

# Does Off-Balance-Sheet Intervention Amplify Fed Monetary Shocks? Evidence from India's Forward Book

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## Abstract

The Reserve Bank of India's net short US dollar forward position reached \$102 billion in early 2026, accumulated off-balance-sheet over a decade of forward market intervention. This paper tests whether this outstanding contingent liability amplifies the transmission of Federal Reserve monetary policy shocks to the Indian rupee. This paper matches high-frequency-identified monetary policy surprises from [Bauer and Swanson \(2023\)](#) to 72 FOMC events over 2016–2026 and estimate state-dependent local projections following [Jordà \(2005\)](#). A one percentage point INR depreciation on the prior FOMC day predicts a \$35.9 billion expansion in the net short forward book, with a cumulative three-lag effect of \$75.7 billion. This reactive accumulation occurs when currency pressure is most acute. The interaction between the monetary policy shock and the lagged forward book is positive and significant at the seven-to-nine trading day horizon across all specification variants. Amplification concentrates in the large net short regime above \$14 billion and compounds during global risk-off episodes. The results reveal an intervention trap. Forward sales built to resist depreciation create a contingent liability that constrains defensive capacity when the next tightening shock arrives.

*Keywords:* off-balance-sheet intervention, forward book, monetary policy spillovers, local projections, financial accelerator, Indian rupee, high-frequency identification

*JEL:* F31, F32, E52, G15

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## 1. Introduction

Central banks in emerging market economies intervene in foreign exchange markets to smooth volatility, signal policy intentions, and build precautionary reserves. A large empirical literature examines whether such intervention moves the exchange rate in the desired direction (Dominguez and Frankel, 1993; Fatum and Hutchison, 2006; Fratzscher et al., 2019; Adler et al., 2019; Menkhoff, 2013). This literature treats intervention as a flow decision and finds that intervention smooths volatility but cannot resist fundamental trends. A separate question has received less attention. A central bank’s accumulated forward commitments from past intervention episodes alter how external shocks transmit to the exchange rate. This paper provides the first event-study evidence on this channel.

The institutional setting is India from 2016 to 2026. The Reserve Bank of India operates under a managed float and intervenes in both spot and forward markets. Forward intervention generates a net short dollar position in the RBI’s off-balance-sheet accounts. By early 2026, the RBI’s net short forward position exceeded \$102 billion, roughly one-sixth of gross spot reserve holdings. This represents the largest known off-balance-sheet foreign exchange exposure among emerging market central banks. The scale and lack of empirical analysis of its macroeconomic consequences motivate this paper.

Does the outstanding stock of the RBI’s net short forward position alter the transmission of Federal Reserve monetary policy shocks to the Indian rupee? Two channels suggest amplification. The valuation channel operates through mark-to-market losses when the dollar appreciates. Fed tightening shocks generate precisely this appreciation. The valuation effect reduces the central bank’s effective intervention capacity and raises the cost of additional forward defence. The rollover channel operates through maturing forward contracts. Dollar appreciation at rollover dates raises the cost of maintaining the existing book. These costs accumulate over the weeks following the shock, not on impact. The two channels compound each other. The central bank absorbs the initial exchange rate pressure, but valuation and rollover costs make the medium-run adjustment larger when the pre-existing position is larger.

The forward book built to resist depreciation becomes the source of amplified vulnerability when the next tightening shock arrives. This is the intervention trap.

The mechanism connects to the financial accelerator logic of [Bernanke et al. \(1999\)](#). Balance-sheet deterioration amplifies real shocks because the cost of external finance rises with net worth deterioration. The analogy operates at the central bank level. The forward book creates leverage-like exposure whose cost rises with dollar appreciation, constraining the bank's capacity to absorb additional pressure precisely when the shock is largest. The channel is also related to the "original sin redux" channel, a term coined by [Carstens and Shin \(2019\)](#) to describe how currency mismatches have shifted from emerging market borrowers to the balance sheets of foreign lenders. [Bertaut et al. \(2025\)](#) explore the consequences of this reallocation of risk, highlighting the mutually reinforcing nature of currency and duration risks on local currency sovereign bonds. Our paper identifies an analogous but conceptually distinct channel at the central bank itself. The liability side of the central bank's off-balance-sheet position is the locus of vulnerability.

The empirical strategy uses orthogonalised monetary policy surprises from [Bauer and Swanson \(2023\)](#), which isolate policy tightening by projecting out pre-announcement macroeconomic and financial conditions. This orthogonalisation is necessary because raw futures-based surprises conflate tightening with information-effect signals about the US economic outlook. The two components generate qualitatively different exchange rate responses in emerging markets ([Nakamura and Steinsson, 2018](#); [Jarociński and Karadi, 2020](#)). The Bauer-Swanson surprises are matched to 72 FOMC events and combined with daily USD/INR rates and the RBI's monthly net forward position to estimate state-dependent local projections following [Jordà \(2005\)](#) and [Ramey and Zubairy \(2018\)](#).

This paper contributes to three literatures. First, it provides the event-study evidence that the stock of outstanding central bank forward commitments, distinct from the flow of current intervention, alters exchange rate shock transmission. The distinction matters because the stock is persistent and accumulates in a way directly opposed to the stabilisation

motive. The largest net short positions arise in periods of maximum currency stress. Second, it connects the literature on FX intervention effectiveness (Fratzscher et al., 2019; Adler et al., 2019; Menkhoff, 2013) to the literature on monetary policy spillovers to emerging markets (Miranda-Agrippino and Rey, 2020; Kalemli-Özcan, 2019; Rey, 2015). The central bank's own balance-sheet position mediates the transmission of external monetary shocks. Third, it provides empirical support for the concern that accumulated off-balance-sheet positions create central bank balance-sheet vulnerability distinct from sovereign and corporate currency mismatches (Carstens and Shin, 2019; Bertaut et al., 2025). The findings are directly relevant to the Integrated Policy Framework (Basu et al., 2020; Adrian et al., 2021), which evaluates intervention as a flow decision and does not account for the macroeconomic consequences of cumulative stock accumulation.

Section 2 describes the institutional context and the intervention trap mechanism. Section 3 presents a simple formalisation of the amplification channel. Section 4 describes the data and identification strategy. Section 5 presents the estimation framework. Section 6 reports the main results. Section 7 provides robustness and falsification evidence. Section 8 discusses policy implications. Section 9 concludes.

## **2. Institutional Context and the Intervention Trap**

### *2.1. India's Exchange Rate Regime and Intervention Mechanics*

India operates a de jure managed float. The International Monetary Fund classifies the regime as "other managed arrangement," a category that accommodates the RBI's active use of both spot and forward operations (Ilzetzi et al., 2019). The RBI intervenes primarily through the interbank market and through the State Bank of India as an agent. Spot interventions are disclosed in the weekly reserve data with a lag of approximately two weeks. Forward interventions are disclosed monthly in the International Reserves and Foreign Currency Liquidity template published in the Reserve Bank of India Bulletin.

Forward intervention involves contracted forward dollar sales. The RBI agrees to deliver

dollars at a contracted forward rate on a future settlement date. These contracts create a net short dollar forward position in the RBI’s off-balance-sheet accounts. Unlike spot reserve sales, which reduce gross reserves immediately, forward sales create a deferred liability. Settlement typically occurs within three to twelve months. The outstanding net forward position is the accumulation of past decisions that remain unsettled.

When INR appreciation pressure is sustained, spot dollar purchases build reserves but risk overshooting the intended target. Forward dollar sales supplement spot absorption by committing to deliver dollars in the future, reinforcing the signal of INR appreciation resistance. If INR appreciation pressure recedes, the forward contract can be unwound or allowed to expire. The flexibility of the forward instrument, combined with its off-balance-sheet treatment, has made it the instrument of choice for reserve-constrained central banks in episodes of sustained capital inflows.

## *2.2. The Scale and Dynamics of the RBI’s Forward Book*

Table 1 shows the evolution of the RBI’s net short forward position. The position was small, below \$10 billion, through 2019. The capital inflow surge of 2020 and 2021, driven by low global rates and portfolio reallocation, generated sustained INR appreciation pressure. The RBI absorbed this pressure through a combination of spot dollar purchases and forward dollar sales. Spot purchases were widely reported. The forward sales attracted far less analytical attention.

