

The impact of net foreign-asset deficits on private credit: banks versus central banks in IMF-programme economies

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Abstract

Between 2022 and 2024 several emerging and frontier economies ran short of foreign currency, and the net foreign assets of their banks and central banks turned negative. This study asks which of the two positions constrains bank credit to the private sector, and whether deteriorations and improvements have symmetric effects. It uses quarterly balance-sheet data from the International Monetary Fund for eight economies with IMF-supported programmes (Argentina, Bangladesh, Egypt, Ghana, Kenya, Pakistan, Sri Lanka and Zambia) over 2001–2026. Positive and negative changes in each position are separated in a panel nonlinear autoregressive distributed lag model estimated by pooled mean group, and asymmetric local projections trace the short-run responses. Banks' own net foreign assets have no significant long-run effect on real private credit. In the short run, falls in banks' net foreign assets are followed by more credit, not less, which is consistent with banks drawing on foreign assets to fund domestic lending. The central bank's position matters instead. A one-point fall in its net foreign assets, measured as a share of its total assets, is associated with real private credit about 2.5% lower in the long run, whereas a one-point rise raises credit by about 0.8%, and the difference is significant. This asymmetry is robust to sample, lag and estimator choices but not to removing common quarterly shocks, so it captures how shared external stress reaches credit through official reserves. Rebuilding official buffers matters more for credit than restricting banks' foreign positions.

Introduction

Between 2022 and 2024 several emerging and frontier economies ran short of foreign currency. Higher US interest rates, the war in Ukraine and, for Egypt, the Red Sea disruptions that cut Suez Canal receipts by about USD 6 billion in 2024 alone (IMF 2025) drained hard-currency inflows, and many of these countries turned to the International Monetary Fund. The shortage showed up on two balance sheets. In Egypt, the net foreign assets (NFA) of the central bank fell from 10.8% of its total assets in mid-2021 to –7.6% in early 2023, and banks' NFA fell from small surpluses to –4.0% of their assets in mid-2023 (Fig. 1). Real bank credit to the private sector fell by about 10% between the end of 2022 and the third quarter of 2023 and regained its earlier level only in the third quarter of 2025. The central banks of Pakistan and Ghana also moved into net foreign liabilities during 2022.

Panel (a): net foreign assets of banks (other depository corporations, % of their total assets) and of the central bank (% of its total assets). Panel (b): bank claims on the private sector deflated by the consumer price index, 2021Q4 = 100. Source: author's calculations from IMF Monetary and Financial Statistics and Consumer Price Index data.

Two channels could link these positions to credit. Under a bank funding channel, a bank whose foreign liabilities exceed its foreign assets must roll over foreign-currency funding, stay within limits on its open currency position and hold foreign-currency liquidity, and each of these draws on resources that could otherwise be lent. Under an official-buffer channel, the constraint is national rather than bank-specific. When the central bank runs down its NFA, importers face rationed foreign exchange, sales of reserves

drain domestic liquidity, policy rates rise and both the supply of and demand for credit weaken. The two positions often deteriorate together, but they need not, because banks' NFA can also fall when banks bring funds home to lend. Telling the channels apart matters for policy: the first calls for tighter limits on banks' foreign positions, the second for rebuilding official reserves.

The literature shows that foreign funding moves domestic credit. Cross-border bank lending loosens financial conditions and raises credit in emerging markets (Aldasoro et al. 2020; Baskaya et al. 2017), and banks cut lending when dollar funding dries up (Cetorelli and Goldberg 2011; Ivashina et al. 2015). Bagsic et al. (2025) show that Philippine banks whose foreign assets grow faster than their foreign liabilities lend more during depreciations, and Ansari et al. (2023), in this journal, link capital inflows to bank credit in India. A separate literature shows that international reserves cushion economies in crises (Obstfeld et al. 2010; Dominguez et al. 2012; Frankel and Saravelos 2012). Three gaps remain. Bank and official positions are rarely compared in one model, and most studies measure flows into the economy rather than the stocks that constrain balance sheets. Most studies also assume symmetry, although credit-less recoveries, in which output recovers after a sudden stop while credit does not (Calvo et al. 2006; Abiad et al. 2011), suggest that deteriorations and improvements need not have mirror-image effects. Finally, the economies that relied on IMF support during the recent shortage are under-represented in this evidence.

This paper compares the two positions using quarterly IMF balance-sheet data for banks and central banks in eight economies with IMF-supported programmes: Argentina, Bangladesh, Egypt, Ghana, Kenya, Pakistan, Sri Lanka and Zambia. Following Shin et al. (2014), changes in each NFA ratio are split into positive and negative partial sums, and the panel nonlinear autoregressive distributed lag (NARDL) model is estimated with the pooled mean group (PMG) estimator of Pesaran et al. (1999). Asymmetric local projections (Jordà 2005) trace the responses over two years.

