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Emerging Market Resilience: Good Luck or Good Policies?

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Abstract

Emerging markets have shown remarkable resilience during risk-off episodes in recent years. While favorable external conditions—good luck—contributed to this resilience, improvements in policy frameworks—good policies—played a critical role in bolstering the capacity of emerging markets to withstand the adverse consequences of these events. Improvements in monetary policy implementation and credibility have reduced reliance on foreign exchange (FX) interventions and capital flow management measures, and stricter macroprudential regulation also contributed to less FX interventions. Also, central banks have become less sensitive to fiscal interference and hold sway over domestic borrowing conditions. Looking ahead, countries with robust frameworks face easier policy trade-offs and are better positioned to navigate risk-off episodes. In contrast, economies with weaker frameworks risk de-anchoring inflation expectations and larger output losses if monetary tightening is delayed, especially when persistent price pressures emerge. In these settings, FX interventions offer only temporary relief and are less necessary when policy frameworks are sound.

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1 Introduction

Emerging markets (EMs) have historically been vulnerable to global financial shocks, often experiencing significant economic and financial instability during periods of heightened risk aversion—commonly referred to as "risk-off" episodes (Caballero and Kamber, 2019; Miranda-Agrippino and Rey, 2020a). These shifts in the risk appetite of global investors have typically triggered capital outflows, leading to currency depreciations that tightened financial conditions, owing to currency mismatches and increased borrowing costs (Chari *et al.*, 2023; Goldberg and Krogstrup, 2023). The 1997–98 Asian crisis provides the canonical illustration: Indonesia, Malaysia, the Philippines, and Thailand all experienced abrupt reversals in capital flows, sharp currency depreciations, and severe balance-sheet stress as global investors withdrew from the region. As a result, risk-off shocks have been akin to supply shocks because they ultimately cause output losses and inflation surges, complicating policy trade-offs. These dynamics have defined the dilemma faced by EMs, which generally could not react to a shock leading to a capital outflow that depreciates the currency with monetary policy easing, because of price and financial stability concerns. Instead, policymakers often needed to tighten policies, exacerbating output losses and preventing currencies from depreciating, thereby fueling "fear of floating" (Ghosh *et al.*, 2017).

Recent experience marks a departure from this historical pattern, with many EMs displaying remarkable resilience—both in terms of financial and economic conditions—to external shocks (Kalemli-Özcan and Unsal, 2023; Hardy *et al.*, 2024).[1] For instance, during the 2018–19 trade tension between the US and China, many large EMs—such as Mexico, Brazil, Indonesia, Thailand, the Philippines, and South Africa—experienced only moderate currency depreciation and limited exchange-market pressure relative to earlier episodes of comparable global risk retrenchment. Similarly, during the acute stress associated with the COVID-19 pandemic, despite record portfolio outflows and a global spike in risk aversion, most systemic EMs—as Brazil, Mexico, India, Indonesia, and Poland—avoided disorderly balance-of-payments adjustments and maintained market access, relying primarily on exchange-rate flexibility, as well asaccess to swap lines or regional safety nets.

Two hypotheses have emerged to explain this improved performance. One is simply that EMs got lucky: steady growth in advanced economies (AEs), favorable terms of trade, and easier financial conditions after the global financial crisis (GFC) helped mitigate external pressures. Moreover, despite rapid and sizable monetary tightening by major central banks, the post-pandemic global financial environment remained broadly accommodative, allowing many emerging market sovereign and corporate bond issuers to obtain long-term financing at historically low rates.[2] Finally, the relatively strong US recovery after the pandemic and the soft landing following the Federal Reserve's tightening cycle likely further dampened spillovers to EMs (Chen and Tillmann, 2025).

Another, yet complementary, explanation is the "good policies" argument. This attributes resilience to adverse shifts in investor sentiment to changes in EMs' monetary, macroprudential, and

[1] For a more general assessment of EMs' performance in sustaining expansions and recovering from downturns, see Abiad *et al.* (2015), Cerra *et al.* (2013), Prasad and Kose (2011), Aizenman *et al.* (2024), among others. Compared with that literature, this paper focuses on EMs' performance in response to risk-off shocks.

[2] By contrast, prior to the GFC, EMs were more vulnerable to currency, banking, and sovereign default crises (Gourinchas and Obstfeld, 2012).

capital flow management (CFM) frameworks. While different frameworks and exchange rate regimes may be appropriate according to country circumstances, the adoption of inflation targeting and greater exchange rate flexibility has enhanced EMs' capacity to absorb external shocks and stabilize macroeconomic conditions (Obstfeld *et al.*, 2019). As monetary policy frameworks matured, long-term inflation expectations became better anchored, reducing the pass-through of currency depreciation to domestic prices and the persistence of inflation (Campa and Goldberg, 2005; Bems *et al.*, 2021; Carriere-Swallow *et al.*, 2021).[3] Meanwhile, tighter macroprudential policies contributed to reducing foreign exchange (FX) mismatches, allowing countries to move away from the "original sin" (i.e., currency mismatch) and facilitating more countercyclical monetary responses to external shocks (Kalemli-Özcan and Unsal, 2023; Bergant *et al.*, 2024).[4] And CFM measures have been used more sparingly (Bergant *et al.*, 2025).[5]

In this paper, we take stock of emerging market performance in output and inflation stabilization during risk-off episodes over almost three decades and illustrate the appropriate policy responses conditional on the quality of policy frameworks. To do that, we first identify risk-off episodes using an algorithm-based approach and examine whether EMs have been more resilient during recent episodes—both according to real and financial indicators—compared with earlier ones. Second, we propose a series of empirical exercises to assess the evolution of monetary, macroprudential, and CFM frameworks moving beyond the *de jure* definition and focusing on their implementation, credibility, and outcomes. Third, we provide an illustrative quantification of the extent to which emerging market resilience is rooted in enhanced policy frameworks, or the result of favorable yet changing external conditions. And fourth, we analyze the benefits of improved policy frameworks by leveraging the quantitative model for the Integrated Policy Framework of Adrian *et al.* (2021) to show how improvements in policy frameworks are reflected in better policy trade-offs.

Our results indicate that EMs have historically been vulnerable to global risk-off events, but recent evidence points to increased resilience. While the magnitude and duration of risk-off episodes have not meaningfully changed—nor have the underlying financial factors leading to these events—–most EMs have displayed a remarkable degree of resilience since the GFC, experiencing smaller output contractions and negligible inflationary pressures.

The implementation and credibility of monetary policy have gradually improved over time, with EMs equipped with strong policy frameworks relying less on FX interventions. Estimates from a monetary policy reaction function suggest that central banks in EMs have increasingly focused on output stabilization rather than exchange rate management, reflecting better-anchored inflation ex-

[3]Unsal *et al.* (2022) document the credibility improvements in monetary policy frameworks over time using indexes constructed with a narrative approach.

[4]Enhanced fiscal credibility lessened fiscal dominance concerns and a de-dollarization trend of debt, containing sovereign risk premiums (Gomez-Gonzalez *et al.*, 2022; Apeti *et al.*, 2024). At the same time, improvements in governance and institutional capacity, particularly in debt management, have also contributed to greater resilience, supporting domestic borrowing at longer maturities and fostering the development of deeper local currency bond markets, thereby reducing the risks stemming from both the "original sin" (currency mismatch) and the "original sin redux" (nonresident outflows). Lastly, evidence suggests that advances in FX hedging instruments in some EMs have improved the currency composition of sovereign balance sheets (Alfaro *et al.*, 2024) and enhanced monetary policy transmission (Erel *et al.*, 2023; Liang *et al.*, 2025).

[5]Das *et al.* (2022) show that preemptive capital flow measures can also lower external finance premiums in the aftermath of risk-off shocks, enabling countries' continued access to international capital markets during troubled times.

pectations. Financial markets' expectations also align more closely with actual policy decisions, signaling improved credibility. At the same time, EMs with better-anchored inflation expectations intervene less in FX markets and use disproportionately less CFM measures in response to risk-off episodes, as the exchange rate pass-through tends to be lower and fear of floating is reduced. Similarly, more stringent macroprudential regulation limits the share of foreign currency debt, mitigating financial stability concerns and reducing the need for FX interventions.

Our findings also show that central banks are less sensitive to fiscal pressures and retain traction over domestic borrowing conditions. Before the GFC, higher government spending often led to looser monetary policy and rising inflation expectations, but post-crisis spending increases have been met with rate hikes, and long-term inflation expectations have remained anchored, as central banks have become more independent. Central banks have also gained in terms of autonomy. We find that domestic monetary policy shocks transmit effectively to short-term yields. However, US monetary policy continues to influence longer-term yields and riskier asset classes.

The macroeconomic resilience during risk-off episodes observed in recent years not only reflects benign external conditions, but it is also rooted in improved policy frameworks. Comparing typical risk-off events after the GFC with those before, our analysis estimates that improved policy frameworks accounted for 0.5 percentage point higher growth and 0.6 percentage point lower inflation. In contrast, favorable external conditions supported faster growth, contributing another 0.5 percentage point, but did not ease inflationary pressures.

We next use the structural model to illustrate the benefits of strong policy frameworks. To this end, we consider two alternative calibrations of emerging market economies, aimed at representing their median characteristics before and after the GFC, with the latter period featuring less FX mismatches and better anchored inflation expectations. The results of the model simulations suggest that strong policy frameworks reduce the extent of monetary policy tightening required to contain inflation, allowing a shift in focus toward output stabilization. In response to a risk-off shock that depreciates the nominal exchange rate by 10 percent, economies with strong policy frameworks——as in the period after the GFC——experience 85 percent smaller output contractions in the following year than economies with weak policy frameworks—as in the period before the crisis. In addition, improved balance sheets—such as lower exposure to FX mismatches—cut in half the risk of sudden stops and reduce their severity.

If we combine a risk-off shock with an inflationary cost-push shock, as in the post-pandemic environment, the model implies that EMs with weak policy frameworks should avoid delaying monetary tightening. In fact, our simulations show that if such EMs hesitate to tighten the monetary stance, they encounter steeper costs later. In a scenario with 10 percent nominal exchange rate depreciation and a 0.5 percentage point increase in inflation, policy rates need to rise by as much as 1.4 percentage points more than in comparable EMs that follow a standard Taylor rule to eventually bring inflation back to target, resulting in output contractions that are 0.7 percentage point larger.

