allowing the exchange rate to absorb the full adjustment.

Finally, the response of reserves to a positive shock to ΔER (an unanticipated depreciation of the rupee) is negligible and statistically insignificant throughout the 20-quarter horizon (Figure 2c). The point estimate oscillates around zero and the confidence bands are wide, providing no evidence that exchange rate depreciation systematically triggers reserve drawdowns over the full sample. This null result is itself informative when taken together with the positive and persistent response of reserves to capital flow shocks. It suggests that the RBI's reserve operations over this period have been oriented more towards absorbing capital inflow surpluses than towards defending the exchange rate during depreciation episodes. This asymmetry suggests that exchange rate defence through reserve sales has not been a first-order feature of RBI intervention over the full sample period.

This persistent and asymmetric intervention pattern with systematic accumulation in response to capital inflows but no systematic depletion in response to depreciation, is the dynamic the paper hypothesizes should have weakened after 2016. The subsequent sections test this directly by comparing structural impulse responses across the pre- and post-FIT subsamples.

4.3 Forecast Error Variance Decomposition

Table 5 reports the forecast error variance decomposition (FEVD) of foreign exchange reserves at selected horizons. The FEVD decomposes the h -step-ahead forecast error variance of reserves into contributions from each structural shock, providing a summary measure of the relative importance of different drivers of reserve dynamics over time.

In the short run, own shocks account for the largest share of variation in reserves, explaining 68.4% of forecast error variance at the one-quarter horizon. The contribution of capital flow shocks rises over time, from 28.6% at the one-quarter horizon to 47.1% at four quarters and 62.4% at the twenty-quarter horizon. This confirms that capital flows are the dominant external driver of reserve dynamics in India over the medium to long run, consistent with the impulse response evidence presented earlier. The contribution of interest rate differential shocks to reserve variation is modest throughout, rising only to 1.5% at the twenty-quarter horizon, suggesting that monetary policy influences reserves primarily indirectly through its effect on capital flows rather than through a direct chan-

nel. Exchange rate shocks contribute negligibly to reserve variation at all horizons, peaking at just 2.3% at the one-quarter horizon and declining to 0.8% by the twentieth quarter, consistent with the statistically insignificant IRF of reserves to exchange rate shocks documented earlier.

Table 5: Forecast Error Variance Decomposition: Foreign Exchange Reserves

Horizon (Quarters)	ΔIRD (%)	CF (%)	ΔER (%)	RES (%)
1	0.7	28.6	2.3	68.4
4	2.8	47.2	0.9	49.2
8	1.9	59.6	0.8	37.8
12	1.7	61.5	0.8	36.0
20	1.5	62.4	0.8	35.2

Note: Each row reports the percentage of the h -step-ahead forecast error variance of detrended log foreign exchange reserves attributed to each structural shock. Columns sum to 100. Sample: 2002Q1–2025Q3.

5 Pre vs Post Inflation Targeting

5.1 Motivation and Design

The full-sample estimates treat the entire 2002–2025 period as structurally uniform, abstracting away from the monetary policy regime change that occurred when India adopted flexible inflation targeting in June 2016. Prior to FIT, the RBI operated under a multiple indicator approach in which the repo rate was one signal among many, alongside exchange rate, credit, and output conditions. Under FIT, price stability became the primary and legally mandated objective of monetary policy, with the repo rate anchored to a 4% CPI inflation target with a $\pm 2\%$ tolerance band. This shift has two direct implications for the transmission chain examined in this paper. First, the interest rate differential may have become a more credible and predictable signal to foreign portfolio investors under FIT, altering the sensitivity of capital flows to monetary policy conditions. Second, with inflation as the primary mandate and greater exchange rate flexibility officially sanctioned, the RBI's incentive to accumulate reserves in response to capital inflows may have diminished, as the central bank is no longer simultaneously targeting the exchange rate and inflation under the same policy umbrella. The SVAR is therefore re-estimated separately over the pre-FIT period (2002Q1–2016Q1) and the post-FIT period (2016Q2–2025Q3), and the structural impulse response functions are compared across the two subsamples to test whether the $CF \rightarrow RES$ transmission attenuated following the regime change, as the paper's hypothesis predicts.