The results favour the official-buffer channel. Banks' own NFA has no significant long-run effect on real private credit, and in the short run falls in banks' NFA are followed by more credit rather than less. A one-point fall in the central bank's NFA ratio is associated with real private credit about 2.5% lower in the long run, while a one-point rise raises it by about 0.8%; the asymmetry is significant. These results hold across samples, lag orders and estimators, but they rest on external stress that the countries share, a point the Discussion takes up.

The next section reviews the literature and states the hypotheses. The Methods section describes the data and the estimation strategy, and the Results section presents the estimates and robustness checks. The final sections discuss the findings and conclude.

Literature review and hypotheses

Banks' foreign position and lending

The bank-lending channel holds that banks which lose funding cut lending when they cannot replace it at similar cost (Bernanke and Gertler 1995; Kashyap and Stein 2000), and banks with less liquid balance sheets reduced credit more during the 2007–2009 crisis (Cornett et al. 2011). Foreign liabilities are a particularly unstable source of funding. Hahm et al. (2013) show that non-core liabilities, of which foreign borrowing is a large part, signal financial vulnerability in emerging economies, and Bruno and Shin (2015) show how cross-border bank funding transmits global liquidity to domestic credit. Because global financial conditions move with US monetary policy (Rey 2013; Miranda-Agrippino and Rey 2020), banks that rely on foreign funding import these shocks. Micro evidence confirms the channel: global banks transmitted the 2008 shock to their affiliates and borrowers (Cetorelli and Goldberg 2011), banks that lost dollar funding cut dollar lending (Ivashina et al. 2015), and capital inflows raised loan supply in Turkey through banks' non-core liabilities (Baskaya et al. 2017).

The sign of the net position also shapes how currency shocks pass through. With foreign-currency liabilities a depreciation weakens balance sheets (Krugman 1999; Céspedes et al. 2004), whereas banks with net foreign assets can gain and lend more, as German banks did after the 2014 euro depreciation (Beck et al. 2022) and Philippine banks with growing foreign assets did after peso depreciations (Bagsic et al. 2025). Macroprudential limits on foreign-currency positions reduce banks' foreign borrowing (Ahnert et al. 2021). On this view, a deficit in banks' NFA binds through funding, through exposure to depreciation and through regulation. Banks' foreign assets, however, are also a liquidity store that can be drawn down to fund domestic loans, in which case falls in NFA would accompany credit expansions rather than contractions.

The central bank's external position and credit

International reserves insure the domestic financial system against drains of foreign currency (Obstfeld et al. 2010). Countries that entered the 2008–2009 crisis with larger reserves suffered smaller output losses (Dominguez et al. 2012), and reserves were among the most reliable predictors of crisis incidence (Frankel and Saravelos 2012). When reserves run low, the central bank rations foreign exchange or lets the currency fall, sells reserves that drain domestic liquidity, and raises interest rates to stem outflows. Each response weakens credit through the cost of funds, the value of collateral and the demand of firms that cannot import inputs. In economies with IMF-supported programmes the central bank's NFA, rather than gross reserves, is the relevant measure, because programme and swap liabilities can leave gross reserves high while the net position turns negative.

Why the effects may be asymmetric

Three arguments suggest that deteriorations and improvements need not have mirror-image effects. Capital flows reverse abruptly but return gradually (Calvo 1998; Forbes and Warnock 2012). Financial frictions bind harder in downturns, when net worth and collateral values fall (Bernanke and Gertler 1995). Central banks fear reserve losses and rebuild buffers before they ease (Aizenman and Hutchison 2012),

so returning inflows first clear import backlogs and restore reserves before they reach bank lending. The result is the credit-less recovery documented by Calvo et al. (2006) and Abiad et al. (2011). The NARDL framework of Shin et al. (2014) tests long-run and short-run asymmetry within one cointegrating model.

Hypotheses

H1. A fall in banks' NFA reduces real private credit.

H2. A fall in the central bank's NFA reduces real private credit.

H3. Falls in NFA reduce real private credit by more than rises of equal size increase it.

Methods

Sample and data

The sample covers economies that faced acute foreign-currency shortages during 2022–2024, had an IMF arrangement in force during 2022–2025 and still had IMF credit outstanding in March 2026 (IMF 2026a): Argentina, Bangladesh, Egypt, Ethiopia, Ghana, Kenya, Pakistan, Sri Lanka and Zambia. All data come from the IMF Data portal and were downloaded on 16 October 2026: the balance sheets of other depository corporations (ODCs, here "banks") and of the central bank from the Monetary and Financial Statistics (IMF 2026b, 2026c), consumer prices (IMF 2026d), exchange rates (IMF 2026e) and interest rates (IMF 2026f). The data are quarterly; where only monthly observations exist, end-of-quarter values are used for stocks.