We finally use the structural model to look at the role of FX interventions in containing inflation and limiting output losses associated with monetary tightening. In EMs with weak frameworks, FX interventions that cut the exchange rate depreciation triggered by the risk-off shock from 10 to

5 percent also reduce the need for rate hikes, ultimately lowering output losses by 0.9 percentage points two years after the shock compared with a no-intervention scenario. However, the benefits of FX interventions are marginal in countries with strong frameworks, where inflation expectations are already well anchored and the weaker exchange rate supports net exports. These results validate the notion that FX interventions are a useful policy tool, but not a substitute for improved policy frameworks. In countries with strong policy frameworks, FX interventions become less relevant, repositioning policymakers in the trilemma and allowing them to opt for a flexible exchange rate and an independent monetary policy.

Taken together, our results revamp the debate about the dilemma vs. trilemma in international macroeconomics. Resilience to risk-off episodes, the diminished need for FX interventions and capital controls in the presence of strong policy frameworks, and the evidence of autonomy of domestic monetary policy are suggestive of a progressive transition toward a world that, while unequal across countries, appears to be characterized by the trilemma of the classic Mundell-Fleming framework and less by the dilemma described in Rey (2015), in which monetary policy independence is limited unless capital controls are used.

Related literature Our results contribute to the literature that examines the sensitivity of EMs to global financial shocks. Numerous papers have assessed spillovers to emerging markets from shocks to US monetary policy (Maćkowiak, 2007; Bräuning and Ivashina, 2020; Tillmann, 2016), and the US dollar cycle (Obstfeld and Zhou, 2022). Miranda-Agrippino and Rey (2020a, 2022) document that monetary policy of advanced economies, notably the US, induce comovements in international financial variables that characterize a "Global Financial Cycle" with large spillovers to EMs. Our findings speak most closely to papers that study the impacts of global risk aversion on EMs (Chari *et al.*, 2020, 2022; Das *et al.*, 2022; Chari *et al.*, 2023). We contribute to this literature by extending the RORO Index and using an new algorithm-based approach to identify distinct risk-off episodes. We provide novel evidence that EMs have become more resilient to global risk-off shocks during and in the aftermath of these episodes.

Our paper also builds on a literature that studies policy frameworks in EMs. Several papers have examined different types of frameworks in EMs, including monetary policy frameworks (Mohanty and Klau, 2005; Frankel, 2010; Cobham, 2021, 2025; De Leo *et al.*, 2022), macroprudential policies (Claessens *et al.*, 2013; Bergant *et al.*, 2024), and foreign exchange interventions (Menkhoff, 2013; Ghosh *et al.*, 2016). We contribute to this literature by providing a comprehensive overview of recent developments of policy frameworks. Rather than examining the effectiveness and credibility of different types of policies in isolation, we provide a joint assessment of the role of policy frameworks in explaining the recent resilience of EMs during risk-off episodes, drawing on both empirical evidence and a structural model.

The remainder of the paper is organized as follows. Section 2 describes the approach to identify risk-off episodes. Section 3 discusses the the performance of EMs during these episodes. Section 4 presents the results of the empirical exercises that quantify the contributions of policy frameworks and external conditions to the improved resilience during risk-off episodes. Section 5 presents the results of the structural model simulations. Section 6 concludes.

2 Risk-off episodes

The global search for yield can generate destabilizing outcomes in EMs when risk appetite declines, leading to capital flight (Hofmann *et al.*, 2016; Chari *et al.*, 2021, 2022). The sophistication of international capital markets results in a multitude of factors that can affect risk appetite. The risk-on risk-off (RORO) Index of Chari *et al.* (2023) is a multifaceted measure of these factors and describes investors' willingness to take on, retain, or offload risky assets in AEs.

For the purpose of this paper, we leverage the RORO Index extending it to cover additional years in the late 1990s and early 2000s when risk-off episodes occurred. Hence, the extended version of the index starts in 1997 up to the end of 2024. It consists of the z-score of the first principal component of daily changes in a set of standardized variables reflecting changes in funding liquidity (G-spread on 2, 5, and 10-year Treasuries, the TED spread, the LIBOR-OIS spread, and the bid-ask spread on 3-month Treasuries), credit risk (US ICE BofA BBB Corporate Index Option-Adjusted Spread and the US BAA corporate - 10Y Treasury spread), risk aversion (returns on the S&P 500, STOXX 600, and MSCI Advanced Economies Index, and option implied volatilities from the VIX index), and prices of safe haven assets (trade-weighted US Dollar Index against advanced foreign economies and the price of gold). Compared to the original version of the index, we drop the Euro High Yield Index Option-Adjusted Spread, the VSTOXX index, the Libor-OIS spread and three G-spreads from the construction of the extended version of the RORO Index, as these variables are only available starting in 1998, 1999, 2001, and 2003, respectively. This, however, does not materially affect movements in the index: the correlation between the original index and its extended version is 98 percent.[6]

We then deploy an algorithm-based approach to date risk-off episodes. A month is defined as the start of a risk-off episode if (i) the standardized RORO in that month is positive following a month during which the standardized RORO was zero or negative, (ii) the mean of the standardized RORO during the four months following the starting month is positive, (iii) the standardized RORO exceeds one in at least one of the four months following the starting month.[7] There needs to be a minimum of five months between two risk-off episodes, so an episode is only classified as risk-off if the previous six months had not been classified as risk-off. A month marks the end of a risk-off episode if (i) the RORO exceeds one in at least one of the months since the start of the episode; (ii) the RORO is negative; and (iii) its four-month forward average is negative.

Figure 1 illustrates the 16 risk-off episodes identified by the algorithm.[8] These correspond to well-known events (e.g., dot-com crash, the GFC, the European sovereign debt crisis, and the COVID-

[6] Table A1 in Appendix A-I reports the data sources.

[7] Lowering the cutoff of four months to define the episodes generates short episodes that are bunched together and share the same drivers, based on narrative evidence. Increasing the cutoff leads the algorithm to miss important short risk-off episodes such as the Asian financial crisis and the pandemic.

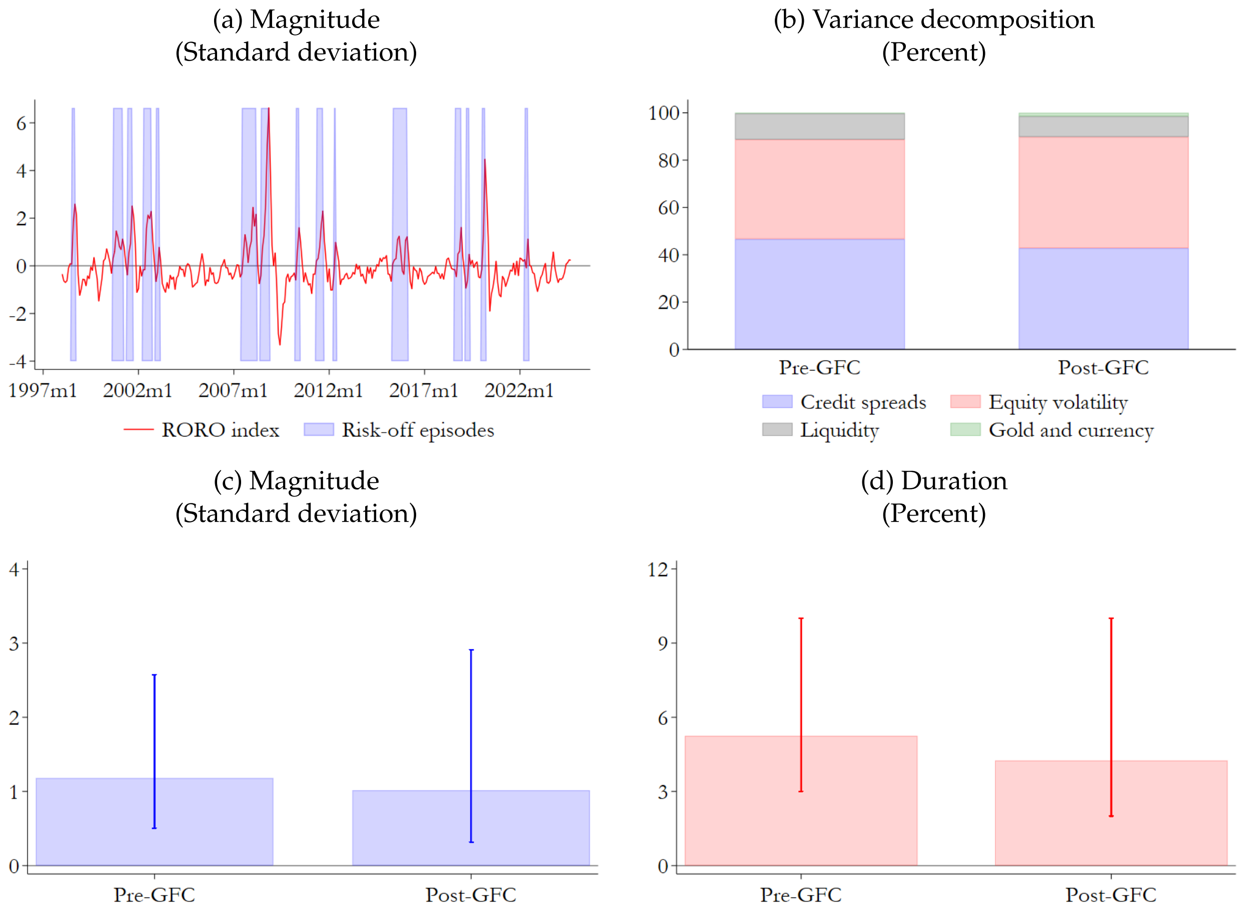
[8] Table A2 in Appendix A-II reports the list of the risk-off episodes, their magnitude and duration, and the main events associated to these episodes.

19 pandemic) and are evenly split between the period before and after the GFC.[9] An analysis of the proportion of the RORO's variation explained by each subcomponent indicates that—–in both periods—–about 45 percent of the RORO's variation during risk-off episodes is explained by credit spreads, just above 40 percent by equity volatility, about 10 percent by liquidity risks, and the remainder by currency risks.[10] On average, episodes before and after the GFC are broadly comparable. The average risk-off episode registered an increase of about one standard deviation and lasted about five months in both periods. The largest episodes were the GFC itself and the pandemic; the longest were the subprime crisis starting in June 2007 and the global growth scare starting in May 2015 (both lasted 10 months).