As global monetary policy normalised from mid-2022, the RBI faced a structural problem. The net short forward position built during the inflow episode could not be unwound without tolerating INR depreciation that the bank was simultaneously attempting to limit. The forward book therefore rolled rather than unwound. Maturing positions were replaced with new forward sales, often at less favourable rates, generating implicit rollover costs. By December 2022 the net short position had grown to \$35 billion, reaching \$78 billion by December 2024 and \$102 billion by January 2026.

Table 1: Evolution of the RBI's Net Short Forward Position

| Date          | Net Short Forward Book (USD bn) | Period Change (USD bn) |
|---------------|---------------------------------|------------------------|
| December 2016 | −4                              | —                      |
| December 2019 | −6                              | −2                     |
| December 2020 | 15                              | +21                    |
| December 2021 | 28                              | +13                    |
| December 2022 | 35                              | +7                     |
| December 2023 | 52                              | +17                    |
| December 2024 | 78                              | +26                    |
| December 2025 | 95                              | +17                    |
| January 2026  | 102                             | +7                     |

*Note:* Positive values indicate a net short dollar position. Source: RBI Bulletin, International Reserves and Foreign Currency Liquidity template, various issues.

### *2.3. How the Forward Book Creates an Amplification Channel*

The transmission mechanism operates through two mutually reinforcing channels that bind at intermediate rather than immediate horizons.

The first is the valuation channel. The RBI's outstanding net short forward contracts commit the bank to deliver dollars at contracted rates. When a Fed tightening shock causes dollar appreciation, the mark-to-market value of the existing short dollar position turns negative. This is not a cash loss on the announcement date, as the contracts have not yet settled. It constitutes a deterioration in the central bank's effective net worth. The larger the forward book, the larger the valuation loss per unit of dollar appreciation. This constrains the bank's willingness to add further forward sales, as each additional sale adds to an already-stressed short position.

The second is the rollover channel. The forward position matures in tranches over the coming months. As each tranche comes due, the RBI must either deliver the contracted dollars or roll the position into a new forward contract at a spot rate that has already adjusted upward. The rollover cost accumulates over trading days and weeks following the FOMC event, generating the delayed amplification pattern visible in the local projection estimates. The cost of rolling an \$80 billion position under a currency that has depreciated by two

percent exceeds the cost of rolling a \$10 billion position by a factor commensurate with the size difference.

Together these channels operate as a financial accelerator in the spirit of [Bernanke et al. \(1999\)](#). The deterioration of the central bank's net worth raises the marginal cost of defensive action, causing the eventual exchange rate adjustment to be larger. The accelerator logic predicts amplification concentrated at intermediate horizons for two reasons. First, the contemporaneous insulation motive remains operative regardless of the forward book level. The central bank does not want to produce a disorderly adjustment on the day of the FOMC event. Second, valuation and rollover costs bind only in the days and weeks following the initial shock. This prediction is precisely what the local projection evidence in Section 6 documents.

The forward book is not built strategically in advance of shocks. It is built in response to realised depreciation. The RBI therefore carries the largest net short positions when the currency is under the most stress and when the next shock will be most costly to absorb. The forward book built for stabilisation becomes the source of subsequent amplification.

### 3. A Conceptual Framework

This section formalises the amplification mechanism. Let  $S_t$  denote the INR per USD exchange rate, with increases representing depreciation. The RBI carries an outstanding net short forward position  $F_{t-1}$  in US dollar billions entering period  $t$ . A forward contract sold at time  $t - k$  at forward rate  $S_{t-k}^f$  obligates the bank to deliver dollars at settlement. The mark-to-market loss when the spot rate moves by  $\Delta S_t$  is  $F_{t-1} \Delta S_t$ . The central bank's effective net worth evolves as

$$NW_t = NW_{t-1} - F_{t-1} \Delta S_t + \tau_t \quad (1)$$

where  $\tau_t$  collects other valuation components. A dollar appreciation ( $\Delta S_t > 0$ ) reduces net worth when  $F_{t-1} > 0$ . This is the valuation cost of the existing short position.

The valuation effect in equation (1) implies that a larger forward book amplifies the balance-sheet consequences of a given dollar appreciation. When the Fed tightens and the dollar appreciates, the resulting net worth deterioration is larger when the pre-existing forward book is larger. This reduces the central bank’s capacity to absorb further pressure and amplifies the eventual exchange rate adjustment.

To test this amplification hypothesis, let  $\varepsilon_t^{MP}$  denote the orthogonalised Fed policy surprise and  $\Delta S_{t,t+h}$  the cumulative log depreciation of the INR at horizon  $h$ . The empirical specification is

$$\Delta S_{t,t+h} = \alpha_h + \beta_h \varepsilon_t^{MP} + \phi_h (F_{t-1} \times \varepsilon_t^{MP}) + \delta_h F_{t-1} + \mathbf{X}'_{t-1} \boldsymbol{\theta}_h + u_{t,h} \quad (2)$$

The coefficient  $\phi_h$  captures state-dependent amplification. A positive value means that a given Fed tightening shock produces greater cumulative INR depreciation when the pre-existing forward book is larger.

Equations (1) and (2) motivate why  $\phi_h$  should be positive but do not generate a horizon profile for  $\phi_h$ . The hump-shaped profile is derived from the institutional timing of the two channels. The valuation loss in equation (1) is immediate but unrealized. It affects net worth but not cash flow. Rollover costs accrue only as contracts mature, typically over the subsequent trading days and weeks. This sequencing generates a delayed amplification pattern.  $\phi_h$  is near zero at short horizons, rises to a positive value at intermediate horizons, and decays toward zero at long horizons. The hump-shaped prediction is therefore a testable restriction on the local projection estimates.

## 4. Data and Identification

### 4.1. Monetary Policy Shocks

Identification rests on the high-frequency monetary policy surprises of [Bauer and Swanson \(2023\)](#). Their procedure measures futures-market price changes in a narrow window around each FOMC statement release and projects out a set of macroeconomic and financial forecasts

observable before the announcement. The residual measures the exogenous component of the policy decision, purged of the information-effect contamination documented by [Nakamura and Steinsson \(2018\)](#). Raw high-frequency surprises conflate genuine tightening with an upward revision to the Fed’s view of the economic outlook, and the two components generate qualitatively different responses in emerging market currencies. The Bauer-Swanson orthogonalisation is therefore necessary for clean causal identification. <sup>1</sup>

The event sample covers scheduled FOMC announcements from January 2016 to January 2026. After matching to the RBI forward book data and imposing data availability conditions on lagged controls, the usable sample comprises 72 FOMC events. Of these, 33 events occur when the lagged forward book carries a net short position (positive forward book value), and 39 events fall in net-long or transitional periods. Two events, the emergency inter-meeting cuts of March 3 and March 15, 2020, are flagged separately for robustness checks.

#### *4.2. Exchange Rate*

The outcome variable is the cumulative log return of the USD/INR exchange rate, measured as the log ratio of the RBI official daily reference rate at the Indian market close  $h$  trading days after the FOMC event to the rate at the Indian market close on the FOMC announcement date itself. FOMC announcements release at 14:00 Eastern Time, corresponding to approximately 00:30 IST on the following calendar day, after the Indian foreign exchange market has closed. Measuring outcomes in Indian trading days eliminates mechanical biases from weekends and domestic holidays. Positive values denote INR depreciation.