Ethiopia drops out because the IMF reports no balance-sheet data for its banks. Three country series contain one-quarter breaks that reflect reclassification rather than economic change, so their samples start after the break: Pakistan in 2005Q1 (a 25% jump in ODC total assets), Ghana in 2009Q1 (claims on the private sector and the government reclassified back and forth during 2008) and Sri Lanka in 2011Q2 (a 33% jump in ODC total assets). The IMF's ODC data for Sri Lanka end in 2020Q2, and Argentina's consumer price index and central-bank data begin in 2016Q4 and 2017Q1. A country enters the panel only with at least 36 consecutive quarters of complete data; all eight remaining countries meet this rule. The unbalanced panel covers 2001Q4–2026Q3 with 621 country-quarters (Table 1).

Table 1
Sample coverage and net foreign asset positions by country

Country	Banks' NFA (% of bank assets)					Central bank NFA (% of CB assets)			
	Sample	T	Mean	Min	% < 0	Mean	Min	% < 0	ΔC
Argentina	2017Q1–2026Q3	39	1.4	–1.6	15	14.8	0.0	3	0.36
Bangladesh	2001Q4–2026Q2	99	–0.4	–1.9	65	52.0	14.1	0	1.67
Egypt	2004Q1–2026Q3	91	3.6	–4.0	26	12.6	–7.6	16	0.34
Ghana	2009Q1–2026Q1	69	2.1	–2.7	19	19.0	–12.1	12	0.84
Kenya	2001Q4–2026Q2	99	1.1	–4.0	45	58.0	16.5	0	1.13
Sri Lanka	2011Q2–2020Q2	37	–8.0	–11.0	100	45.7	29.5	0	2.35
Pakistan	2005Q1–2026Q3	87	1.0	–2.1	43	11.4	–13.6	23	0.00
Zambia	2001Q4–2026Q3	100	11.5	2.0	0	16.7	–35.5	18	1.89

T is the number of quarters. % < 0 is the share of quarters with a negative position. ΔC is mean quarterly growth of real bank credit to the private sector (%). NFA, net foreign assets; CB, central bank. Samples start after documented reclassification breaks (see Methods). Source: author's calculations from IMF data.

Variables

The dependent variable is the log of real bank credit to the private sector, $100 \times \ln(\text{ODC claims on the private sector} / \text{consumer price index})$, so its first difference is quarterly real credit growth in per cent. Banks' NFA is ODC claims on non-residents minus liabilities to non-residents, as a percentage of ODC total assets. The central bank's NFA is its net foreign assets as a percentage of its total assets. Scaling each position by the balance sheet that carries it keeps the two measures comparable and avoids a GDP denominator, which is not available quarterly for all countries. Following Shin et al. (2014), each NFA ratio x is decomposed into partial sums of its positive and negative changes, $x^+_{it} = \sum_{j \leq t} \max(\Delta x_{ij}, 0)$ and $x^-_{it} = \sum_{j \leq t} \min(\Delta x_{ij}, 0)$. The quarterly depreciation of the domestic currency against the US dollar, $100 \times \Delta \ln(\text{exchange rate})$, enters the short run as a control, because depreciation revalues foreign-currency loans. Table 2 reports descriptive statistics.

Table 2
Descriptive statistics

Variable	N	Mean	SD	Min	Max
Real private credit growth (% q/q)	613	1.05	4.72	-21.05	19.78
Banks' NFA (% of bank assets)	621	2.48	5.72	-11.04	24.86
Banks' foreign assets (% of bank assets)	621	6.93	5.50	1.15	27.53
Banks' foreign liabilities (% of bank assets)	621	4.45	2.83	0.53	13.98
Central bank NFA (% of CB assets)	621	29.42	25.17	-35.46	81.62
Depreciation against USD (% q/q)	621	2.23	8.23	-40.97	83.69

Pooled unbalanced panel of eight economies, 2001Q4–2026Q3. Real credit growth is $100 \times \Delta \ln(\text{ODC claims on the private sector} / \text{CPI})$. Depreciation is $100 \times \Delta \ln(\text{domestic currency per US dollar, end of period})$. Source: author's calculations from IMF data.

Panel NARDL model

The long-run relation is

$$C_{it} = \theta_B^+ B_{it}^+ + \theta_B^- B_{it}^- + \theta_Z^+ Z_{it}^+ + \theta_Z^- Z_{it}^- + u_{it}, \quad (1)$$

where C is log real private credit, B is banks' NFA ratio and Z is the central bank's NFA ratio. With the regressors collected in x_{it} , the error-correction form is

$$\Delta C_{it} = \varphi_i (C_{i,t-1} - \theta' x_{i,t-1}) + \sum_{j=1}^{p-1} \lambda_{ij} \Delta C_{i,t-j} + \sum_{j=0}^{q-1} \delta'_{ij} \Delta x_{i,t-j} + \kappa_i D_{it} + \mu_i + \tau_i t + \sum_s \eta_{is} S_{st} + \varepsilon_{it}, \quad (2)$$

where φ_i is the speed of adjustment, D is depreciation, μ_i and $\tau_i t$ are a country-specific intercept and trend, and S are quarterly seasonal dummies. Positive coefficients on the negative partial sums mean that falls in NFA reduce credit. H1 and H2 therefore predict $\theta_B^- > 0$ and $\theta_Z^- > 0$. H3 predicts $\theta^- > \theta^+$ in the long run and $\Sigma \delta^- > \Sigma \delta^+$ in the short run. The country trends matter for NARDL: partial sums drift by construction, and without trends they could pick up the secular growth of credit.