[9] The 2013 taper tantrum is not identified as a risk-off episode because financial variables in AEs that feed into the RORO Index increased only modestly. In contrast with typical risk-off episodes, US bond yields increased sharply, consistent with a shock to US monetary policy rather than to an increase in risk aversion in AEs (Harikrishnan *et al.*, 2023). Applying the algorithm to other indices of shifts in global risk aversion (Bekaert *et al.*, 2022) yields similar results.

[10] Following Chari *et al.* (2023), we compute the relative contributions of the sub-indices for liquidity, credit risk, risk aversion, and prices of safe haven assets in explaining the variation of the RORO index: $Prop(S_{i,t}) = Cov(\widehat{RORO}_t, \widehat{\beta}_i S_{i,t}) / Var(\widehat{RORO}_t)$, where $\widehat{RORO}_t$ is the fitted value from regressing the RORO index on the four sub-indices $S_{i,t}$, and $\widehat{\beta}_i$ is the estimated regression coefficient for subindex i. We run the decomposition separately for the period before and after the GFC.

Figure 1: Risk-off episodes



Notes: Panel (a) shows the standardized three-month sum of an extended version of the RORO Index of Chari *et al.* (2023), along with the risk-off episodes. A month marks the start of a risk-off episode if (i) the RORO turns positive after being zero or negative, (ii) its four-month forward average is positive, and (iii) it exceeds one in at least one of those four months. Episodes must be at least five months apart, with no risk-off classification in the prior six months. A month marks the end of a risk-off episode if (i) the RORO has exceeded one in at least one of the months since the start of the episode, (ii) the RORO is negative, and (iii) its four-month forward average is negative. Panel (b) shows the variance decomposition of the RORO Index into its contributing factors, where the bars denote the averages. The pre-GFC period is 1997–2009 and the post-GFC period is 2010–2024. Panels (c) and (d) show the magnitude and duration of risk-off episodes, respectively, before and after the GFC, where the bars denote the averages and the whiskers denote the ranges from minimum to maximum; in both panels, the pre-GFC period is 1997–2009 and the post-GFC period is 2010–2024.

3 Emerging market resilience to risk-off episodes

We examine whether EMs have become more resilient to risk-off episodes in recent years. Our sample consists of 26 EMs representing almost 90 percent of GDP of the 'Emerging Markets and Middle-Income Economies' group of the October 2025 World Economic Outlook classification.[11] Specifically, we compare the behavior of financial and economic indicators indicators—portfolio outflows, nominal exchange rate, and EMBI spread, as well as consumer prices and real GDP— during risk-off episodes versus normal times (i.e., non-risk-off periods) using the following specification

$$y_{i,t+h} - y_{i,t-1} = \sum_{r=-4}^{R} \beta^h RO_{t+r} + \gamma^h PostGFC_t + \delta^h RO_t \times PostGFC + \sum_{r=1}^{R} \eta^{r,h} X_{i,t-r} + \alpha_i^h + \varepsilon_{i,t}^h \quad (1)$$

where $y_{i,t+h}$ is the level of the outcome indicator of country i measured h quarters after the start of the risk-off episode; RO_t is a dummy variable equal to one if a month in quarter t coincides with the start of a risk-off episode, entering the specification with leads and lags to control for other risk-off episodes that potentially start during the year preceding and following the risk-off episodes; $X_{i,t}$ is a vector of controls including real GDP growth and CPI inflation, as well as the lagged dependent variable; and α_i^h denotes country fixed effects. We estimate this equation with quarterly data, so $R = 4$.[12] Following the "clean controls" approach of Dube *et al.* (2025), the 4 observations following the start of risk-off episodes are excluded from the sample to ensure that the control group only includes observations outside risk-off episodes.

The results in Figure 2 compare the responses of emerging market's capital flows, exchange rates, and credit spreads during risk-off episodes before and after the GFC.[13] Focusing on the period before the GFC, two quarters after the start of a risk-off episode portfolio outflows reached 0.2 percent of GDP, the exchange rate depreciated by 9 percent, and the EMBI spread was 1.6 percentage points higher.[14] Since the GFC, risk-off episodes have not been accompanied by outsized portfolio outflows, the exchange rate impact is smaller, and the increase in sovereign spreads is about 60 percent of what it used to be before the GFC. This greater resilience is reflected in easier policy trade-offs. Six months after the start of a risk-off episode, output losses are smaller in the post-crisis period—1 percent—compared with the pre-crisis period—1.9 percent, while the effects on inflation—0.9 percent in the pre-crisis period—became muted after the crisis.[15] These estimates are suggesting of increased

[11] Within the 'EMs and Middle-Income Economies' group, the sample is selected according to the following criteria: (i) a population larger than 5 million in 2024 (or latest available data), (ii) at least 10 years of data on sovereign spreads, (iii) at least 10 years of quarterly GDP data, and (iv) at least 10 years of quarterly portfolio flows data. For comparative purposes, the paper uses the same criteria to select 30 AEs, accounting for almost 94 percent of GDP of the 'Advanced Economies' group in the October 2025 World Economic Outlook.

[12] All dependent variables are winsorized at 1 percent tails.

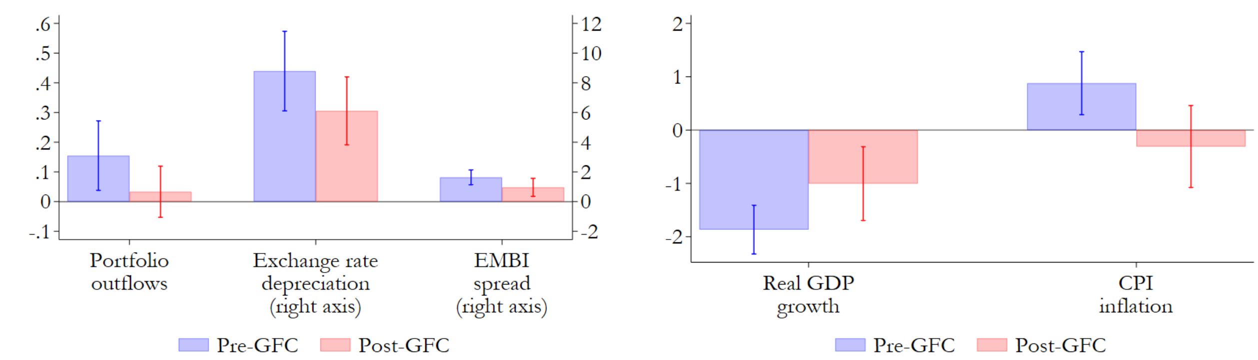
[13] The full set of results is reported in Table A3 in Appendix A-II.

[14] The choice of the GFC as the date to split the sample is driven by data considerations. Since for many countries in the sample data coverage begins in the early 2000s, the GFC allows for an equal number of risk-off episodes in the two subperiods. However, this does not imply that the crisis represents a structural break in EMs' performance in response to risk-off events. Rather, resilience is understood to have improved gradually over time.

[15] Economic crises in EMs typically have been associated with large output costs because they often represented declines in the trend growth rather than fluctuations around a trend (Aguiar and Gopinath, 2007; Cerra and Saxena, 2008).

Figure 2: Macroeconomic effects of risk-off episodes
(Percent)

(a) Capital flows, exchange rate, and borrowing costs (b) Output and prices



Notes: The figures report the coefficients of regressions of the six-month change in portfolio outflows, the nominal exchange rate depreciation, and the EMBI spread in panel (a); and the real GDP growth and CPI inflation in panel (b). The change in portfolio flows is expressed in percent of initial GDP. All regressions include controls for real GDP growth, inflation, the lags of the dependent variable, and country fixed effects. The bars denote the point estimates and the whiskers denote the 90 percent confidence intervals obtained with robust standard errors. The pre-GFC period is 1997–2009 and the post-GFC period is 2010–24.

resilience to surges in risk aversion in the post-crisis period.

4 Evolving policy frameworks in EMs

The increased resilience of EMs during risk-off episodes after the GFC corresponds to a period with a substantially larger number of countries adopting inflation-targeting regimes and tightening macroprudential regulations, while reducing the use of FX interventions and CFM measures. However, ascribing such resilience to *de jure* changes in policy frameworks can be misleading as *de facto* policy frameworks vary substantially across countries (Levy-Yeyati and Sturzenegger, 2005; Carare and Stone, 2006). This section describes progress achieved in the implementation of policy frameworks—benchmarking it to the experience of AEs.

4.1 Monetary policy implementation

Improvements in monetary policy frameworks can be assessed in several dimensions. We start by estimating the Taylor rule coefficients from a standard monetary policy reaction function, and compare changes in the coefficients before and after the GFC

$$r_{i,t} = \rho r_{i,t-1} + (1-\rho)\left[\alpha_i + \beta_1 E_t \bar{\pi}_{i,t+h} + \gamma_1 \bar{y}_{i,t-3} + PostGFC_t \times \left(\beta_2 E_t \bar{\pi}_{i,t+h} + \gamma_2 \bar{y}_{i,t-3}\right)\right] + \tau_t + \varepsilon_{i,t} \quad (2)$$

where $r_{i,t}$ is the policy rate of country i in year t, $E_t\bar{\pi}_{i,t+h}$ is the one-year ahead inflation expectation from consensus forecasts, $\bar{y}_{i,t-3}$ is the (interpolated) real-time GDP output gap, and α_i and τ_t are country and time fixed effects.[16] The Taylor rule coefficients are obtained by diving the short-run coefficient by $(1-\rho)$. Standard errors are double clustered at the country level and month level. Following Carvalho *et al.* (2021), the regressions are estimated by OLS. The sample, in this case, excludes EMs with fixed exchange rate regimes, as well as countries with extreme values or dramatic policy shifts (i.e., Argentina, Türkiye, and Ukraine). For EMs, regressions are run separately for the period prior to the GFC and the period after that. As a benchmark, we also estimate the Taylor rule coefficients for AEs.