#### *4.3. Forward Book State Variable*

The RBI’s net short forward position is constructed from the International Reserves and Foreign Currency Liquidity template published in the Reserve Bank of India Bulletin. We

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<sup>1</sup>[Jarociński and Karadi \(2020\)](#) use a sign-restriction approach to decompose monetary policy surprises into information and tightening components, with effects estimated for U.S. asset prices and the U.S. economy. [Camara \(2021\)](#) applies the same decomposition to a panel of emerging market economies and finds that pure tightening shocks depreciate emerging market currencies and tighten financial conditions, while the information-disclosure component produces a short-lived appreciation and looser conditions.

compute net forward sales minus net forward purchases in US dollar billions. Positive values indicating a net short dollar exposure. The measure is lagged by one calendar month relative to the FOMC event date. An event in month  $t$  uses the published end-of-month  $(t - 1)$  value. The one-month lag is appropriate because the monthly bulletin is published with a four-to-six week delay, so the  $(t - 1)$  end-month value is the most recent public observation available at the time of the FOMC announcement. The series exhibits strong first-order serial correlation (estimated  $\rho \approx 0.96$ ), reflecting the institutional tendency to roll maturing positions. This persistence further supports the predetermination assumption. The lagged forward book is not a contemporaneous response to the current-month FOMC event.

#### 4.4. Controls and Summary Statistics

Lagged control variables include the CBOE VIX, the US 10-year Treasury yield, and the DXY US dollar index, all measured at the market close on the day preceding the FOMC announcement. These controls address standard confounds in emerging market exchange rate

Table 2: Summary Statistics

| Variable                                                                           | Mean  | SD   | P10   | P50   | P90   | $N$ |
|------------------------------------------------------------------------------------|-------|------|-------|-------|-------|-----|
| <i>Full sample (<math>N = 72</math> FOMC events)</i>                               |       |      |       |       |       |     |
| Forward book (USD bn)                                                              | 23.5  | 38.2 | -28.0 | 12.0  | 74.0  | 72  |
| MP surprise (Bauer-Swanson, bps)                                                   | 0.8   | 12.4 | -13.0 | 0.5   | 13.0  | 72  |
| 9-day log return (%)                                                               | 0.09  | 0.68 | -0.70 | 0.07  | 0.85  | 72  |
| VIX                                                                                | 18.5  | 6.5  | 12.0  | 16.5  | 27.0  | 72  |
| US 10-year yield (%)                                                               | 2.80  | 1.10 | 1.20  | 2.75  | 4.30  | 72  |
| DXY                                                                                | 100.5 | 6.5  | 91.0  | 100.0 | 108.0 | 72  |
| <i>Net-short subsample (forward book <math>&gt; 0</math>, <math>N = 33</math>)</i> |       |      |       |       |       |     |
| Forward book (USD bn)                                                              | 45.2  | 28.5 | 9.0   | 38.0  | 83.0  | 33  |
| MP surprise (bps)                                                                  | 0.6   | 12.2 | -13.0 | 0.5   | 13.0  | 33  |
| 9-day log return (%)                                                               | 0.19  | 0.74 | -0.60 | 0.12  | 1.00  | 33  |

Notes: Forward book is the RBI net short dollar forward position, lagged one calendar month, in USD billions. Positive values indicate net short dollar exposure. MP surprise is the Bauer-Swanson orthogonalised monetary policy shock in basis points. The 9-day log return is the cumulative USD/INR log return over the nine Indian trading days following the FOMC event, measured as log depreciation (positive = INR depreciation). VIX is the CBOE Volatility Index; DXY is the US Dollar Index; both are measured one day before the FOMC announcement.

event studies. Global risk appetite (VIX), the prevailing US interest rate environment (US 10-year yield), and broad dollar strength (DXY) all affect the INR and may correlate with the forward book position through the intervention reaction function. Summary statistics are provided in Table 2.

## 5. Estimation Framework

### 5.1. The Intervention Trap

The reactive nature of forward book accumulation is established by estimating

$$FB_{t-1} = \alpha + \sum_{k=1}^3 \beta_k \Delta e_{t-k} + \delta_{MP} MP_{t-1} + \gamma' \mathbf{X}_{t-1} + u_t \quad (3)$$

where  $FB_{t-1}$  is the net short forward position in USD billions,  $\Delta e_{t-k}$  is the log USD/INR change around the  $(t-k)$ -th FOMC event (positive = depreciation),  $MP_{t-1}$  is the lagged Bauer-Swanson shock, and  $\mathbf{X}_{t-1}$  collects VIX and the US 10-year yield. Standard errors are clustered by FOMC event.

### 5.2. Local Projection Amplification

The amplification coefficient is estimated at each horizon  $h \in \{1, \dots, 15\}$  via

$$\Delta e_{t,t+h} = \alpha_h + \beta_h MP_t + \phi_h (MP_t \times FB_{t-1}) + \delta_h FB_{t-1} + \gamma_h' \mathbf{X}_{t-1} + \lambda_h' \mathbf{Y}_t + \varepsilon_{t,h} \quad (4)$$

where  $\mathbf{Y}_t$  includes year fixed effects in the primary specification. The term  $\beta_h$  captures the average exchange rate response to the Fed shock, and  $\phi_h$  is the primary object of interest. It measures how the response at horizon  $h$  varies with the pre-existing forward book level. A positive  $\phi_h$  indicates amplification. Standard errors are clustered by FOMC event, consistent with the event-study design in which heteroskedasticity is the primary inference concern (Cameron and Miller, 2015).

### 5.3. Three-Regime Threshold Model

Following [Hansen \(2000\)](#), a grid search over decile points of the forward book distribution identifies thresholds  $\hat{\gamma}_1$  and  $\hat{\gamma}_2$  minimising total residual sum of squares of

$$\Delta e_{t,t+9} = \alpha_r + \beta_r MP_t + \gamma'_r \mathbf{X}_{t-1} + \varepsilon_t, \quad r \in \{1, 2, 3\} \quad (5)$$

Regime assignments are R1 if  $FB_{t-1} \leq \hat{\gamma}_1$ , R2 if  $\hat{\gamma}_1 < FB_{t-1} \leq \hat{\gamma}_2$ , and R3 if  $FB_{t-1} > \hat{\gamma}_2$ . The monetary policy slope  $\hat{\beta}_r$  varies across regimes by construction. Inference uses asymptotic cluster-robust standard errors. The small-sample caveat of [Cameron and Miller \(2015\)](#) applies to R3 where the event count is 15.

## 6. Results

### 6.1. The Intervention Trap

Table 3 reports results from equation (3). Column (1) uses the US 10-year yield in levels. Column (2) replaces it with the first difference to separate the temporal level effect from yield news.

A one percentage point INR depreciation on the prior FOMC day is associated with a \$35.9 billion expansion in the net short forward book ( $t=2.93$ ). The lag-2 and lag-3 coefficients are \$17.6 billion and \$22.2 billion respectively, both positive and jointly significant. The cumulative three-lag effect reaches \$75.7 billion per one percentage point depreciation (Figure 1). The US 10-year yield level enters with a coefficient of \$12.5 billion per percentage point ( $t=3.31$ ), consistent with the RBI building the forward book during periods of sustained dollar strength associated with a high-rate environment. When the yield is replaced with its first difference in Column (2), the change in the yield is not significantly related to the forward book ( $t=-1.37$ ). The level, not the news, drives accumulation. The lagged monetary policy shock itself enters negatively, indicating that surprise tightening in the prior FOMC meeting slightly reduces the forward book, perhaps by slowing capital inflows and thus reducing the appreciation pressure the bank was attempting to resist.

Table 3: The Intervention Trap: Reactive Accumulation of the Forward Book

|                                                                | (1) US10Y in Levels | (2) US10Y as Change |
|----------------------------------------------------------------|---------------------|---------------------|
| <i>Dependent variable: RBI net short forward book (USD bn)</i> |                     |                     |
| 1% INR depreciation (lag 1)                                    | 35.9***<br>(12.2)   | 35.6***<br>(12.6)   |
| 1% INR depreciation (lag 2)                                    | 17.6<br>(12.2)      | 16.5<br>(12.3)      |
| 1% INR depreciation (lag 3)                                    | 22.2**<br>(9.8)     | 23.1**<br>(10.0)    |
| Lagged MP shock                                                | −1.96**<br>(0.88)   | −1.84**<br>(0.85)   |
| US 10Y yield (level)                                           | 12.5***<br>(3.8)    |                     |
| $\Delta$ US 10Y yield                                          |                     | −14.8<br>(10.8)     |
| VIX                                                            | −0.53<br>(0.39)     | −0.52<br>(0.41)     |
| Constant                                                       | −26.7<br>(15.9)     | −4.3<br>(6.7)       |
| $N$                                                            | 69                  | 69                  |

Standard errors in parentheses, clustered by FOMC event. \*\*\*p<0.01, \*\*p<0.05, \*p<0.10. Coefficients for lag-2 INR depreciation and VIX are scaled as marginal responses in USD billions. Cumulative three-lag effect in Column (1): \$75.7 bn per 1% INR depreciation.