Estimation and tests

PMG constrains the long-run coefficients θ to be equal across countries but lets adjustment speeds, short-run coefficients, trends and error variances differ. It is estimated by maximum likelihood (Pesaran et al. 1999), and the mean group (MG) estimator, which averages country-specific estimates (Pesaran and Smith 1995), and the dynamic fixed-effects (DFE) estimator with Driscoll and Kraay (1998) standard errors serve as comparisons. A Hausman test compares PMG with MG. The common lag order is chosen by the Schwarz criterion over $p, q \in \{1, \dots, 4\}$, which selects ARDL(1,1). Before estimation, the Pesaran

(2015) test checks cross-sectional dependence and the CIPS test (Pesaran 2007) checks unit roots, with critical values simulated for the panel's own unbalanced structure. Cointegration is indicated by a negative and significant error-correction coefficient (Kremers et al. 1992; Pesaran et al. 1999).

Local projections (Jordà 2005) complement the long-run analysis by estimating, for horizons $h = 0, \dots, 8$,

$$C_{i,t+h} - C_{i,t-1} = \beta_h^+ \Delta B^+_{it} + \beta_h^- \Delta B^-_{it} + \gamma_h^+ \Delta Z^+_{it} + \gamma_h^- \Delta Z^-_{it} + \text{controls} + \mu_i + e_{i,t+h}, \quad (3)$$

where Δx^+ and Δx^- are the positive and negative parts of the quarterly change, and the controls are two lags of credit growth, depreciation and seasonal dummies. Standard errors are Driscoll–Kraay.

All estimators were programmed in Python and checked on simulated panels with known coefficients; a Stata do-file using xtpmg (Blackburne and Frank 2007) is available for replication. An AI assistant (Claude, Anthropic) was used to help draft the estimation code, search the literature and edit the text. The author designed the study, chose the data and specifications, checked all code, data, results and references, and takes full responsibility for the content.

Results

Preliminary tests

Table 3 reports the diagnostic tests. The CIPS test does not reject a unit root in the levels of any variable at the 5% level, and it rejects one in every first difference, so no series is $I(2)$ and the ARDL framework applies. Cross-sectional dependence is strong in levels but weak in first differences, and the PMG residuals show no remaining dependence ($CD = -0.17$, $p = 0.86$; Table 4).

Table 3
Panel unit-root and cross-sectional dependence tests

Variable	CIPS [p-value]		Pesaran CD [p-value]	
	Level	First difference	Level	First difference
Log real private credit (×100)	−1.95 [0.28]	−5.36 [0.00]	15.32 [0.00]	0.86 [0.39]
Banks' NFA ratio	−2.08 [0.17]	−6.04 [0.00]	8.17 [0.00]	1.59 [0.11]
Banks' NFA ⁺	−1.90 [0.32]	−5.81 [0.00]	39.16 [0.00]	1.81 [0.07]
Banks' NFA [−]	−1.63 [0.62]	−5.61 [0.00]	38.82 [0.00]	1.60 [0.11]
Central bank NFA ratio	−1.89 [0.33]	−4.84 [0.00]	12.43 [0.00]	1.93 [0.05]
Central bank NFA ⁺	−2.27 [0.06]	−5.39 [0.00]	38.89 [0.00]	1.29 [0.20]
Central bank NFA [−]	−1.27 [0.89]	−4.34 [0.00]	38.23 [0.00]	2.54 [0.01]

CIPS is the cross-sectionally augmented panel unit-root test of Pesaran (2007) with an intercept and one lag; p-values come from 1000 simulations of the null for the panel's own unbalanced structure. CD is the Pesaran (2015) test of cross-sectional independence. NFA⁺ and NFA⁻ are partial sums of positive and negative changes. Source: author's estimates.

Long-run estimates

Table 4 reports the baseline estimates. H1 is not supported. Neither partial sum of banks' NFA has a significant long-run coefficient in the PMG, DFE or MG estimates, and both point estimates are negative, the opposite of the predicted sign.