Columns (1) and (2) of Table 1 show that the Taylor rule coefficients associated with deviations of inflation expectations from the target declined in the post-GFC period, likely reflecting improved central bank credibility and more strongly anchored long-term inflation expectations (that is, beyond the monetary policy horizon). With better-anchored inflation expectations, central banks in EMs have shifted attention to curbing output fluctuations. The estimates capture this desirable countercyclical bias in the post-crisis reaction function, with the Taylor rule coefficient on deviations of output from its potential being negative and statistically not significant in the pre-GFC period and positive and statistically significant in the post-crisis years. Column (3) shows that estimates for AEs are strikingly similar to those of EMs in the post-crisis period.

We also report the results of an additional set of estimations for EMs, in which we augment Equation 2 with changes in the nominal effective exchange rate (NEER) to capture fear-of-floating concerns. The coefficient on NEER depreciation in columns (4) and (5) is about half in the post-GFC period compared to the pre-GFC period, suggesting that central banks in EMs have become less concerned about exchange rate fluctuations, possibly reflecting the smaller pass-through to prices and a shift toward inflation as the economies' nominal anchor. When controlling for the NEER depreciation, the coefficient on the inflation gap and the output gap remain broadly comparable.

We further explore whether in fact the exchange rate pass-through to prices declined and whether inflation expectations became more strongly anchored in recent years. First, we estimate the exchange rate pass-through before and after the GFC with the following specification

$$p_{i,t+h} - p_{i,t-1} = \beta^h \Delta\widehat{e}_{i,t} + \delta^h \Delta\widehat{e}_{i,t} \times PostGFC_t + \sum_{r=1}^{R} \eta^{r,h} X_{i,t-r} + \alpha_i^h + \tau_t^h + \varepsilon_{i,t}^h \quad (3)$$

where $p_{i,t+h}$ is the level of the consumer price index of country i in month $t+h$, $\Delta\widehat{e}_{i,t}$ is the nominal exchange rate depreciation between the day before and the day after scheduled monetary policy announcements in the US, $X_{i,t-r}$ is a vector of controls including 12 lags of inflation, the exchange rate depreciation, and the policy rate, and α_i and τ_t are country and time fixed effects. The results in the left panel of Figure 3 confirm that, in the period before the GFC, two years after a one percentage point depreciation in the exchange rate, inflation was about 1.5 percentage point higher. However, we do not find any statistically significant effect in the post-crisis period.

Then, we turn to examining whether the degree of anchoring of long-term inflation expectations

[16]The real-time output gap is computed using real GDP data available up to period t and World Economic Outlook forecasts for the following five years, reflecting data available to the policymakers at the time in which monetary policy decisions are taken (Orphanides and Norden, 2002).

Table 1: Monetary policy reaction function

	Taylor rule			Augmented Taylor rule	
	EMs		AEs	EMs	
	Pre-GFC	Post-GFC		Pre-GFC	Post-GFC
	(1)	(2)	(3)	(4)	(5)
Inflation gap	2.047**	1.314***	1.572***	2.251***	1.279***
	(0.969)	(0.322)	(0.581)	(0.806)	(0.401)
Output gap	-0.323	0.398**	0.355*	-0.104	0.487**
	(0.638)	(0.181)	(0.197)	(0.626)	(0.213)
NEER depreciation				0.514***	0.247**
				(0.121)	(0.109)
Observations	3,455	3,455	2,709	3,455	3,455
R^2	0.993	0.993	0.996	0.993	0.993

Notes: The table reports the Taylor rule coefficients of the actual monetary policy reaction function. The pre-GFC period is 1997–2009 and the post-GFC period is 2010–24. The sample excludes countries with fixed exchange rate regimes, and Argentina, Türkiye, and Ukraine. All regressions include country and time fixed effects. Standard errors are double clustered at the country and month level and reported in parentheses. ***, **,* denote statistical significance at 1, 5, and 10 percent levels.

changed over time. In this case, we estimate the following specification for each country using rolling regressions over a six-year window:

$$\Delta E_t \pi_{t+36} = \beta^h \Delta E_t \pi_{t+12} + \varepsilon_t^h \tag{4}$$

where $\Delta E_t \pi_{t+36}$ and $\Delta E_t \pi_{t+12}$ denote the changes in the three-year ahead and the one-year inflation expectations as of month t, respectively. Our findings in the right panel of Figure 3 indicate that the sensitivity of long-term inflation expectations to changes in short-term inflation expectations declined substantially after the GFC.[17]

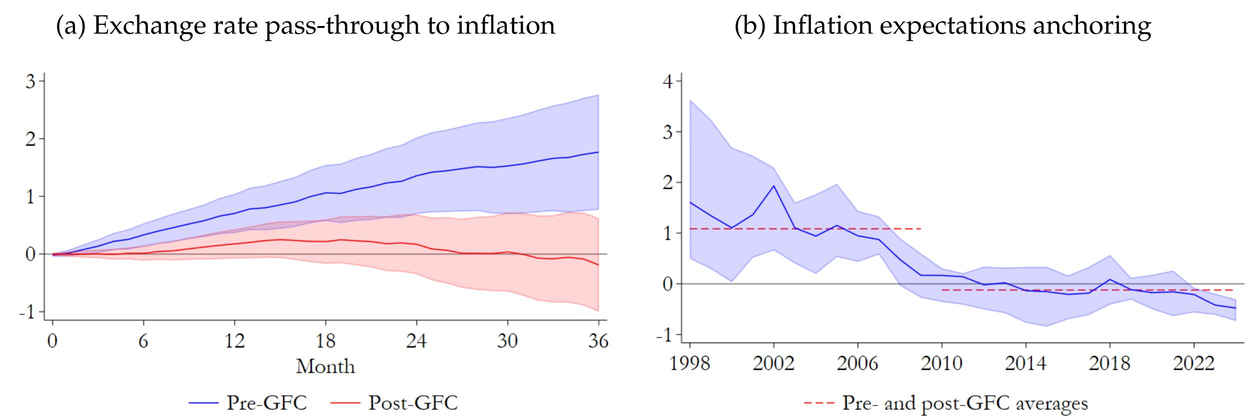
4.2 Credibility of the monetary policy rule

When monetary policy is credible, professional forecasters are expected to align their perceptions of the central bank's reaction function with its actual conduct. Financial markets, however, may take longer to internalize such shifts, since credibility builds over time. Survey data combining the interest rate expectations of individual forecasters with the corresponding macroeconomic projections make it possible to estimate time-varying Taylor rule coefficients.

Following Bauer *et al.* (2024), we estimate the Taylor rule coefficients from a specification for the perceived monetary policy reaction function using forecaster-country level data from Consensus

[17] Table A4 in Appendix A-II reports the regression results underlying the left panel of Figure 3.

Figure 3: Exchange rate pass-through and anchoring of inflation expectations
(Percent)



Notes: Panel (a) shows the exchange rate pass-through to inflation, which is estimated as the cumulative percentage change in the consumer price index in response to a one percentage point depreciation of the nominal exchange rate vis-à-vis the USD. Lines denote point estimates and the shaded areas denote 90 percent confidence intervals. Panel (b) shows the sensitivity of long-term (three-year ahead) expected inflation to short-term (one-year ahead) inflation forecasts. The line denotes the cross-country average and the shaded area denotes the interquartile range. The pre-GFC period is 1997–2009 and the post-GFC period is 2010–24.

economics

$$E_t^j r_{i,t+1} = \rho_t E_{t-1}^j r_{i,t+1} + \left(1 - \rho_t\right)\left(\alpha_{i,t}^j + \beta_t E_t^j \pi_{i,t+1} + \gamma_t E_t^j y_{i,t+1}\right) + \eta^j + \varepsilon_{i,t}^j \tag{5}$$

where $E_t^j r_{i,t+1}$ is forecaster j's one-year ahead expectation of the three-month saving rate of country i, $E_t^j \pi_{i,t+1}$ and $E_t^j y_{i,t+1}$ denote next year inflation expectations and next year's real GDP forecast, and η^j denotes forecaster fixed effects.[18] The regressions are estimated separately for each calendar year with a minimum of 1,000 observations. Standard errors are clustered at the forecaster level. As for the actual reaction function, the sample excludes EMs with fixed exchange rate regimes, as well as Argentina, Türkiye, and Ukraine.

The results in Figure 4 show a progressive decline in the magnitude of the Taylor rule coefficient on expected inflation over time and a marginal increase in the size of the output gap coefficient, pointing to gains in monetary policy credibility.[19]

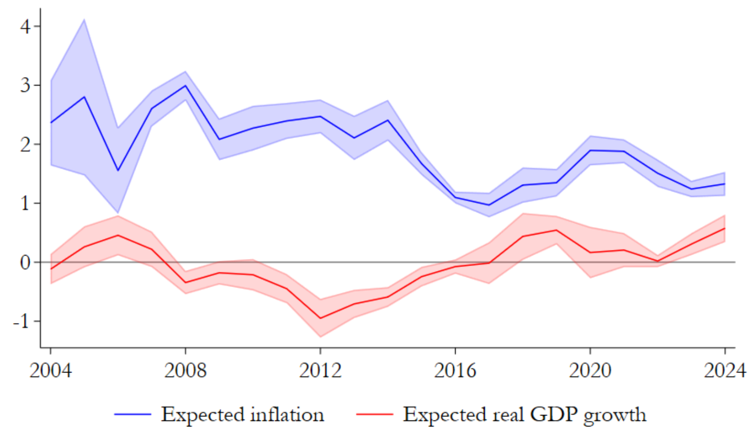
4.3 Central bank independence and autonomy

A crucial aspect of monetary policy frameworks is the extent of central banks' independence from fiscal pressures (Sargent *et al.*, 1981; Rogoff, 1985). EMs have traditionally been plagued by fiscal dominance. When a central bank is not independent, the government has an incentive to rely on the central bank to finance its expenses, which, in turn, limits the monetary authority's ability to raise

[18]The variable definitions used for the estimation of the perceived monetary policy reaction function are different from the ones used for the actual monetary policy reaction function in Subsection 4.1 due data availability.

[19]Table A5 in Appendix A-II reports the results of the estimations.