Figure 1 plots the estimated lag coefficients scaled to a one percent depreciation, with 90 percent confidence intervals. The pattern is uniformly positive across three lags, with the first lag economically and statistically dominant.

These results document the trap mechanism. The RBI does not build the forward book in anticipation of stable periods. It builds it in response to realised depreciation. The position is therefore largest when the currency is under the most stress and the marginal cost of further exposure is highest. Any subsequent Fed tightening arrives to find the balance sheet already stretched in the net short direction.

The asymmetry test confirms that the trap is directionally one-sided. Separating depreciation lags from appreciation lags, the response to depreciation is directionally larger than the response to appreciation, though the difference is not significant given the sample size.

**Figure 1: The Intervention Trap**

A 1% INR depreciation on the prior FOMC day  $\rightarrow$  +35.9 bn USD net-short (lag 1;  $t=2.93$ ,  $p<0.01$ ).  
Cumulative 3-lag effect: +75.7 bn. US 10Y +1pp  $\rightarrow$  +12.5 bn ( $t=3.31$ ).

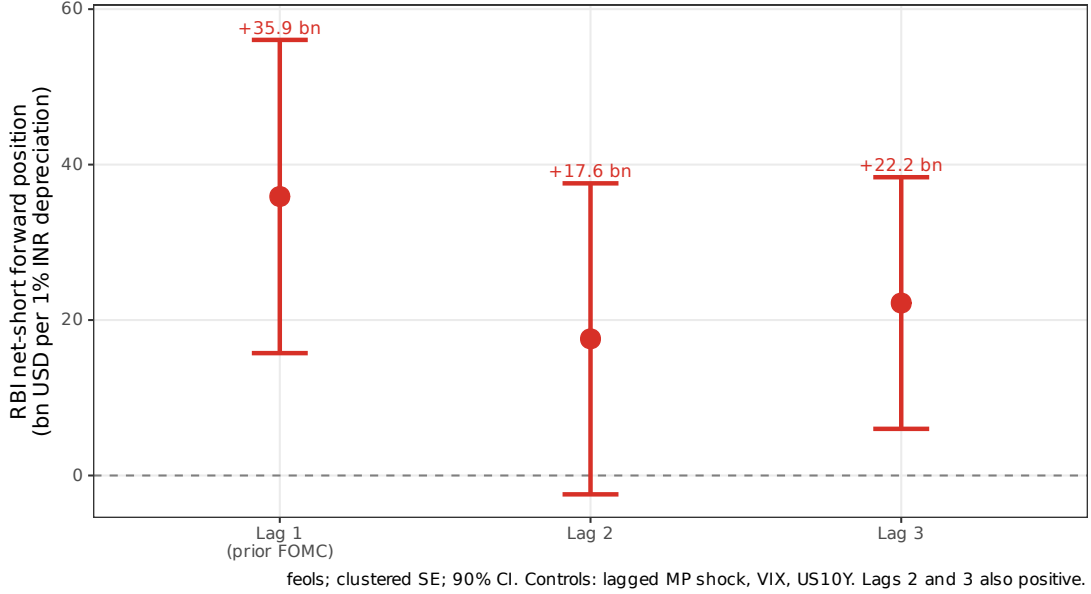


**Figure 1: The Intervention Trap: Reactive Forward Book Accumulation at FOMC Frequency.** Estimated change in the RBI net short forward book (USD billions) associated with a one percent INR depreciation at lags one, two, and three around prior FOMC events, from equation (3), Column (1). Lag 1: \$35.9 bn ( $t=2.93$ ). Cumulative three-lag effect: \$75.7 bn. US 10-year yield (level): \$12.5 bn per 1 percentage point ( $t=3.31$ ). Error bars show 90 percent confidence intervals. Standard errors clustered by FOMC event. Controls: lagged Bauer-Swanson shock, VIX, US 10-year yield.  $N = 69$ .

The inability to detect a statistically sharp asymmetry may reflect symmetry in the reaction function at FOMC frequency, or may simply reflect power limitations with 72 events.

## 6.2. Full-Sample Amplification

Table 4 presents the amplification coefficient  $\hat{\phi}$  from equation (4) at the nine-trading-day horizon across six specification variants. The baseline without fixed effects produces  $\hat{\phi} = 0.00172$ . The primary specification with year fixed effects yields  $\hat{\phi} = 0.00203$ . Adding both year and quarter fixed effects generates a t-statistic of 2.05, ruling out intra-year seasonality as a confound. Excluding the 2020 and 2021 pandemic episodes reduces the sample to 57 events but preserves significance. Excluding only 2020 yields similar results. Excluding the two emergency inter-meeting cuts of March 2020 increases precision. Across all six variants, the amplification coefficient is positive and significant at the five or ten percent level.

Table 4: Forward Book Amplification of Fed Shocks at the Nine-Day Horizon

| Specification                                            | $\hat{\phi}$ | SE       | $t$ -statistic | $N$ |
|----------------------------------------------------------|--------------|----------|----------------|-----|
| (1) Baseline (no fixed effects)                          | 0.001720     | 0.000677 | 2.541          | 72  |
| (2) Year FEs (primary)                                   | 0.002028     | 0.000952 | 2.130          | 72  |
| (3) Year and quarter FEs                                 | 0.001968     | 0.000961 | 2.048          | 72  |
| (4) Exclude 2020 and 2021                                | 0.002014     | 0.000873 | 2.308          | 57  |
| (5) Exclude 2020 only                                    | 0.001612     | 0.000757 | 2.128          | 64  |
| (6) Exclude emergency cuts                               | 0.001786     | 0.000693 | 2.576          | 71  |
| Three-regime R3 ( $\hat{\gamma}_2 = \$14$ bn, $N = 15$ ) | 0.15940      | 0.06272  | 2.542          | 15  |

$\hat{\phi}$  is the coefficient on the interaction  $MP_t \times FB_{t-1}$  from equation (4). Controls in all specifications:  $MP_t$ ,  $FB_{t-1}$ , VIX, US 10-year yield, DXY. Standard errors clustered by FOMC event. Emergency cuts are the inter-meeting FOMC decisions of 2020-03-03 and 2020-03-15. Three-regime R3  $\hat{\beta}$  is the monetary policy slope when the forward book exceeds \$14 bn, from equation (5). Caution:  $N = 15$  events; see [Cameron and Miller \(2015\)](#).

**Figure 2: Amplification Survives Year Fixed Effects — Full-Sample LP**

Full sample ( $N=72$ ). Year FEs absorb between-year confounds.  $t=2.11$  at  $h=7$  and  $t=2.13$  at  $h=9$ . Filled circles =  $|t| > 1.645$ .