Table 4
Panel NARDL estimates: real private credit and net foreign assets

Long-run coefficients	PMG	DFE	MG
Banks' NFA ⁺	-1.023	-1.838	85.682
	(1.396)	(2.393)	(71.154)
Banks' NFA ⁻	-0.513	-3.127	-46.838
	(1.018)	(2.422)	(66.112)
Central bank NFA ⁺	0.831***	0.752**	8.021
	(0.267)	(0.371)	(7.425)
Central bank NFA ⁻	2.546***	2.035***	52.970
	(0.342)	(0.686)	(48.423)
Error-correction coefficient (φ)	-0.039*	-0.038***	-0.107***
	(0.020)	(0.011)	(0.039)
<i>Short-run coefficients (PMG: country average)</i>			
Δ Banks' NFA ⁺	-0.500		
	(0.382)		
Δ Banks' NFA ⁻	-1.119		
	(0.891)		
Δ Central bank NFA ⁺	-0.097		
	(0.095)		
Δ Central bank NFA ⁻	0.107		
	(0.072)		
Depreciation	0.182***		
	(0.055)		
<i>Symmetry tests, Wald $\chi^2(1)$ [p-value]</i>			
Long run, banks: $\theta^+ = \theta^-$	0.08 [0.775]	2.60 [0.107]	1.05 [0.306]
Long run, central bank: $\theta^+ = \theta^-$	15.07 [< 0.001]	3.91 [0.048]	1.20 [0.273]
Short run, banks: $\Sigma\delta^+ = \Sigma\delta^-$	0.30 [0.582]		
Short run, central bank: $\Sigma\delta^+ = \Sigma\delta^-$	2.19 [0.139]		

<i>Long-run coefficients</i>	PMG	DFE	MG
Hausman test, PMG vs MG, $\chi^2(4)$ [p-value]	10.28 [0.036]		
Residual CD statistic [p-value]	-0.17 [0.862]		
Countries / observations	8 / 613	8 / 613	8 / 613

Dependent variable: $100 \times \log$ real bank credit to the private sector. ARDL(1,1) selected by the Schwarz criterion. All models include depreciation, a country-specific linear trend and quarterly dummies in the short run. Long-run coefficients measure the percentage change in real credit per one-point cumulative rise (+) or fall (-) in the NFA ratio; a positive coefficient on a - term means that falls reduce credit. Standard errors in parentheses: maximum-likelihood for PMG long-run coefficients, cross-country dispersion for PMG short-run and MG coefficients, Driscoll–Kraay for DFE. *, ** and *** denote significance at the 10%, 5% and 1% levels. Source: author's estimates.

H2 is supported. Both partial sums of the central bank's NFA have positive and significant PMG coefficients. A one-point fall in the central bank's NFA ratio is associated with real private credit 2.55% lower in the long run, while a one-point rise is associated with credit 0.83% higher. The long-run symmetry test rejects equality ($\chi^2 = 15.07, p < 0.001$), so H3 is supported in the long run for the central bank's position: losses of official foreign assets weigh on credit about three times as much as equal gains help it. The DFE estimates tell the same story (2.04 against 0.75; $p = 0.048$ for symmetry). The MG estimates are too imprecise to be informative, because several country error-correction coefficients are close to zero and the country-specific long-run ratios $-\beta_i/\varphi_i$ explode.

Adjustment is slow. The average PMG error-correction coefficient is -0.039 ($p = 0.057$), which implies a half-life of deviations of about 18 quarters. The coefficient is negative in seven of eight countries and significant for Bangladesh, Ghana, Pakistan and Zambia (Additional file 1: Table S2). The Hausman test rejects the PMG restriction at the 5% level ($p = 0.036$). Given the instability of the MG estimates with eight countries, PMG remains the preferred estimator (Pesaran et al. 1999), but heterogeneous long-run slopes cannot be ruled out.

Short-run dynamics

In the short run, the PMG coefficients on changes in both positions are small and insignificant, and short-run symmetry is not rejected for either position (Table 4). Depreciation raises measured real credit within the quarter ($0.18, p < 0.01$), which reflects the revaluation of foreign-currency loans.

The local projections in Fig. 2 show the timing. A one-point fall in banks' NFA is followed by more credit, not less: real credit is 2.2% higher after six quarters and 2.9% higher after eight ($p = 0.013$). A rise in banks' NFA has no significant effect at any horizon. A one-point fall in the central bank's NFA is followed by a gradual decline in real credit that reaches 0.98% after seven quarters ($p < 0.01$), whereas a rise has

no significant effect. The point estimates are asymmetric, but the differences between rises and falls are not significant at any horizon (Additional file 1: Table S3).

Cumulative change in log real private credit (%) h quarters after a one-point rise (left) or fall (right) in banks' NFA (top) and the central bank's NFA (bottom), from Eq. (3). Shaded areas are 90% confidence intervals based on Driscoll–Kraay standard errors. Eight countries, 2001Q4–2026Q3. Source: author's estimates.

Robustness

Table 5 reports robustness checks for the PMG estimates. The central bank's coefficients and their asymmetry are stable when Argentina, whose inflation was extreme, is dropped, when Sri Lanka, whose data end in 2020, is also dropped, under ARDL(2,2), and when banks' foreign liabilities replace their NFA. The banks' coefficients never support H1. When foreign liabilities replace NFA, falls in liabilities are associated with more credit, not less, and without country trends falls in banks' NFA are also associated with more credit. Without trends the central bank's coefficients stay positive and significant, but their asymmetry is no longer significant ($p = 0.131$). A linear ARDL with symmetric effects gives a long-run coefficient of 1.27 ($p < 0.01$) on the central bank's NFA and -0.90 ($p = 0.17$) on banks' NFA.