Figure 4: Markets' perceptions of monetary policy reaction function
(Taylor rule coefficients)



Notes: The figure shows the Taylor rule coefficients of the perceived monetary policy reaction function. The sample excludes countries with fixed exchange rate regimes, Argentina, Türkiye, and Ukraine. The lines denote the point estimates and the shaded areas denote 90 percent confidence intervals.

interest rates to control inflation, weakening inflation-expectation anchoring.[20]

To assess how much fiscal dominance continues to challenge central bank independence in EMs, we examine the response of policy rates and long-term inflation expectations—beyond the monetary policy horizon—in the year after an unexpected increase in military spending

$$Y_{i+t+h} = \beta FiscalShock_{i,t-1} + \gamma FiscalShock_{i,t-1} \times PostGFC_t + \gamma X_{i,t-1} + \alpha_i + \tau_t + \varepsilon_{i,t} \quad (6)$$

where $Y_{i,t+h}$ is either the two-year ahead inflation expectation or the next year policy rate of country i in year $t+h$, $FiscalShock_{i,t-1}$ is the previous year percent change in military spending growth, $X_{i,t-1}$ is a vector of controls, which includes lags of inflation, exchange rate, GDP growth, inflation forecasts, policy rate, government debt to GDP ratio, government expenditure growth, and military spending growth, and α_i and τ_t are country and year fixed effects. Standard errors are clustered at the country and year level.

The results in Table 2 are suggestive of fiscal dominance prior to the GFC, when increases in spending were followed by monetary easing and higher expected inflation. Unlike before the GFC, central banks since then no longer accommodate fiscal spending, leaving long-term inflation expectations close to target, similarly to AEs.

Military spending tends to be more exogenous to economic conditions than other spending categories, but it is relatively small in some EMs. Thus, we also follow an alternative approach that relies on primary spending—instead of military spending—and a SVAR-based identification approach similar to Blanchard and Perotti (2002) and Ilzetzki *et al.* (2013), which assumes a lagged response of

[20] Monetary financing is not the only channel through which governments may exert pressure on central banks. For instance, governments may also seek to ease financial conditions ahead of elections to stimulate economic activity and improve electoral prospects (Dinç, 2005).

Table 2: Responses of inflation expectations and policy rates to changes in military spending

	EMs		AEs	
	Expected inflation (1)	Policy rate (2)	Expected inflation (3)	Policy rate (4)
Military spending growth	0.024**	-0.099**	0.001	0.003
	(0.010)	(0.041)	(0.001)	(0.004)
Military spending growth x post-GFC	-0.028*	0.124**		
	(0.014)	(0.050)		
Observations	468	438	610	615
Adjusted R^2	0.849	0.833	0.800	0.924

Notes: The regressions include controls for lags of inflation, exchange rate, GDP growth, inflation forecasts, policy rate, government debt to GDP ratio, government expenditure growth, military spending growth, and country and year fixed effects. The pre-GFC period is 1997–2009 and the post-GFC period is 2010–24. Standard errors are clustered at the country-by-year level and reported in parentheses. ***, **,* denote statistical significance at 1, 5, and 10 percent levels.

government primary expenditure to other macroeconomic variables. Specifically, we estimate

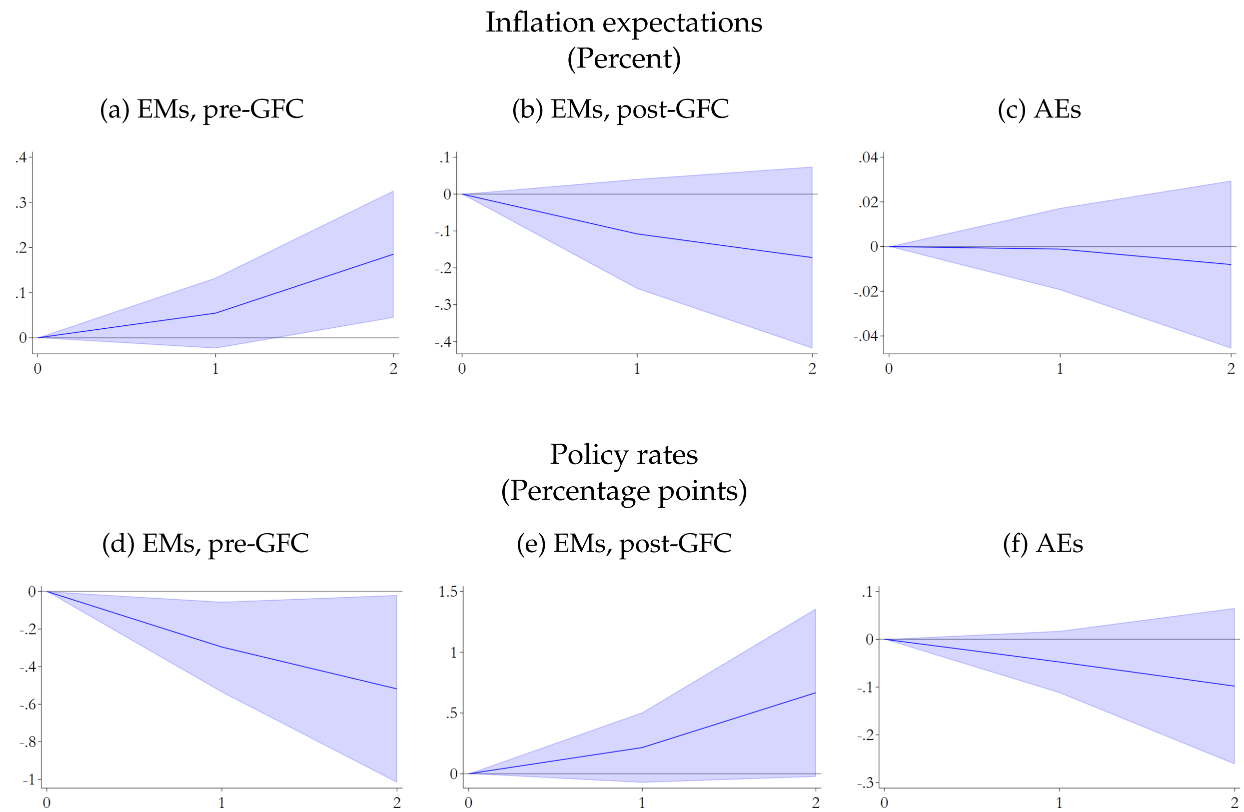
$$AY_{i,t} = \sum_k C_k Y_{i,t-k} + Bu_{i,t} \tag{7}$$

where $Y_{i,t}$ is a vector of variables comprising log GDP, exchange rate depreciation, policy rates, 5-year ahead inflation expectations, and log government primary expenditure for country i and year t; C_k is a matrix of the lagged coefficients; matrix B is diagonal, so that vector $u_{i,t}$ is a vector of i.i.d. shocks; and matrix A allows for the simultaneous effects among the endogenous variables $Y_(i,t)$. The system is estimated with country and year fixed effects. The ordering of the variables for the Choleski decomposition is log GDP, exchange depreciation, policy rates, five-year forward inflation expectations, and log government primary expenditure.

Figure 5 shows the SVAR impulse responses of inflation expectations and policy rates to a one percent increase in government primary expenditure. The results indicate that in the period prior the GFC, monetary policy was eased in response to spending increases, and expected inflation increased, pointing to fiscal dominance. In the post-crisis period, however, central banks increased policy rates in the aftermath of spending increases—even though the estimates are borderline insignificant—leaving long-run inflation expectations unchanged. The post-crisis dynamics resemble those of AEs. We conclude that the results using military spending are broadly consistent with those obtained using primary spending in a SVAR.

Another key dimension of the implementation of monetary policy is the extent to which it retains autonomy with respect to US monetary policy actions. The literature has widely documented the powerful financial spillovers of US monetary policy to the rest of the world (Rey, 2015; Kalemli-Özcan, 2019; Degasperi *et al.*, 2020; Miranda-Agrippino and Rey, 2020b; Di Giovanni and Rogers,

Figure 5: Responses of inflation expectations and policy rates to fiscal spending shocks



Notes: Panels (a) to (c) show the responses of five-year ahead inflation expectations and panels (d) to (f) show the responses of policy rates to a one percent increase in government primary expenditures estimated with a SVAR including log GDP, exchange rate depreciation, policy rates, five-year ahead inflation expectations, and log government primary expenditures. The horizontal axes report the years since the primary expenditure shock. The lines denote the point estimates and the shaded areas denote 90 percent confidence intervals. The pre-GFC period is 1997–2009 and the post-GFC period is 2010–24.

2024). However, this has potentially changed in light of the improvements documented so far.

Following Grigoli *et al.* (2025), we examine the impact of US and domestic monetary policy shocks on emerging market financial variables the day after a monetary policy announcement using the following specification

$$y_{i,t+1} - y_{i,t-1} = \beta^{EM} mps_{i,t}^{EM} + \beta^{US} mps_{i,t}^{US} + \alpha_i + \varepsilon_{i,t} \tag{8}$$

where $y_{i,t+1} - y_{i,t-1}$ denotes the change in government bond yields, stock prices, spreads, and exchange rates with respect to the day prior to the shock; $mps_{i,t}^{EM,h}$ captures domestic monetary policy shocks identified as in Checo *et al.* (2024); $mps_{i,t}^{US,h}$ captures US monetary policy shocks identified as in Bauer and Swanson (2023), and α_i denotes country fixed effects.

The results in Table 3 show that domestic shocks transmit strongly to government bond yields, especially at the short end of the yield curve, indicating that monetary policy retains traction on borrowing conditions. A one-standard-deviation domestic monetary policy shock raises the three-month yield by about 10 basis points, whereas US monetary policy shocks show a considerably smaller—and not statistically significant—pass-through to domestic borrowing conditions. However, the effects on 10-year yields—whose risk premiums are more sizable—are broadly comparable. US monetary policy shocks, on the other hand, have larger effects on riskier asset classes, including stock prices, exchange rates, and credit spreads. A one-standard-deviation US monetary policy shock leads to a 24 basis point decline in stock prices, a 15 basis point exchange rate depreciation, and a 57 basis point widening of credit spreads. In contrast, a one-standard-deviation domestic monetary policy shock appreciates the currency by 7 basis points and lowers stock prices by 9 basis points.