5.2 Impulse Responses

Figure 3 presents the structural impulse response functions from the pre-FIT (2002Q1–2016Q1) and post-FIT (2016Q2–2025Q3) subsamples side by side. Given the shorter post-FIT sample of 37 quarters, both subsamples

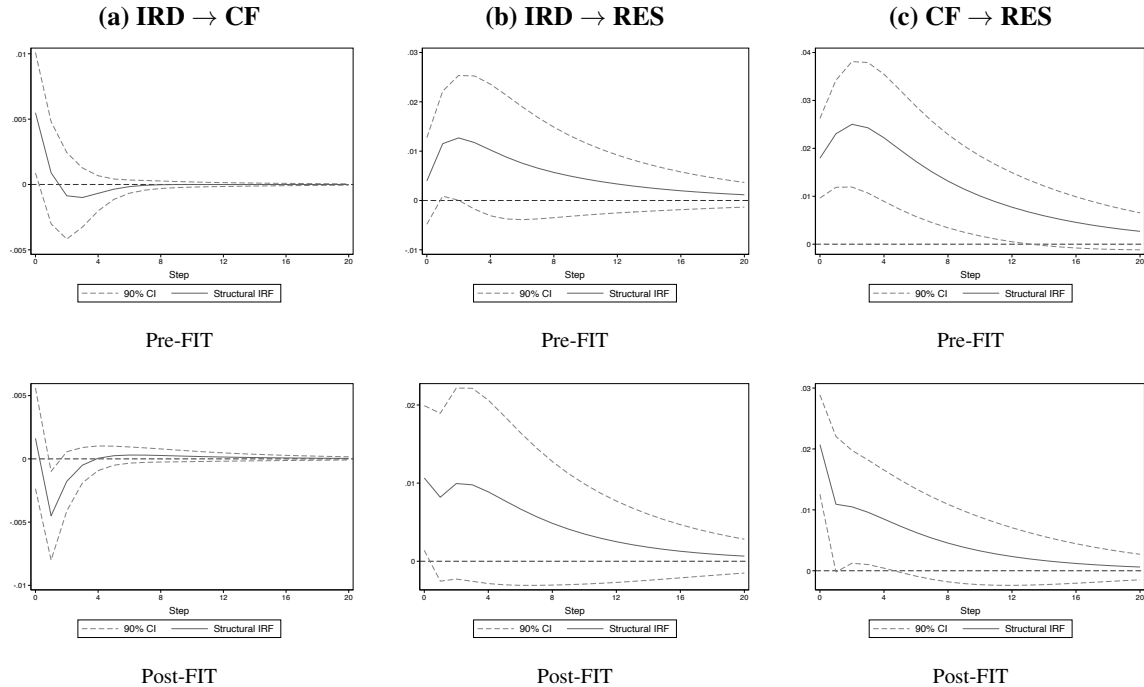


Figure 3: Comparison of impulse responses across regimes. The top row shows pre-FIT estimates and the bottom row shows post-FIT estimates. Shaded regions denote 90% confidence intervals.

are estimated with a lag order of one to preserve degrees of freedom; the recursive Cholesky ordering is maintained throughout.⁴

The comparison across the three transmission channels reveals substantial differences in dynamic responses before and after the regime change. In the pre-FIT period, the response of capital flows to an interest rate differential shock is positive on impact and statistically significant in the first one to two quarters, consistent with the standard interest parity mechanism where a widening of the India–US interest rate differential attracts portfolio inflows in the short run (Figure 3a). In the post-FIT period, by contrast, the response is statistically insignificant on impact but turns negative by the first quarter, reaching its trough around the second quarter before recovering to zero. The response of reserves to an interest rate differential shock also differs across subsamples (Figure 3b). In the pre-FIT period, the response builds gradually, peaking around the second to third quarter before dissipating slowly. In the post-FIT period, the on-impact response is larger but dissipates more rapidly, returning toward zero by approximately the sixth quarter. Finally, the response of reserves to a capital flow shock follows the same pattern (Figure 3c). In the pre-FIT period, the response peaks around the third to fourth quarter and remains statistically significant for approximately ten quarters. In the post-

FIT period, the response is positive on impact but drops sharply, with the lower confidence band crossing zero by approximately the fourth quarter.