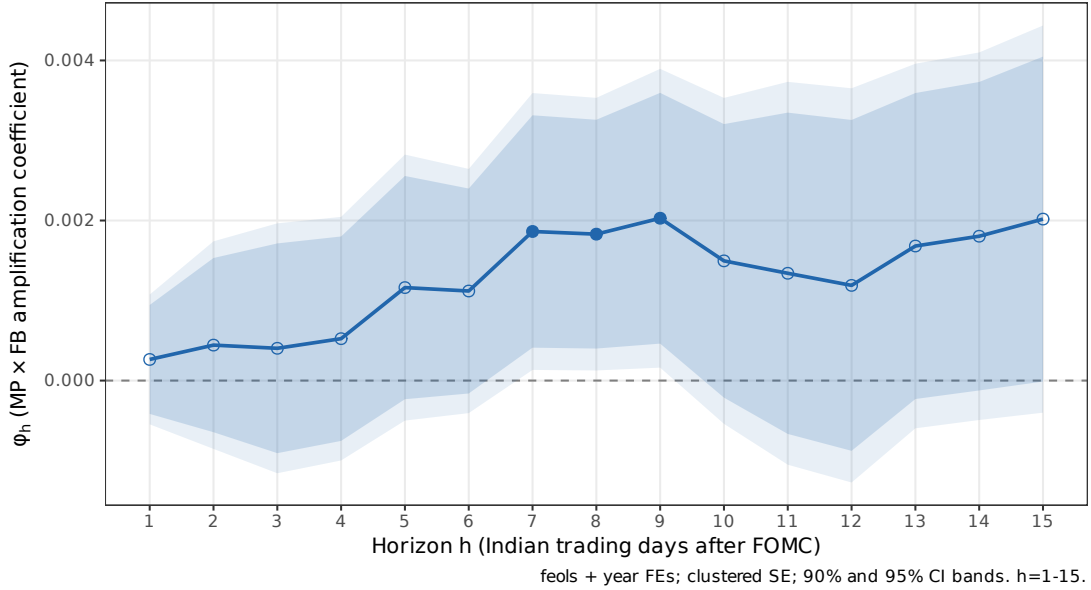


Figure 2: **Amplification Survives Year Fixed Effects: Full-Sample Local Projection.** Local projection amplification coefficient  $\hat{\phi}_h$  from equation (4) at horizons  $h = 1$  through 15, estimated on the full sample ( $N = 72$ ) with year fixed effects. Filled circles denote  $|t| > 1.645$ . Shaded bands show 90 percent (dark) and 95 percent (light) confidence intervals.  $\hat{\phi}_h$  is positive and significant at  $h = 7$  ( $t=2.11$ ) and  $h = 9$  ( $t=2.13$ ), consistent with balance-sheet costs binding at approximately a two-week lag. Standard errors clustered by FOMC event.

Figure 2 plots the LP interaction coefficient  $\hat{\phi}_h$  at horizons  $h = 1$  through 15 from the primary year-fixed-effects specification. Three features of this profile are notable. First,  $\hat{\phi}_h$  is statistically indistinguishable from zero at short horizons ( $h \leq 5$ ), consistent with the central bank successfully insulating the spot rate contemporaneously regardless of the forward book level. Second, the coefficient rises and becomes significant at  $h = 7$  ( $t=2.11$ ) and  $h = 9$  ( $t=2.13$ ), corresponding to approximately one and two calendar weeks after the FOMC event. Third, the coefficient moderates at longer horizons and returns toward insignificance beyond  $h = 11$ . This hump-shaped profile at intermediate horizons is the principal testable prediction of the balance-sheet amplification mechanism described in Section 3. Valuation and rollover costs bind with a lag of roughly two trading weeks.

### 6.3. Three-Regime Threshold Structure

The grid-search threshold model identifies thresholds at  $\hat{\gamma}_1 = -\$26$  billion and  $\hat{\gamma}_2 = \$14$  billion. In regime R1, large net-long events (forward book below  $-\$26$  billion,  $N = 15$ ), the monetary policy slope is  $-0.022$  ( $t=-0.40$ ). There is no detectable INR depreciation response to Fed tightening in this regime. In regime R2, moderate-position events ( $-\$26 < FB \leq \$14$  billion,  $N = 42$ ), the slope is  $0.052$  ( $t=1.86$ ), positive but only marginally significant. In regime R3, large net short events (forward book above  $\$14$  billion,  $N = 15$ ), the slope is  $0.159$  ( $t=2.54$ ), approximately three times the R2 estimate. The pattern is strictly monotone across regimes:  $R1 < R2 < R3$  (Figure 3).

Three features of the threshold result stand out. First, the amplification boundary is not at zero. A Chow test for a break at  $FB = 0$  yields  $F=0.363$ , failing to reject the null of no break. The relevant threshold is at  $\$14$  billion of net short exposure. This suggests that modest forward book positions do not meaningfully amplify transmission. Second, the R3 estimate of  $0.159$  per unit shock is economically large. For the average forward book in R3 ( $\$45$  billion), a one standard deviation positive MP shock (about 12 basis points) implies an additional cumulative depreciation of approximately 0.85 percent at the nine-day horizon compared to a counterfactual with a small or zero forward book.

We flag the caveat.  $N = 15$  events in R3, all concentrated in 2019, 2023, 2024, 2025, and 2026. [Cameron and Miller \(2015\)](#) note that cluster-robust standard errors become unreliable below 20 clusters. The magnitude and sign of the R3 estimate should be read as an order-of-magnitude characterisation of the amplification regime rather than a precisely identified point. The full-sample LP evidence in Table 4 does not share this small-sample concern.

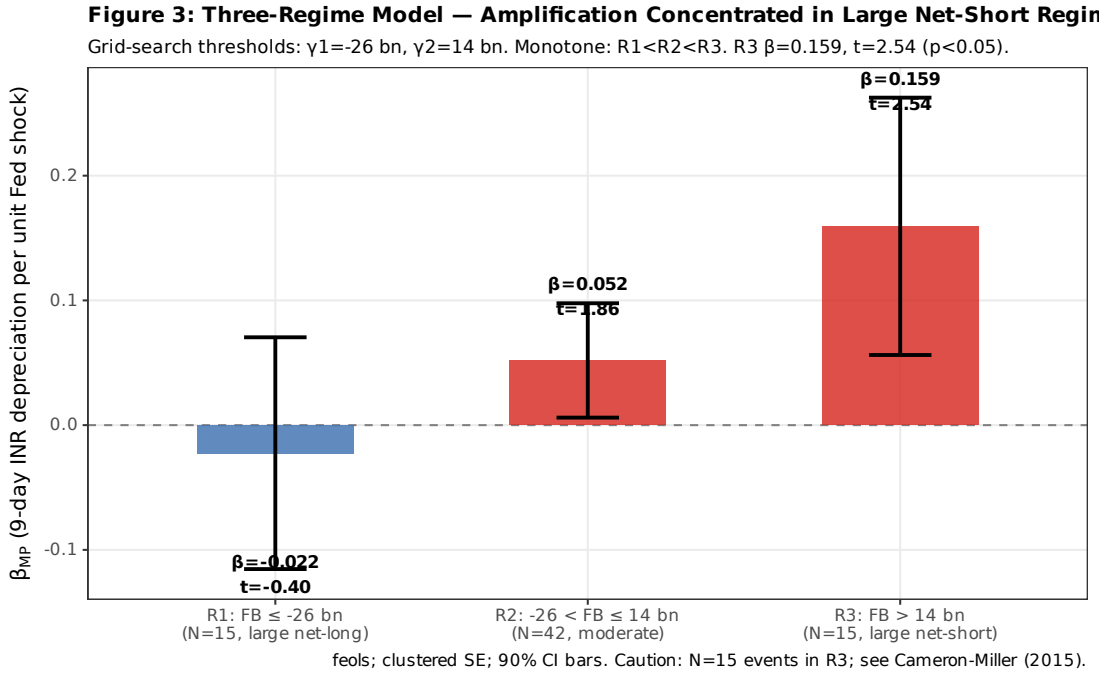


Figure 3: **Three-Regime Model: Amplification Concentrated in the Large Net Short Regime.** Monetary policy slope  $\hat{\beta}_{MP}$  at  $h = 9$  from equation (5). Grid-search thresholds:  $\hat{\gamma}_1 = -\$26$  bn and  $\hat{\gamma}_2 = \$14$  bn. R1 ( $N = 15$ , large net long):  $\hat{\beta} = -0.022$  ( $t = -0.40$ ). R2 ( $N = 42$ , moderate):  $\hat{\beta} = 0.052$  ( $t = 1.86$ ). R3 ( $N = 15$ , large net short):  $\hat{\beta} = 0.159$  ( $t = 2.54$ ). The pattern is strictly monotone across regimes. Error bars show 90 percent confidence intervals. Caution:  $N = 15$  in R3; see [Cameron and Miller \(2015\)](#).