Table 3: Responses of govt bond yields, stock prices, exchange rates, and EMBI spreads to monetary policy shocks

	Govt. bond yields				
	Three months (1)	Ten years (2)	Stock prices (3)	Exchange rate (4)	EMBI spread (5)
Domestic monetary policy shock	0.104***	0.028***	-0.090**	-0.066*	0.122
	(0.031)	(0.008)	(0.037)	(0.038)	(0.116)
US monetary policy shock	0.024	0.021***	-0.244***	0.148***	0.569***
	(0.017)	(0.006)	(0.047)	(0.030)	(0.139)
Observations	2,610	4,063	5,845	6,131	5,261
Adjusted R^2	0.014	0.014	0.008	0.010	0.003

Notes: Monetary policy shocks are identified as in Checo *et al.* (2024). The sample varies by country according to data availability for domestic monetary policy shocks, which in most cases covers only the post-GFC period. All regressions include country fixed effects. Robust standard errors are reported in parentheses. ***, **,* denote statistical significance at 1, 5, and 10 percent levels.

4.4 The use of FX interventions and CFM measures

EMs have historically exhibited fear of floating, owing to concerns over balance sheet mismatches, pass-through to inflation, and financial instability (Calvo and Reinhart, 2002). Resistance to letting the exchange rate float, in turn, has hindered the development of hedging instruments and constrained the depth of domestic financial markets. As a result, many EMs' central banks continued to engage in substantial exchange rate management even after adopting inflation-targeting frameworks. While there is a case for FX interventions even within an inflation-targeting regime, the benefits from deploying this policy tool diminish as policy frameworks mature and financial frictions ease (IMF 2023a).[21]

We explore whether economies with better anchored inflation expectations or tighter FX macroprudential regulation may allow UIP deviations caused by risk-off events to run their course rather than leaning against them. To test this hypothesis, we estimate the following local projection specification[22]

$$FXI_{i,t+h} = \beta^h \widehat{UIP}_{i,t} + \delta^h \widehat{UIP}_{i,t} \times PF_i + \sum_{r=1}^{R} \eta_j^h X_{i,t-j} + \alpha_i^h + \tau_t^h + \varepsilon_{i,t}^h \tag{9}$$

where $FXI_{i,t+h}$ is the cumulative FX interventions (i.e., net sales of FX) relative to GDP of country i measured h months after month t; $\widehat{UIP}_{i,t}$ denotes the 12-month uncovered interest parity (UIP) deviations, instrumented by the RORO index; $X_{i,t}$ is a vector of controls, which includes 12 lags of inflation, exchange rate, UIP deviation, and FX interventions; PF_i is a proxy for the quality of policy framework of country i; α_i^h and τ_t^h denote country and month fixed effects. To measure the quality of the policy framework, we leverage the cross-country variation in the degree of anchoring of inflation expectations to mitigate endogeneity concerns, using the index of Bems *et al.* (2021) averaged at the country level. Also, we use the cumulative net tightening of macroprudential regulation (including FX exposure related capital requirements, loan and other position restrictions) as of the previous month—as this is largely pre-determined—similar to Bergant *et al.* (2024).

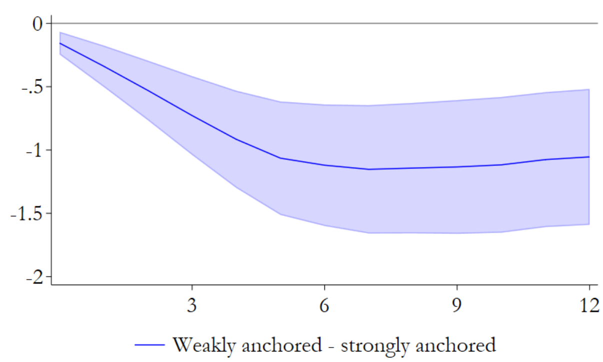
The results in Figure 6 indicate that EMs with well-anchored inflation expectations intervene less in FX markets in response to UIP deviations triggered by risk-off episodes, as the exchange rate pass-through tends to be lower. Similarly, our findings suggest that when macroprudential regulation effectively limits the share of foreign currency debt, financial stability concerns are reduced, and the need for FX intervention is diminished. Thus, EMs with strong policy frameworks are more likely to allow deviations from uncovered interest parity to play out rather than counteracting them by selling foreign currency.

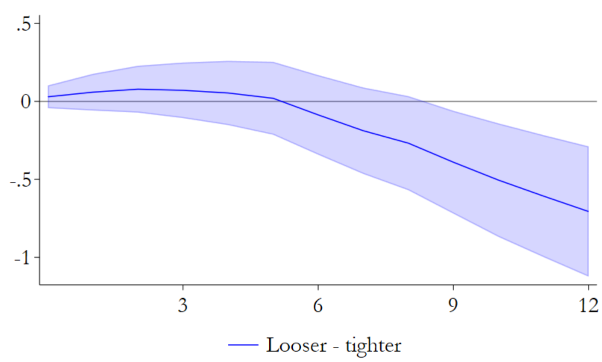
We then run similar regressions examining the use of CFM measures when policy frameworks are stronger compared to whey the weaker. Figure 7 suggests that EMs also tighten CFM measures relatively less in response to uncovered interest parity deviations caused by risk-off events when

[21] FX interventions can be warranted in the presence of financial market imperfections—such as shallow markets or currency mismatches—provided they are transparent, rules-based, and do not undermine monetary policy credibility. Specifically, such interventions can be used to counter destabilizing premia from FX market frictions, counter financial stability risks from FX mismatches, and prevent potential de-anchoring of inflation expectations.

[22] The theoretical literature identifies the UIP wedge as the factor to be stabilized to maximize welfare (Basu *et al.*, 2020).

Figure 6: Use of FX interventions conditioning on policy frameworks
(Percent of GDP)





Notes: Panels (a) and (b) show the cumulative FX interventions (measured as net purchases) in response to a one percentage point UIP deviation (instrumented with the RORO index) conditional on the degree inflation expectation anchoring or the stringency of macroprudential regulation, respectively. Percentiles 10 and 90 of the corresponding distributions are used to plot the figures. The regressions include controls for lagged inflation, exchange rate, UIP deviation, FX interventions, CFM measures, and country and time fixed effects. The measure of inflation expectation anchoring index is from Bems *et al.* (2021). The stringency of macroprudential regulation is measured as the net cumulative tightening in FX related capital requirements, loan, and other position restrictions. The sample excludes EMs with fixed exchange rate regimes. The lines denote the point estimates and the shaded areas denote 90 percent confidence intervals.

their inflation expectations are strongly anchored. While the point estimates go in the same direction, the evidence is not statistically significant when interacting the instrumented UIP deviations with the cumulative net tightening of macroprudential regulation.[23]

4.5 The contribution of policy frameworks to macroeconomic stabilization

After establishing that EMs have become more resilient to risk-off episodes since the GFC and that policy frameworks substantially improved over the past few decades, we go back to question of whether these dynamics reflect "good luck" or "good policies". To quantify the contribution of policy frameworks relative to the contribution of benign external conditions in boosting emerging market resilience to risk-off events, we first explore the extent to which proxies for the quality of policy frameworks predict growth and inflation in EMs during the 12 months following the start of a risk-off episode. Specifically, we estimate

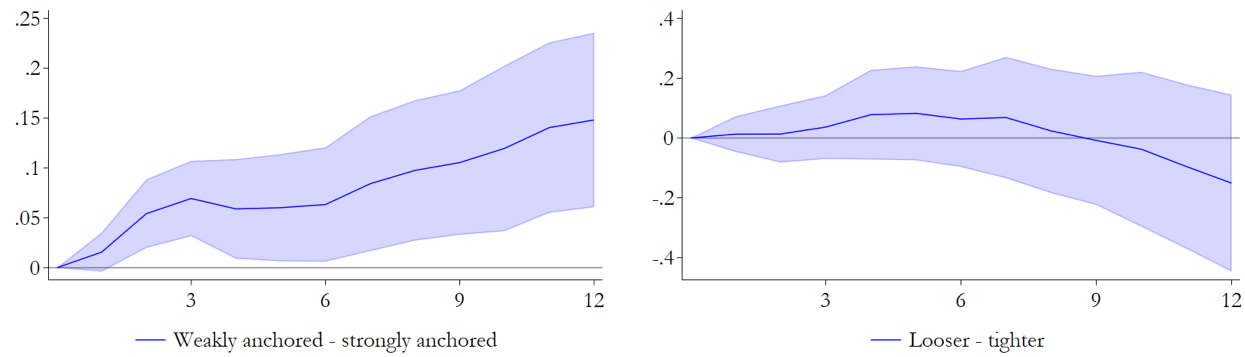
$$y_{i,\tau+12} - y_{i,\tau-1} = \sum_{k=1}^{K} \beta^k P^k_{i,\tau-1} + \sum_{j=1}^{J} \gamma_j \Delta X_{i,\tau-j} + \alpha_\tau + \varepsilon_{i,\tau} \tag{10}$$

where $y_{i,\tau+12} - y_{i,\tau-1}$ is the change in the log real GDP or log CPI for country i 12 months after the start of each episode τ; $P^k_{i,\tau-1}$ is a set of k pre-determined policy variables (i.e., the degree of anchoring of inflation expectations, the level of reserve adequacy, the extent of FX mismatches, the stringency

[23] Table A6 and Table A7 in Appendix A-II report the regression results underlying Figure 6 and Figure 7, respectively.

Figure 7: Use of CFM measures conditioning on policy frameworks
(Index)

(a) Conditioning on inflation expectations anchoring (b) Conditioning on macroprudential regulation



Notes: Panels (a) and (b) show the cumulative net tightening of CFM measures in response to a one percentage point UIP deviation (instrumented with the RORO index) conditional on the degree inflation expectation anchoring or the stringency of macroprudential regulation, respectively. Percentiles 10 and 90 of the corresponding distributions are used to plot the figures. The regressions include controls for lagged inflation, exchange rate, UIP deviation, CFM measures, and country and time fixed effects. The measure of inflation expectation anchoring index is from Bems *et al.* (2021) and the measure of CFM measures is from Bergant *et al.* (2025). The stringency of macroprudential regulation is measured as the net cumulative tightening in FX related capital requirements, loan, and other position restrictions. The sample excludes Argentina, Türkiye, and Ukraine. The lines denote the point estimates and the shaded areas denote 90 percent confidence intervals.

of macroprudential regulation, the external debt burden, the cyclically-adjusted fiscal balance, and the stringency of CFM measures); $\Delta X_{i,\tau-j}$ denotes the J lags of the changes in log real GDP and log CPI; and α_τ denotes episode fixed effects, which ensure that the exercise compares the resilience of EMs with varying quality of policy frameworks during the same risk-off episodes.[24]

Since the variables proxying the strength of policy frameworks tend to be correlated and endogenous to each other, we first run regressions controlling for one variable at the time. The results in panel (a) of Figure 8 indicate that countries entering risk-off episodes with stronger policy frameworks experienced higher real GDP growth and lower inflation.[25] For example, an emerging market that entered a risk-off episode at a one standard deviation lower FX mismatches is expected to experience 0.9 percentage point higher growth than an emerging market that enters the same risk-off episode at the average level of FX mismatches. Similarly, an emerging market at a one standard deviation greater anchoring of long-term inflation expectations tends to experience 2.3 percentage points lower inflation.