The sign reversal in the capital flow response is consistent with the mechanism identified by Ho and McCauley (2003), who note that the effect of monetary tightening on capital flows in inflation targeting emerging markets is not always unambiguous. Under the pre-FIT multiple indicator approach, a widening interest rate differential signalled a deliberate intention to attract foreign capital, generating inflows consistent with the standard interest parity mechanism (Matschke et al., 2023). Under FIT, where rate increases are driven by the legal obligation to meet the inflation target, foreign investors may instead interpret monetary tightening as a signal of domestic macroeconomic stress rather than a carry opportunity, causing capital inflows to suffer (Ho and McCauley, 2003). This is consistent with the exchange rate puzzle documented by Phul (2024) for the post-FIT period in India, where contractionary monetary policy is associated with rupee depreciation rather than the theoretically predicted appreciation.

Two further mechanisms from the existing literature support the attenuation in reserve responses visible in panels (b) and (c). First, the shorter-lived reserve responses post-FIT are consistent with the learning-by-doing effect identified by Ebeke and Fouejieu (2015), who find that as IT regimes mature, central banks become more willing to allow the exchange rate to absorb external pressure

⁴Lag order selection criteria applied to the post-FIT subsample favour a lag order of one, consistent with this choice. The pre-FIT results are qualitatively unchanged when estimated with lag order two.

rather than intervening through reserve accumulation. India adopted FIT in 2016 and the post-FIT sample covers only nine years, a period during which this transition may still be in progress. The sharp early drop in the post-FIT reserve responses, visible in the lower panels of Figure 3b and Figure 3c, is consistent with this gradual shift where the RBI continues to intervene on impact but withdraws more quickly, allowing the exchange rate to absorb an increasing share of the adjustment. Second, the degree of attenuation is consistent with the constraints imposed by India's relatively open capital account. Under the impossible trinity (Mundell, 1963), a central bank pursuing an independent monetary policy alongside high capital mobility cannot simultaneously manage the exchange rate through sustained foreign exchange intervention without compromising its primary inflation objective (Ebeke and Fouejieu, 2015). The post-FIT pattern, in which the reserve response decays rapidly while remaining positive on impact, is consistent with the RBI facing a tighter constraint on sustained intervention under FIT than it did when exchange rate management was an explicit policy objective. Given the short post-FIT sample of 37 quarters, these findings are best interpreted as indicative of an ongoing transition rather than a definitive shift in intervention behaviour.

6 Conclusion

This paper examines whether India's adoption of flexible inflation targeting in 2016 altered the dynamic relationship between capital flows and foreign exchange intervention. Using a four-variable structural VAR estimated on quarterly data from 2002Q1 to 2025Q3, with a recursive Cholesky identification that places foreign exchange reserves last in the causal ordering, the analysis documents three main findings.

First, over the full sample, capital flow shocks are the dominant structural driver of reserve dynamics, accounting for over 60% of forecast error variance at the twenty-quarter horizon. The reserve response to capital inflow surges is positive, persistent, and statistically significant for approximately eight quarters, while the response to exchange rate depreciation shocks is negligible throughout. This asymmetric pattern is consistent with the fear of appreciation documented in the India-specific intervention literature and provides structural identification-based evidence for it using data through 2025Q3.

Second, the split-sample analysis reveals that the response of capital flows to an interest rate differential shock reverses sign in the post-FIT period. In the pre-FIT period, a widening India-US interest rate differential attracts portfolio inflows, consistent with the standard interest parity mechanism. In the post-FIT period, the same shock generates outflows, consistent with foreign investors reinterpreting monetary tightening under FIT as a signal of domestic inflation stress rather than a carry opportunity

(Ho and McCauley, 2003; Phul, 2024).