#### 6.4. Dose-Response and Non-Parametric Confirmation

Figure 4 provides a non-parametric confirmation of the regime pattern. The full sample of 72 events is divided into eight equal-frequency bins of the lagged forward book. Within each bin, the nine-day depreciation sensitivity  $\hat{\beta}_{MP}$  is estimated by regressing the cumulative log return on the monetary policy shock and controls. The bin-midpoint values of the forward book explain 73 percent of the between-bin variation in the depreciation sensitivity (linear

$R^2 = 0.73$ ). The LOESS smooth confirms the monotone increasing shape. The slope is steepest in the net short region, where moving from the 50th to the 75th percentile of the forward book is associated with roughly a doubling of the depreciation sensitivity. In the net long region, sensitivities cluster near zero. The transition from near-zero to positive sensitivity occurs at approximately the grid-search threshold of \$14 billion, providing independent visual corroboration of the regime estimates in Figure 3.

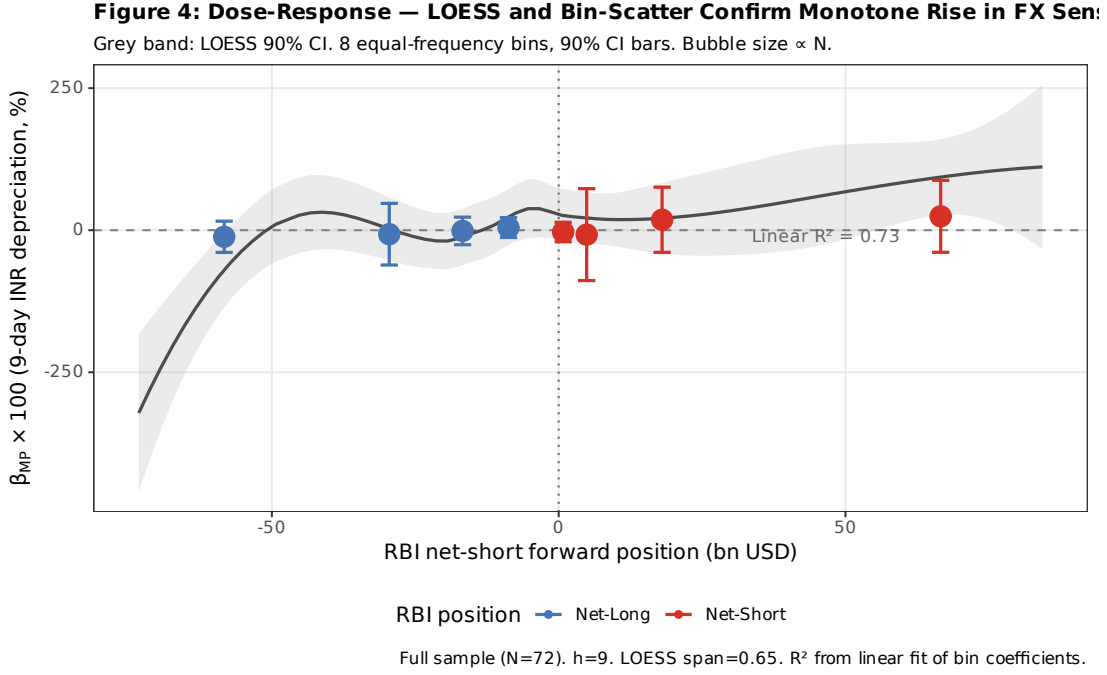


Figure 4: **Dose-Response: Monotone Rise in FX Sensitivity Across the Forward Book Distribution.** Nine-day INR depreciation sensitivity  $\hat{\beta}_{MP} \times 100$  plotted against the RBI net short forward book. Points are eight equal-frequency bin estimates (bubble size proportional to  $N$ ); error bars show 90 percent confidence intervals. Red (blue) indicates net short (net long) periods. Grey band: LOESS 90 percent confidence interval (bandwidth 0.65). Linear fit of bin coefficients:  $R^2 = 0.73$ . The transition from near-zero sensitivity in the net long region to positive sensitivity above \$14 billion aligns with the grid-search threshold in Figure 3. Full sample,  $N = 72$ ,  $h = 9$ .

### 6.5. Double Amplification: The VIX Channel

Figure 5 addresses whether the forward book channel proxies for the global risk cycle. Within the net short subsample ( $N = 33$ ), events are split at the VIX median and LP interaction coefficients are estimated separately for high-VIX and low-VIX groups. Across all horizons from  $h = 5$  to  $h = 12$ , the t-statistic on  $\hat{\phi}_h$  ranges from 2.66 to 3.69 in the high-VIX

group and is uniformly negative in the low-VIX group. The triple interaction in the net short subsample yields a t-statistic of 2.27. As a falsification check, the same triple interaction estimated on the full 72-event sample produces a t-statistic of -0.114. This confirms that the double amplification is specific to the net short regime.

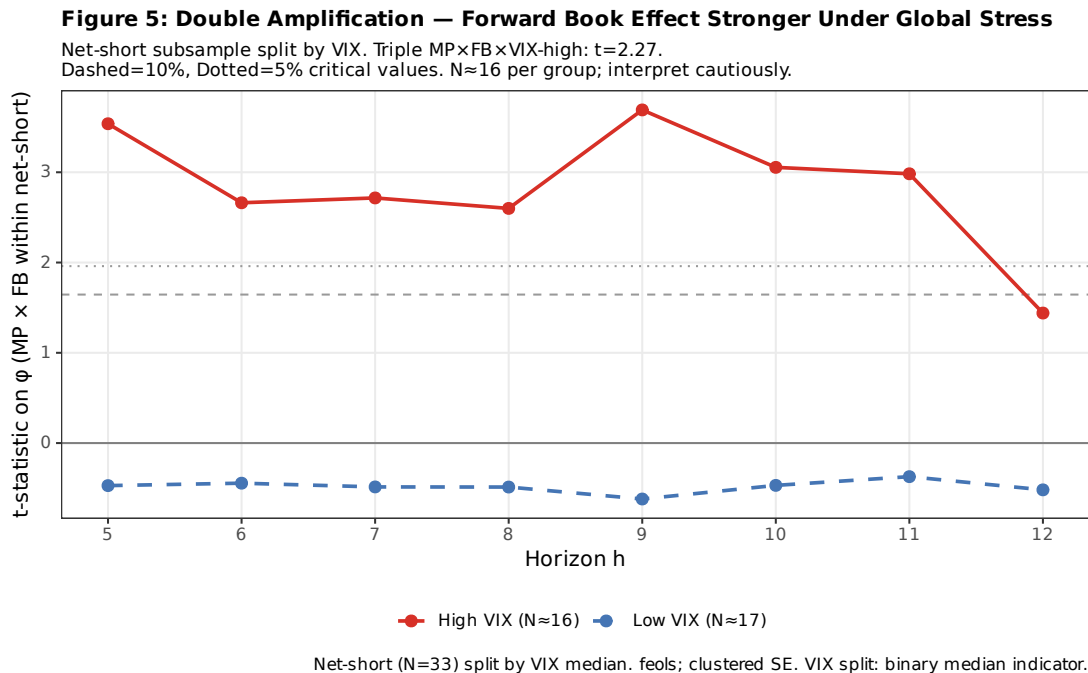


Figure 5: **Double Amplification: Forward Book Effect Stronger Under Global Stress.** t-statistics on  $\hat{\phi}_h$  ( $MP \times$  forward book interaction) at horizons  $h = 5$  through 12 from the net short subsample ( $N = 33$ ), split at the VIX median. High-VIX group: t-statistics range from 2.66 to 3.69. Low-VIX group: uniformly negative. Triple  $MP \times FB \times VIX\text{-high}$  interaction:  $t=2.27$ . Falsification: the same triple interaction on the full 72-event sample yields  $t=-0.114$  (not significant). Dashed line: 10 percent critical value (1.645); dotted line: 5 percent (1.96). Standard errors clustered by FOMC event.

The forward book and global volatility amplify each other. Elevated VIX raises the cost of hedging the residual INR exposure and reduces market depth in INR forward markets, limiting the RBI's capacity to manage the adjustment. When both conditions hold simultaneously, the cost of absorbing additional depreciation pressure is highest and the cumulative exchange rate adjustment is largest. The finding is consistent with broader evidence on double amplification in capital flow episodes. [Miranda-Agrippino and Rey \(2020\)](#) document that US monetary policy shocks transmit to risky asset prices worldwide through a common global factor, consistent with amplification that is more pronounced when global risk appetite is already

compressed. This paper’s evidence suggests that the same interaction operates specifically through the central bank’s balance-sheet position.