We then estimate Equation 10 with all the variables that turned out statistically significant individually and quantify the overall contribution of policy frameworks to growth and inflation dynamics by accounting for the observed changes in these factors in the periods before and after the GFC. Specifically, we compute the contributions as $\sum_{k=1}^{K} \widehat{\beta}^k \Delta \bar{P}_{i,\tau-j}$, where $\Delta \bar{P}^k_{i,\tau-j}$ is the mean of the

[24] Episodes fixed effects also control for the possibility that in recent episodes, emerging market economies could have benefited from a robust policy response and better policy frameworks in AEs. The empirical approach is inspired by previous work that studied the relevance of policy frameworks during the GFC or oil price collapses (Blanchard *et al.*, 2010; Lane and Milesi-Ferretti, 2011; Berkmen *et al.*, 2012; Grigoli *et al.*, 2019).

[25] See Table A8 for the regression results.

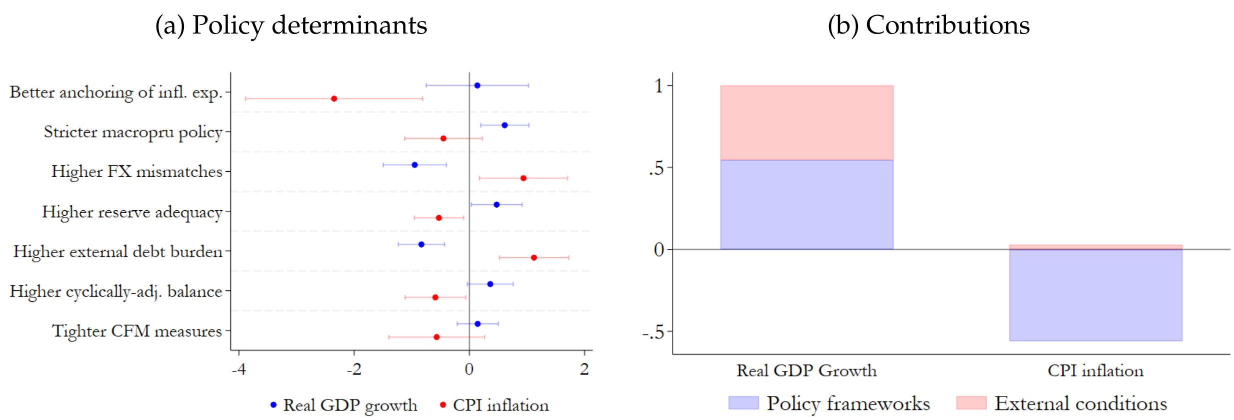
median value of policy variable k during the post-crisis episodes relative to the pre-crisis ones. The contribution of common factors is captured by the episode fixed effects. These, however, may also include changes in policy frameworks common to all countries. Hence, we isolate the contributions from external conditions by estimating

$$\bar{y}_\tau = \alpha + \sum_{m=1}^{M} \beta^m G_\tau^m + \epsilon_\tau \tag{11}$$

where $\bar{y}_\tau$ is the common component of the cumulative 12-month change in the log real GDP or log CPI during episode τ, i.e., the episode fixed effects subtracting the contribution of policy frameworks. G_τ^m is a set of three variables, indexed by m, proxying for external conditions that capture spillovers from advanced economies through trade and financial channels: real GDP growth in advanced economies relative to trend, changes in commodity terms-of-trade, and US financial conditions. All variables are expressed in cumulative changes during the 12 months following the start of the risk-off episode. The contribution of external conditions to growth or inflation during episode τ is the computed as $\sum_{m=1}^{M} \hat{\beta}^m \hat{G}_\tau^m$.

Improved policy frameworks contributed substantially to resilience during recent risk-off episodes, raising growth by 0.5 percentage point and lowering inflation by 0.6 percentage point in the period since the GFC compared with the period before the crisis began. More benign external conditions also contributed to faster growth in EMs after the GFC, by 0.5 percentage point, but did not ease inflationary pressures. These estimates are robust to the exclusion of individual risk-off episodes or the inclusion of the 2013 Taper tantrum episode.[26]

Figure 8: Factors contributing to EM resilience during risk-off episodes
(Percentage points)



Notes: Panel (a) reports the predicted percentage change in real GDP growth and CPI inflation during risk-off episodes for a country the mean to one standard deviation above the mean of the sample. The whiskers denote 90 percent confidence intervals. Panel (b) plots the contributions of policy frameworks and external conditions for the median emerging market in the post-GFC period relative to the pre-GFC period. Variables proxying for external conditions include real GDP growth in advanced economies, changes in commodity terms of trade, and US FCI-G index. The pre-GFC period is 1997–2009 and the post-GFC period is 2010–24.

[26]See Table A9 in Appendix A-II for the results of these tests.

5 A structural analysis of the benefits of improved policy framework

Having presented empirical evidence of how policy frameworks have evolved in emerging market economies and how this process can help explain these countries' improved resilience to risk-off shocks, we now rationalize it within a structural macroeconomic framework. To this end, we leverage the recent advances in modeling vulnerability of open economies to international capital flows, as exemplified by the QIPF model developed at the IMF (Adrian *et al.*, 2021). The model is particularly well suited to study these aspects as it incorporates the following four key frictions: (1) limited risk-bearing capacity of agents in the FX market, giving rise to inefficient fluctuations in the uncovered interest parity risk premium; (2) an occasionally binding external debt limit, which can trigger severe financial crises resembling sudden stops; (3) balance sheet FX mismatches, which may amplify the contractionary impact of exchange rate changes in case of a sudden stop; and (4) imperfectly anchored inflation expectations that can result in a high and persistent pass-through of exchange rate changes to prices and wages. Otherwise, the QIPF model is a standard two-country New Keynesian framework.

5.1 Key elements of the model

Shallow FX markets The key financial friction in the model draws on Gabaix and Maggiori (2015) and introduces agents that actively trade on the FX markets. These agents, dubbed as financiers, hold symmetric nominal positions in domestic and foreign bonds. Crucially, their profit maximization is subject to a balance sheet constraint that reflects an agency friction or, more broadly, limited risk-bearing capacity. This matters because financiers end up absorbing global imbalances in the demand for financial assets. So, if a shift in this demand requires financiers to raise their bond holdings in a particular currency, this has to be associated with an increase in the risk premium that compensates them for greater risk exposure. This further implies a tightening of financial conditions for agents that are unable to trade directly in foreign assets – namely, households and the fiscal authority in our model.

Formally, these considerations result in the following risk-augmented UIP condition

$$1 = \mathbb{E}_t \left\{ \frac{I_t^*}{I_t} \frac{\varepsilon_{t+1}}{\varepsilon_t} \right\} + \Gamma \frac{B_{F,t}}{P_t}, \tag{12}$$

where I_t and I_t^* denote the gross nominal rates of return on domestic and foreign bonds, respectively, ε_t is the nominal exchange rate, expressed as domestic currency units per unit of foreign currency, and P_t is the aggregate price level. $B_{F,t}$ stands for the amount of domestic currency bonds held by financiers, and in equilibrium it must reflect the bond positions taken by other agents. In the QIPF model, these are households ($B_{H,t}$), portfolio investors ($B_{P,t}$), and the government ($B_{G,t}$), the latter including both fiscal and monetary authority. Portfolio investors play the role of noise traders, taking symmetric positions in domestic and foreign bonds, and accounting for exogenous swings in the appetite for domestic currency. Recalling that households and the fiscal authority can trade only in domestic currency bonds, the home country's net foreign assets are $B_t = B_{H,t} + B_{G,t} + \varepsilon_t B^*_{M,t}$, and hence the market clearing condition for domestic currency bonds can be written as

$$B_{F,t} + B_t + B_{P,t} - \varepsilon_t B^*_{M,t} = 0, \tag{13}$$

where $B^*_{M,t}$ are the home economy's FX reserves.

The severity of the financial friction described above is governed by parameter $\Gamma \geq 0$, which we will refer to as FX market shallowness, with $\Gamma = 0$ corresponding to the case of perfectly deep markets. Clearly, the bigger Γ is, the bigger is the impact of foreign debt accumulation (decrease in net foreign assets B_t) or portfolio capital outflow (fall in appetite for domestic currency $B_{P,t}$) on the increase in the UIP premium. It is also clear that FX interventions (decumulation of FX reserves $B^*_{M,t}$) can be used to mitigate the response of the premium.

External debt limit In addition to modeling shallow markets, we follow the literature quantifying the effects of sudden stops (Mendoza, 2010) and introduce a financial friction in the form of an occasionally binding external borrowing constraint

$$-\frac{B_t}{P_t} \leq m\mathbb{E}_t Y_{t+1}, \tag{14}$$

where $m > 0$ and Y_t denotes aggregate output. Formally, this constraint affects a separate type of financial agents, dubbed as banks, which intermediate between financiers and domestic bond issuers. Whenever the economy hits the borrowing limit, the associated financial crunch can be represented as a spread Θ_t (technically, the Lagrange multiplier on constraint (14)) over the policy rate that households and the fiscal authority need to pay to issue debt, i.e., $I^b_t = I_t + \Theta_t$.

Unlike the UIP premium $\Gamma \frac{B_{F,t}}{P_t}$, which responds to any capital flow and can in principle take positive or negative values, the domestic spread Θ_t is zero most of the time, spiking up only in the rare circumstances when the economy enters the sudden stop regime.