Table 5
Robustness of the PMG long-run estimates

Specification	Banks' NFA ⁺	Banks' NFA ⁻	CB NFA ⁺	CB NFA ⁻	φ	CB symmetry p	N/obs
(1) Baseline (Table 4)	-1.023	-0.513	0.831***	2.546***	-0.039*	< 0.001	8/613
	(1.396)	(1.018)	(0.267)	(0.342)	(0.020)		
(2) Excluding Argentina	-0.919	-0.637	0.812***	2.512***	-0.050**	< 0.001	7/575
	(1.400)	(1.017)	(0.267)	(0.340)	(0.020)		
(3) Excluding Argentina and Sri Lanka	-0.821	-0.894	0.736***	2.553***	-0.054**	< 0.001	6/539
	(1.448)	(1.048)	(0.276)	(0.346)	(0.022)		
(4) ARDL(2,2)	-1.191	0.107	0.979***	2.266***	-0.069***	0.002	8/605
	(1.287)	(0.989)	(0.252)	(0.347)	(0.024)		
(5) Banks' foreign liabilities in place of NFA	0.934	-5.835***	0.703***	2.867***	-0.052**	< 0.001	8/613
	(1.732)	(1.920)	(0.272)	(0.312)	(0.023)		
(6) No country-specific trends	-0.163	-2.189***	1.023***	1.213***	-0.050***	0.131	8/613
	(0.606)	(0.699)	(0.176)	(0.152)	(0.017)		
(7) Cross-sectionally demeaned data	-2.199***	1.416**	-0.015	-0.665***	-0.192***	< 0.001	8/613
	(0.827)	(0.590)	(0.146)	(0.094)	(0.072)		

Long-run PMG coefficients with standard errors in parentheses; specifications as in Table 4 unless stated. CB symmetry p is the p-value of the Wald test of equal long-run coefficients on the central bank's positive and negative partial sums. In row (5) the bank columns refer to rises and falls in banks' foreign liabilities (% of bank assets), so a rise is a deterioration. In row (7) every variable is demeaned by its cross-country average in each quarter. A symmetric linear ARDL gives - 0.900 (0.658) for banks' NFA and

1.271*** (0.153) for the central bank's NFA. *, ** and *** denote significance at the 10%, 5% and 1% levels. Source: author's estimates.

Two checks qualify the results. When the data are demeaned by their cross-country average in each quarter, which removes common shocks, the central bank's coefficients turn negative or insignificant, while banks' NFA becomes significant with mixed signs: falls are associated with less credit, as H1 predicts, but so are rises (column 7). The local projections on demeaned data keep the sign of the central bank's effect but weaken it to marginal significance (Additional file 1: Table S4). In addition, when the sample ends in 2019Q4 or the real interest rate is added, which ends the samples for Pakistan and Zambia in 2021, the error-correction coefficient is close to zero and the long-run relation is not identified (Additional file 1: Table S5).

Discussion

The results reject the bank funding channel in its simple form. In these economies banks' NFA positions are small, averaging 2.5% of assets with a standard deviation of 5.7 points, and supervisors cap open currency positions, so the swings that matter happen elsewhere. The positive response of credit to falls in banks' NFA fits the view of banks' foreign assets as a liquidity store: when domestic lending opportunities improve, banks repatriate foreign assets or borrow abroad to fund loans, and NFA falls as credit rises. This is the pattern the capital-flow literature finds for credit expansions (Lane and McQuade 2014; Baskaya et al. 2017), and it means that a deficit in banks' NFA is often a sign of lending, not a constraint on it.

The official position behaves differently. Central-bank NFA ratios swing widely, with a standard deviation of 25 points, and their falls are followed by persistent credit contraction. The asymmetry is consistent with the fear of reserve loss (Aizenman and Hutchison 2012): after a reserve crisis, central banks rebuild buffers and keep policy tight, and returning foreign exchange first clears import backlogs. Egypt illustrates the pattern. Its central bank's NFA ratio rose from – 7.6% at the end of 2023 to 6.6% by mid-2024, after the March 2024 float, yet real credit regained its end-2022 level only in 2025Q3, five quarters later (Fig. 1).

The demeaned estimates show what the official-buffer result identifies. The central bank's NFA fell in Egypt, Pakistan and Ghana at almost the same time, under the same global tightening, and much of the variation that links it to credit is common to the panel. The result therefore describes how shared external shocks reach domestic credit through official foreign-currency positions; it cannot separate this channel from other effects of the same shocks, such as higher global interest rates or commodity prices. That the effect survives country trends, sample changes and lag choices, and that the local projections show it unfolding after the fall in reserves, supports this reading.