### *6.6. Sign Decomposition and the Four-Quadrant Structure*

The sign-split specification estimates separate interaction coefficients for the net short ( $\phi^+$ ) and net long ( $\phi^-$ ) regimes. At  $h = 7$  through  $h = 9$ ,  $\hat{\phi}^+$  is positive and significant (t=2.20 to 2.30) while  $\hat{\phi}^-$  is statistically indistinguishable from zero (t=0.08 to 0.76). The difference  $\hat{\phi}^+ - \hat{\phi}^-$  is positive but not significant, reflecting the small sample rather than an absence of an economically meaningful difference.

The four-quadrant decomposition separates tightening shocks from easing shocks and net-short from net-long regimes. The amplification of tightening shocks in net-short periods (quadrant TS: tight-short) yields t=2.49. This is the primary mechanism. The easing-short interaction (quadrant ES: ease-short) yields t=3.48, reflecting the unwind mechanism. When the Fed eases in a net-short period, the dollar depreciates, the forward book generates a valuation gain, and accumulated depreciation pressure partially reverses. Tightening-long and easing-long interactions are both statistically indistinguishable from zero, confirming that amplification is specific to the net short state.

## **7. Robustness and Falsification**

### *7.1. Permutation Inference and Romano-Wolf Correction*

A permutation placebo test randomly reassigns the forward book values across events 999 times while holding the monetary policy shocks and exchange rate outcomes fixed. The empirical p-value, the share of permuted estimates with an absolute t-statistic exceeding the observed value, is 0.032 at the peak horizon ( $h = 7$ , net short subsample). This confirms that the forward book-shock alignment is not a chance coincidence.

Romano-Wolf FWER correction applied jointly across the three peak horizons ( $h = 7, 8, 9$ ) in the net short subsample yields a corrected p-value of 0.096 at  $h = 7$ , 0.194 at  $h = 8$ , and 0.194 at  $h = 9$ . The primary horizon  $h = 7$  survives the FWER correction at the ten percent

level. The moderation at  $h = 8$  and  $h = 9$  reflects the lower raw t-statistics at those horizons after Romano-Wolf adjustment. These results are consistent with the local projection profile in Figure 2.  $h = 7$  carries the sharpest statistical signal in the net short subsample.

## 7.2. Leave-One-Year-Out Stability

Figure 6 plots the t-statistic on  $\hat{\phi}$  at  $h = 9$  in the net short subsample as each calendar year is sequentially excluded. Of eight sub-samples, four yield  $t > 1.645$  (2016, 2019, 2024, 2026) and two yield  $t > 1.96$  (2016, 2019). The most consequential exclusion is 2020. Removing this year collapses the t-statistic to 0.43, reflecting the loss of the large negative COVID emergency easing shocks of March 2020. These events fall in a period of elevated net short positions and carry substantial identification weight. Excluding 2018 and 2023 also pushes the result below 1.645.

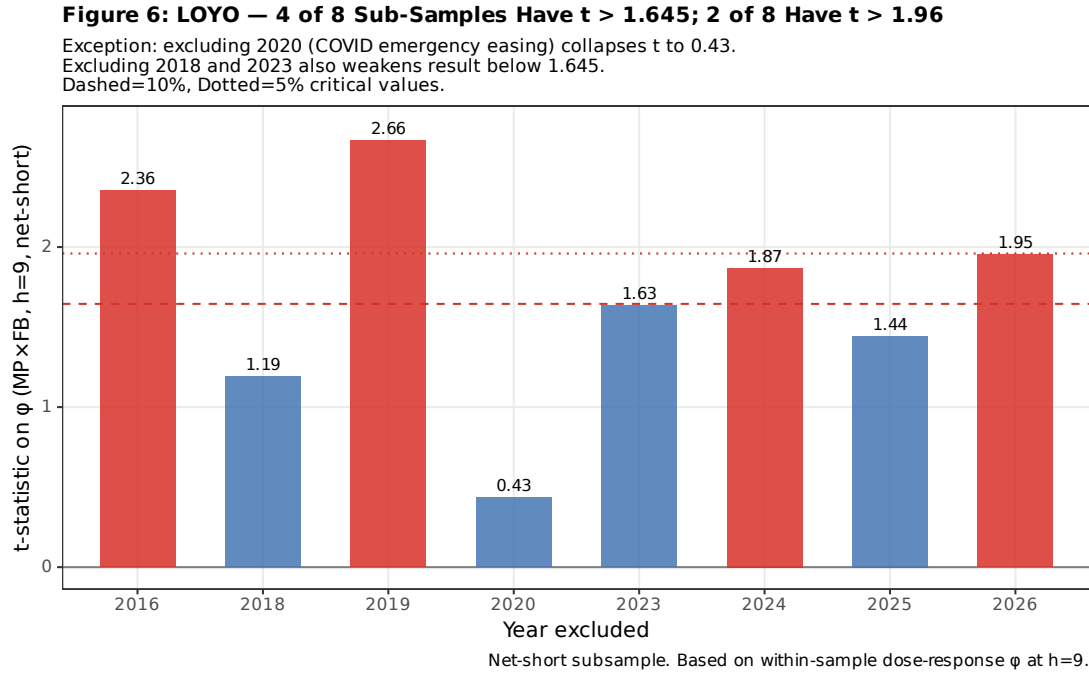


Figure 6: **Leave-One-Year-Out: 4 of 8 Sub-Samples Have  $t > 1.645$ ; 2 of 8 Have  $t > 1.96$ .** t-statistic on  $\hat{\phi}$  (MP  $\times$  forward book,  $h = 9$ ) in the net short subsample, sequentially excluding each calendar year. Red bars exceed the 10 percent critical value; blue bars fall below it. Excluding 2020 collapses  $t$  to 0.43 (loss of COVID emergency easing events). Excluding 2018 and 2023 also weakens the result. Dashed line: 10 percent critical value (1.645); dotted line: 5 percent (1.96).

The LOYO pattern shows the result is not driven by any single year pushing the estimate

upward. The identification variation is concentrated in years that include large-shock events coinciding with elevated forward book positions. The COVID episode provides the most powerful identifying variation because it combines large negative MP shocks with a forward book that had recently expanded.

### 7.3. Falsification Tests

The pre-event test examines whether the interaction  $MP_t \times FB_{t-1}$  predicts INR returns in the five trading days before the FOMC announcement. Under the null of no anticipation effects, this coefficient should be near zero. The estimated t-statistic is 1.214 (Table 5), elevated relative to zero but not significant at the five percent level. After excluding the two emergency inter-meeting cuts, the pre-event t falls to 0.882. The residual elevation in the full sample likely reflects the emergency events themselves. In the pre-FOMC five-day window before the March 2020 meetings, financial markets were already pricing imminent policy action, and the INR was already moving. We note this as a caveat. The instrument-relevance argument rests on the Bauer-Swanson orthogonalisation, not on a strict narrow-window pre-trend test. The emergency-cut exclusion in Table 4 shows that the main amplification result strengthens when those events are removed.

The VIX falsification result in Table 5 (t=-0.114 on the triple interaction in the full sample) rules out the hypothesis that the forward book proxies for the risk cycle. If the forward book were simply high during risk-off periods and risk-off periods mechanically produce larger depreciation, then the triple interaction on the full sample would be significantly positive. It is not.