Third, the reserve accumulation response to capital flow shocks attenuates post-FIT. The response becomes statistically indistinguishable from zero by approximately the fourth quarter, compared to approximately ten quarters in the pre-FIT period. This attenuation is consistent with the learning-by-doing effect documented by Ebeke and Fouejieu (2015), whereby maturing IT regimes are associated with greater exchange rate flexibility and reduced reliance on foreign exchange intervention, and with the impossible trinity constraint (Mundell, 1963) that limits the scope for sustained intervention alongside an independent monetary policy and open capital account.

These findings have two implications. First, the external transmission of monetary policy in India changed structurally following FIT adoption, with the interest rate differential losing its role as a pull factor for capital inflows and instead signalling domestic macroeconomic conditions to foreign investors. Second, the RBI's intervention behaviour has evolved toward shorter-lived responses to capital flow pressures, consistent with a gradual transition toward greater exchange rate flexibility as the IT framework has matured, though the continued positive on-impact response confirms that intervention has not been abandoned.

The main limitation of this analysis is the short post-FIT sample of 37 quarters, which reduces statistical precision and makes it difficult to disentangle the pure FIT effect from concurrent global shocks including the COVID-19 pandemic and the 2022 global monetary tightening cycle. As the post-FIT sample lengthens, future work should revisit these questions with greater statistical power, and may benefit from event-study designs that more cleanly isolate the regime change effect. Extending this framework to other inflation targeting emerging markets would also provide useful cross-country perspective on the external consequences of IT adoption.

References

- Adler, G., Chang, K. S., and Wang, Z. (2021). Patterns of foreign exchange intervention under inflation targeting. *Latin American Journal of Central Banking*, 2:100045.
- Alex, D. (2025). Inflation targeting and the changing transmission mechanism of monetary policy in india. *Economic Modelling*, 151(C):None.
- Bank for International Settlements (2024). Bis statistics explorer. <https://stats.bis.org>. Accessed: 2026-05-04.
- Calvo, G. A. and Reinhart, C. M. (2002). Fear of floating. *The Quarterly Journal of Economics*, 117(2):379–408.
- Ebeke, C. and Fouejjieu, A. (2015). Inflation targeting and exchange rate regimes in emerging markets. IMF Working Paper WP/15/228, International Monetary Fund.
- Engle, R. F. and Granger, C. W. J. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica*, 55(2):251–276.
- Ho, C. and McCauley, R. N. (2003). Living with flexible exchange rates: Issues and recent experience in inflation targeting emerging market economies. BIS Working Papers 130, Bank for International Settlements.
- Hofman, D., Chamon, M., Deb, P., Harjes, T., Rawat, U., and Yamamoto, I. (2020). Intervention Under Inflation Targeting—When Could It Make Sense? *IMF Working Papers*, 20(09).
- Levy-Yeyati, E. and Gómez, J. F. (2022a). Leaning-against-the-wind intervention and the “carry-trade” view of the cost of reserves. *Open Economies Review*, 33:853–877.
- Levy-Yeyati, E. and Gómez, J. F. (2022b). Leaning-against-the-wind intervention and the “carry-trade” view of the cost of reserves. *Open Economies Review*, 33:853–877.
- Matschke, J., von Ende-Becker, A., and Sattiraju, S. A. (2023). Capital flows and monetary policy in emerging markets around fed tightening cycles. *Economic Review*, Fourth Quarter:35–47.
- Mundell, R. A. (1963). Capital mobility and stabilization policy under fixed and flexible exchange rates. *The Canadian Journal of Economics and Political Science / Revue canadienne d’Economie et de Science politique*, 29(4):475–485.
- National Statistical Office (2024). National accounts statistics. <https://mospi.gov.in>. Accessed: 2026-05-04.
- Phul, S. (2024). Efficacy of monetary policy transmission during the flexible inflation targeting regime in india. *South Asian Journal of Macroeconomics and Public Finance*, 13(1):70–99.
- Ramachandran, M. and Maheswari, D. (2022). Asymmetry in forex market intervention: Does it reflect fear of reserve inadequacy? *The Journal of Economic Asymmetries*, 25:e00236.
- Ramachandran, M. and Srinivasan, N. (2007). Asymmetric exchange rate intervention and international reserve accumulation in india. *Economics Letters*, 94(2):259–265.
- Reserve Bank of India (2024a). Balance of payments statistics. <https://www.rbi.org.in>. Accessed: 2026-05-04.
- Reserve Bank of India (2024b). Database on indian economy. <https://dbie.rbi.org.in>. Accessed: 2026-05-04.
- Stock, J. H. and Watson, M. W. (2015). *Introduction to Econometrics*. Pearson Education, Boston, 3 edition.