Conclusions

This paper asked whether banks' own net foreign-asset deficits or the central bank's external position constrains private credit in economies with IMF-supported programmes. Banks' NFA does not reduce credit: in the long run it has no significant effect, and in the short run its falls accompany more lending. The central bank's NFA does matter, and asymmetrically: a one-point fall is associated with real private credit about 2.5% lower in the long run, roughly three times the gain from a one-point rise.

Three implications follow. First, for credit, rebuilding official foreign-currency buffers matters more than tightening limits on banks' net open positions, which already keep banks' exposures small. Second, IMF programmes and national authorities should expect credit to recover slowly after reserves are rebuilt, and measures that clear foreign-exchange backlogs and restore market functioning may shorten the lag. Third, a fall in banks' NFA should not by itself be read as a sign of credit stress, because it often finances domestic lending.

The analysis has limitations. With eight countries and country-level data, it cannot fully separate the supply of credit from demand, and the long-run relation rests on slow error correction and on shocks the countries share. The IMF data do not split credit by currency, Sri Lanka's bank data end in 2020 and Ethiopia could not be included. Bank-level data on foreign-currency positions and loan growth, for example for Egyptian banks through the 2022–2024 shortage, would allow the two channels to be separated within the same macroeconomic shock.

Abbreviations

ARDL

Autoregressive distributed lag

CD

Cross-sectional dependence

CIPS

Cross-sectionally augmented Im–Pesaran–Shin

DFE

Dynamic fixed effects

IMF

International Monetary Fund

MG

Mean group

NARDL

Nonlinear autoregressive distributed lag

NFA

Net foreign assets

ODC

Other depository corporation

PMG

Pooled mean group
SBC
Schwarz Bayesian criterion

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

Declared in the submission system and withheld here to preserve anonymity.

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Author Contribution

M.R.H. conceived and designed the study, collected and analysed the data, interpreted the results and wrote the manuscript. M.R.H. read and approved the final manuscript.

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Data Availability

The data analysed in this study are publicly available from the International Monetary Fund Data portal (<https://data.imf.org>): Monetary and Financial Statistics for other depository corporations (IMF.STA:MFS_ODC) and central banks (IMF.STA:MFS_CBS), Consumer Price Index (IMF.STA:CPI), Exchange Rates (IMF.STA:ER) and Interest Rates (IMF.STA:MFS_IR), accessed 16 October 2026. The estimation dataset is provided as a supplementary file. The estimation code is available from the corresponding author on reasonable request.

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Figures

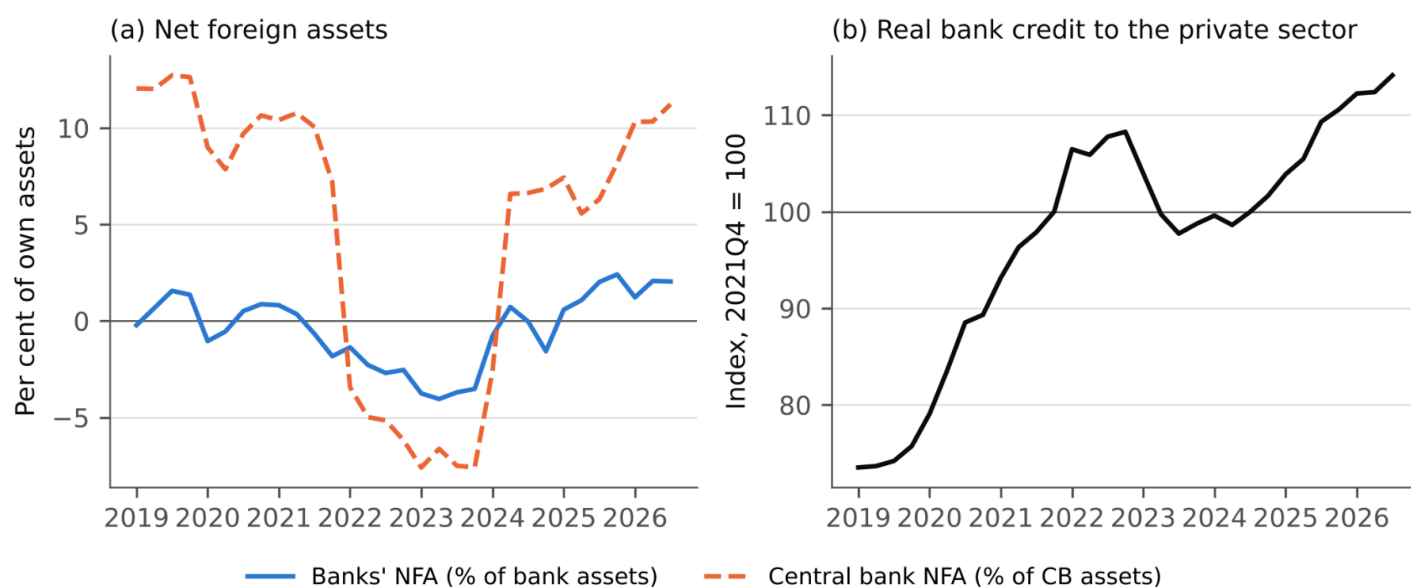


Figure 1

Egypt: net foreign assets and real private credit, 2019–2026

Panel (a): net foreign assets of banks (other depository corporations, % of their total assets) and of the central bank (% of its total assets). Panel (b): bank claims on the private sector deflated by the consumer price index, 2021Q4 = 100. Source: author's calculations from IMF Monetary and Financial Statistics and Consumer Price Index data.