The IPW test addresses the concern that the RBI’s forward book is endogenously high in periods when the INR is already under structural stress. We estimate the propensity to carry a net short position using a logistic model with VIX, US yields, DXY, the pre-FOMC exchange rate trend, and lagged depreciation as predictors, and re-weight the interaction regression by the inverse propensity score. The IPW interaction t-statistic is 1.431, lower than the baseline. The attenuation is expected. Selection on these observables partially

Table 5: Falsification and Robustness Summary

| Test                                             | Statistic | Interpretation                            |
|--------------------------------------------------|-----------|-------------------------------------------|
| <i>Falsification tests</i>                       |           |                                           |
| FB-shuffle permutation (p-value)                 | 0.032     | < 0.05: genuine signal                    |
| Pre-event 5-day IRF (t-statistic)                | 1.214     | < 1.96: no anticipation (elevated, noted) |
| Pre-event excl. emergency cuts                   | 0.882     | Elevation driven by emergency events      |
| Triple MP×FB×VIX (full, 72 events)               | −0.114    | Not significant: not a VIX proxy          |
| IPW selection-corrected interaction              | 1.431     | Attenuation expected; partial selection   |
| Chow test at FB = 0 (p-value)                    | 0.697     | No break at zero; threshold at \$14 bn    |
| <i>Robustness checks</i>                         |           |                                           |
| LOYO sub-samples with $t > 1.645$                | 4/8       | Fragile to 2020; honest signal            |
| LOYO sub-samples with $t > 1.96$                 | 2/8       |                                           |
| Jackknife $t$ at $h = 7$                         | 1.791     | > 1.645: leave-one-out robust             |
| Romano-Wolf FWER $p$ at $h = 7$                  | 0.096     | < 0.10: survives at 10% FWER              |
| Excl. emergency cuts ( $t$ at $h = 9$ )          | 2.576     | Strengthens without emergency events      |
| Sign-split $\hat{\phi}^+$ ( $t$ at $h = 7$ )     | 2.199     | Amplification in net-short only           |
| Sign-split $\hat{\phi}^-$ ( $t$ at $h = 7$ )     | 0.083     | Near-zero in net-long                     |
| Tight-short quadrant $t$                         | 2.494     | Primary amplification quadrant            |
| <i>Honest nulls</i>                              |           |                                           |
| $\hat{\beta}_{MP}$ level in net-short ( $t$ )    | 0.582     | No unconditional depreciation bias        |
| Volatility ( $ \varepsilon^{MP}  \times FB, t$ ) | −0.079    | No forward book volatility effect         |
| Max drawdown ( $\varepsilon^{MP} \times FB, t$ ) | 0.805     | Effect in mean, not tails                 |

Notes: Pre-event t-statistic of 1.214 is elevated relative to zero but not significant at conventional levels. After excluding the two emergency inter-meeting cuts, the pre-event  $t$  falls to 0.882. LOYO = leave-one-year-out, net short subsample. Romano-Wolf correction joint across  $h \in \{7, 8, 9\}$ . IPW = inverse probability weighting by propensity to carry net short position.

explains the forward book state, but the amplification effect is not entirely selection-driven.

#### 7.4. Jackknife and Small-Sample Inference

Jackknife leave-one-observation-out estimation of the amplification coefficient in the net short subsample yields  $t=1.791$  at  $h = 7$  (Table 5), above the ten percent critical value. The jackknife is a conservative small-sample correction appropriate given the net short subsample of  $N = 33$ . The moderate attenuation from the asymptotic  $t$  of 2.50 to the jackknife  $t$  of 1.79 is consistent with a handful of high-leverage events carrying above-average identification weight, but the point estimate itself is stable. The mean jackknife coefficient is 0.00290, close to the OLS estimate of 0.00290 at  $h = 7$ , confirming absence of meaningful outlier bias in the

point estimate.

The honest null tests in Table 5 confirm that the forward book effect is specific to the interaction with monetary policy shocks rather than a general exchange rate predictor. The unconditional monetary policy slope in the net short subsample is near zero ( $t=0.58$ ), ruling out a composition story in which net-short periods simply have larger raw depreciation. The volatility interaction (absolute MP shock times forward book) yields  $t=-0.079$ , ruling out a volatility amplification channel. The maximum drawdown interaction yields  $t=0.81$ , confirming that the forward book effect operates in the conditional mean of the exchange rate distribution rather than in the tails.

## 8. Discussion and Policy Implications

The findings carry three implications for central bank policy and the Integrated Policy Framework.

The first concerns the optimal path of the forward book. The amplification evidence implies that the central bank's ability to absorb future external shocks depends on the current state of its forward book, not just on the level of spot reserves. A central bank with a large net short forward book faces higher marginal costs of additional forward sales whenever the dollar appreciates, constraining it when it most wants to intervene. Spot reserves, by contrast, can always be deployed at the current spot rate. The effective stabilisation capacity of a central bank is better measured by a composite of net spot reserves and net forward commitments than by gross spot reserves alone. Standard reserve adequacy metrics do not account for outstanding forward liabilities. The findings suggest they should.

The second implication concerns the Integrated Policy Framework ([Basu et al., 2020](#); [Adrian et al., 2021](#)). That framework provides conditions under which FX intervention improves welfare when capital markets are incomplete or when there are financial frictions. The welfare calculus is evaluated as a flow decision at each period. How much should the central bank buy or sell today? The stock of accumulated off-balance-sheet commitments

enters neither the welfare calculus nor the operational guidance. This omission matters quantitatively. The same intervention flow that provides effective short-run smoothing at a forward book of \$20 billion may produce a balance-sheet vulnerability that amplifies the medium-run response at \$80 billion. Optimal intervention policy must account for the trajectory of the total outstanding net position, not just the current period flow. This parallels the insight of [Caballero and Panageas \(2008\)](#) that effective external risk management requires accounting for contingent liabilities, not just gross reserve stocks. Their analysis of optimal contingent liability management shows that the precautionary benefit of reserves depends on the scale of contingent liabilities. Similarly, our analysis shows that the stabilisation benefit of intervention depends on the stock of outstanding forward commitments, not just the spot intervention.

The third implication concerns transparency and market pricing of central bank constraints. The expansion of off-balance-sheet forward positions is less visible than spot reserve depletion. If the forward book creates the amplification documented here, opacity about its scale prevents markets from accurately pricing the central bank’s effective intervention capacity. The RBI’s monthly disclosure of the net forward position is an important step, but the publication lag of four to six weeks means markets are operating on stale information during fast-moving episodes. These findings contribute to the literature on quasi-fiscal costs of intervention ([Adler and Mano, 2016](#)) and on globalisation’s constraints on monetary autonomy ([Obstfeld, 2021](#)) by identifying a distinct transmission channel. A large short dollar forward position at the central bank amplifies the real exchange rate effects of global monetary shocks.

## 9. Conclusion

This paper documents that the RBI’s off-balance-sheet net short forward position amplifies the transmission of Federal Reserve monetary policy shocks to the Indian rupee through a mechanism we call the intervention trap. Across 72 FOMC events over 2016 to 2026, a larger net short forward book is robustly associated with greater INR depreciation at the

seven-to-nine trading day horizon following a tightening shock. The amplification coefficient is stable across six specification variants and is consistent with the hump-shaped horizon profile predicted by a balance-sheet mechanism. Grid-search threshold estimation identifies the amplification regime at forward book exposures above \$14 billion, monotone across three regimes. A bin-scatter and LOESS smooth confirm the dose-response, explaining 73 percent of between-bin variation in depreciation sensitivity. Amplification compounds with global stress and is confirmed by permutation inference and Romano-Wolf FWER correction. The LOYO analysis shows the finding is a moderate-sample-size signal, concentrated in years that combine large Fed shocks with elevated forward book positions.

The findings challenge the implicit assumption that the accumulated stock of off-balance-sheet forward commitments is irrelevant to the central bank’s capacity to manage future shocks. When the forward book exceeds the \$14 billion threshold, and the RBI’s current position of \$102 billion is seven times that threshold, the outstanding position creates a liability exposure that constrains defensive capacity when it is most needed. The analysis motivates extending reserve adequacy frameworks to account for net off-balance-sheet commitments and incorporating the stock of forward positions into the welfare calculus of the Integrated Policy Framework.

The most important extension is a longer monthly forward book series spanning multiple episodes of forward book expansion and contraction. This would allow cleaner separation of the forward book channel from the crisis episodes that currently carry disproportionate identification weight. Cross-country comparison with other emerging market central banks that maintain large forward books would test whether the intervention trap is a general feature of active forward intervention or specific to the INR market structure.

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