Appendix

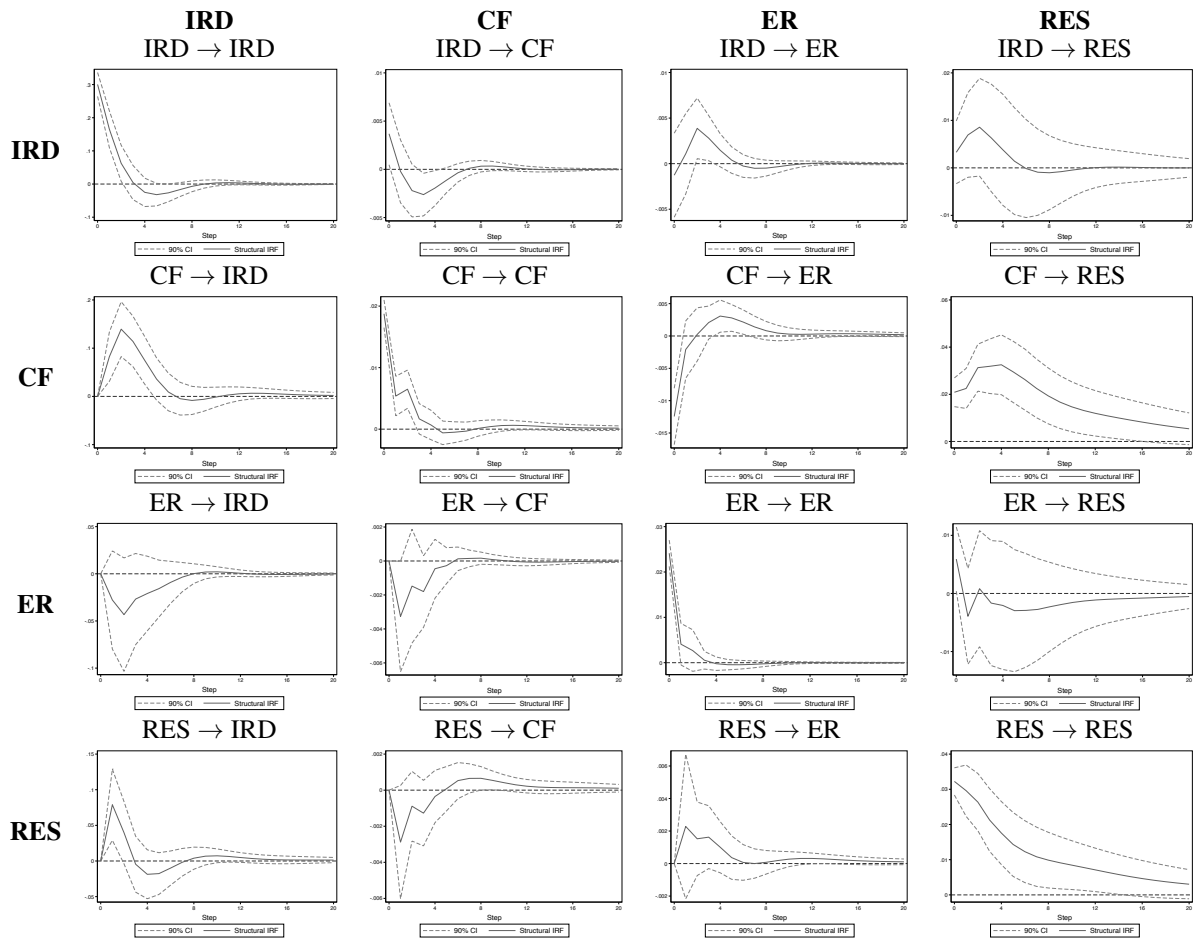


Figure A1: Impulse Response Functions (SVAR, 90% confidence bands)