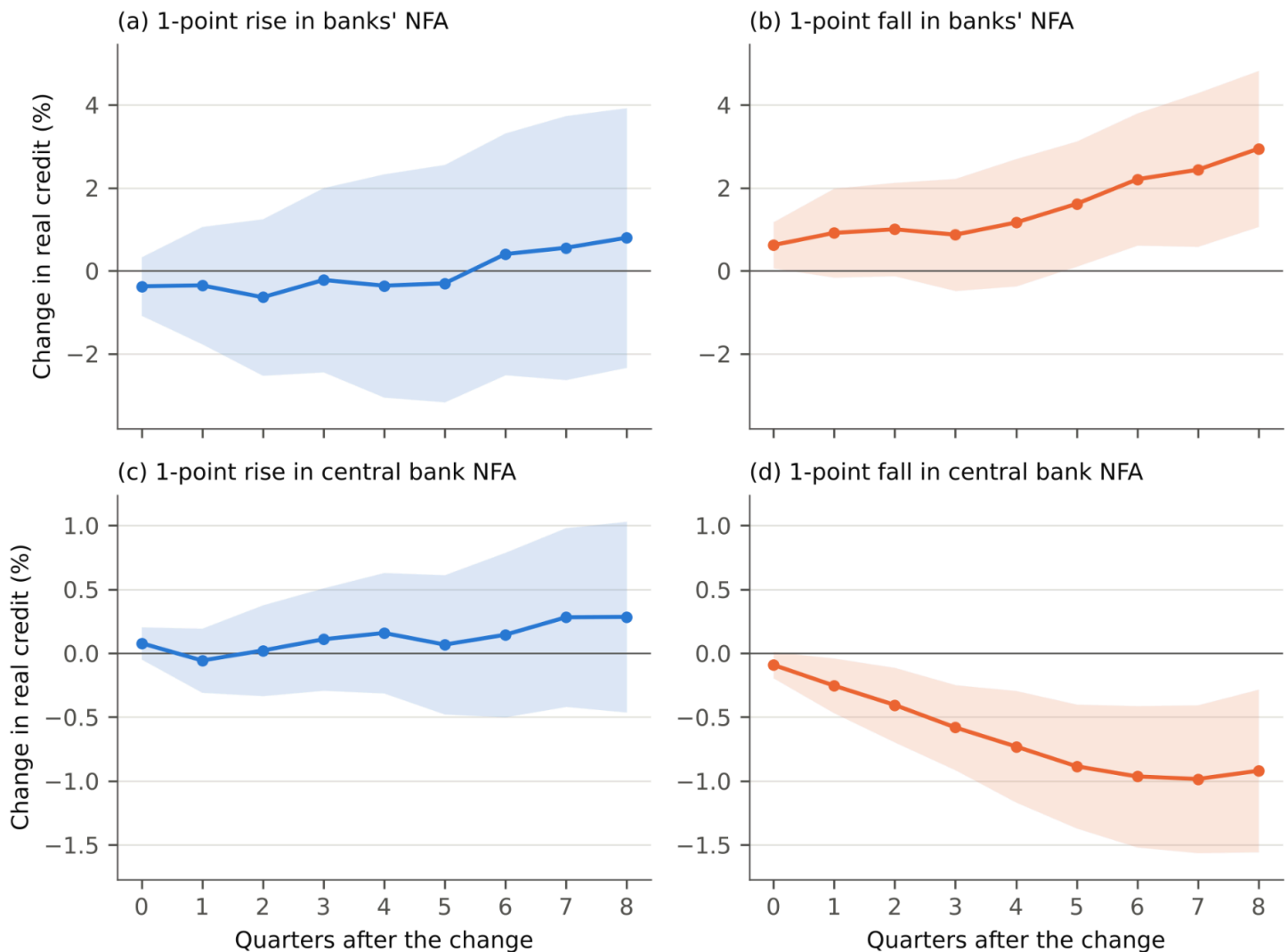


Figure 2

Local projections: real credit after rises and falls in net foreign assets

Cumulative change in log real private credit (%) h quarters after a one-point rise (left) or fall (right) in banks' NFA (top) and the central bank's NFA (bottom), from Eq. (3). Shaded areas are 90% confidence intervals based on Driscoll–Kraay standard errors. Eight countries, 2001Q4–2026Q3. Source: author's estimates.

Supplementary Files

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- [5Additionalfile2estimationdataset.csv](#)