FX mismatches As explained above, the assumed market segmentation precludes households to actively trade in foreign currency denominated assets. However, they can still be exposed to exchange rate risk via nontradable claims on financiers and portfolio investors, as well as via implicit ownership of the central bank's FX reserves. The resulting FX mismatches can be appreciated by studying the law of motion for the economy's net foreign assets

$$B_t = TB_t + \left[(1-\omega)I_{t-1} + \omega I^*_{t-1}\frac{\varepsilon_t}{\varepsilon_{t-1}}\right] B_{t-1} - (1-\omega)\left[I_{t-1}\varepsilon_{t-1} - I^*_{t-1}\varepsilon_t\right] B^*_{M,t-1}, \tag{15}$$

where TB_t is the nominal trade balance and $0 \leq \omega \leq 1$ denotes the domestic ownership share of financiers and portfolio investors.

As can be seen from the second term on the right-hand side of equation (15), ω controls the effective currency composition of the economy-wide net foreign assets. A high value of this parameter implies that, even though households cannot borrow directly in foreign currency, they can be highly exposed to FX risk. This high exposure, in turn, increases the likelihood of a sudden stop, as the economy becomes more vulnerable to sharp revaluations of its foreign debt whenever the exchange rate unexpectedly depreciates. The last term on the right-hand side represents the carry cost of FX reserve accumulation and its magnitude also crucially depends on the ownership share ω, as the profits or losses incurred between the central bank and financiers offset each other when the latter are owned by domestic households.

Inflation deanchoring To let the exchange rate fluctuations have potentially sizable and persistent effects on inflation, and hence potentially create difficult stabilization tradeoffs for central banks, we make two deviations from the standard way of incorporating price and wage rigidities that can be found in a typical New Keynesian model. First, rather than using the Dixit-Stiglitz aggregation of product varieties, the model uses the more general Kimball aggregator as in Harding *et al.* (2022). This introduces a non-linearity to the Phillips curve for domestically produced goods and imports, making inflation more responsive to expansions in economic activity and exchange rate depreciation. Second, we allow the extent of price and wage indexation to respond dynamically to inflation outturns, as in Erceg *et al.* (2024). This mechanism raises the intrinsic persistence of price and wage inflation, and is intended to serve as a proxy for inflation expectation deanchoring when inflation deviates significantly from its target.[27]

Remaining building blocs The rest of the model is fairly standard. We assume imperfect substitution between domestic and foreign-made goods and home bias in aggregate spending. Intermediate goods producers use labor and capital (in fixed supply at aggregate level) as inputs. The central bank sets its policy rate according to a simple rule that responds to deviations of domestic inflation from the target and to the output gap, the latter defined as the deviation of output from the potential equilibrium with flexible prices and wages and no inefficient shocks. We also assume that the fiscal authority has access to lump sum taxes that it can use to stabilize public debt so that its evolution becomes irrelevant for the equilibrium allocations and prices.

5.2 Calibration

We calibrate our model to two alternative types of small open emerging market economies with flexible exchange rates. The first type is aimed to resemble the average EM in the period prior to the GFC. The second represents the average emerging market in the post-crisis period, and, in line with the presented empirical evidence, it features more strongly anchored inflation expectations and smaller balance sheet mismatches. While it may also be that EMs have managed to deepen their FX markets since the GFC, we keep the FX market depth fixed to better highlight the impact of alleviating the other frictions. We want to stress that the two calibration variants are meant to be illustrative and should be interpreted as also informative about the current cross-country differences among EMs. For this reason, we will also refer to the pre-GFC (post-GFC) calibration as representing EMs with strong (weak) policy frameworks. The foreign (large) economy is calibrated to represent the US.

[27] The mechanism we adopt allows for non-zero steady-state indexation and a mild asymmetry in the speed with which persistence rises and falls with inflation, in a marginal modification to the mechanism described by Erceg *et al.* (2024).

More precisely, we set the parameters governing price and wage rigidity to match the higher exchange rate pass-through to consumer prices and wages before GFC relative to the post-GFC period, as documented in Subsection 4.1. This is achieved by assuming that in the latter period (or, in economies having stronger policy frameworks), the frequency of price adjustment by importers is lower and indexation mechanisms in price and wage settings are weaker. As for balance sheet mismatches, we set the share of portfolio investors' assets to GDP such that we match the observed levels of EM net foreign assets prior to and after GFC, equal to -38.4% and -25.9% of annual GDP, respectively. The external borrowing limit is set such that the economy remains in the constrained regime approximately 3 percent of the time under the pre-GFC calibration, which is the typical value used in the sudden stop literature. All other parameters, including the properties of stochastic shocks, are calibrated based on Adrian *et al.* (2021).

5.3 Quantifying policy trade-offs and sudden stop probability

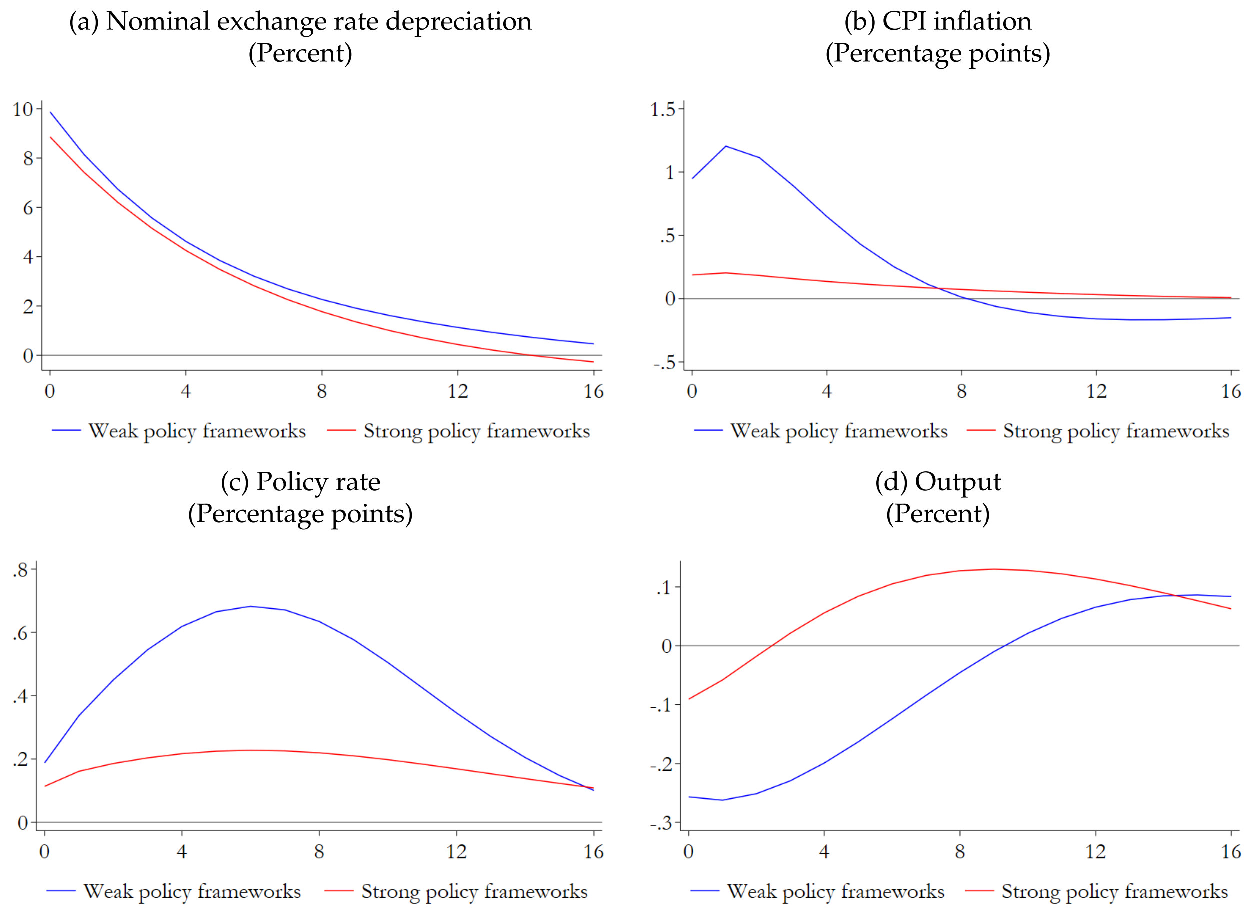
To illustrate the policy trade-offs in EMs with policy frameworks of different quality, we start by considering a risk-off shock that triggers a portfolio capital outflow, the size of which is normalized to make the exchange rate depreciate by 10 percent under the pre-GFC calibration. This shock raises the cost of imports, fueling price inflation, and also translates into higher wages as households strive to achieve compensation for higher prices through higher wages. However, as shown in Figure 9, the increase in inflation in an emerging market economy with strong policy frameworks is moderate as inflation inflation expectations are strongly anchored and the central bank does not need to tighten its policy aggressively. This prevents a strong decline in domestic demand and output even expands supported by higher net exports.

In contrast, policymakers in EMs with weak policy frameworks face much harsher policy trade-offs. For the same shock, a greater exchange rate pass-through to domestic prices leads to a substantial increase in inflation, triggering second-round effects in form of increased wage pressure. The central bank is then forced to tighten much more aggressively, depressing domestic demand. As a result, output strongly contracts. Overall, the monetary authority faces declining economic activity alongside surging prices and may therefore consider deploying additional instruments–such as FX interventions or CFMs–to improve this trade-off.

In simulations presented above, the economy was assumed to be initially in the steady state, and the capital outflow shock was not big enough to cause a concern about the possibility of hitting the external debt limit. We now show that another important implication of the improvement in policy frameworks is the lower likelihood and severity of sudden stops. Apart from better anchoring of inflation expectations, the period after the GFC also witnessed substantial changes in the balance sheets of several EMs. The average net foreign asset position increased by about 12.5 percent of GDP relative to the period before the crisis. As a substantial part of EM debt is denominated in foreign currency, this also implies less exposure to FX mismatches.

These developments reduce the probability of experiencing a sudden stop in two ways. First, lower external debt means that the economy is on average farther away from its limit. Second, this probability additionally decreases because of lower macroeconomic volatility associated with bet-

Figure 9: Policy trade-offs in response to risk-off shocks



Notes: Panels (a) to (d) show model simulation results following a capital outflow shock. The EM with weak policy frameworks is calibrated according to the characteristics of the average EM during the pre-GFC period, while the EM with strong policy frameworks is calibrated to the characteristics of the average EM during the post-GFC period.

ter anchoring of inflation expectations and lower FX mismatches. To distill the latter effect, we run stochastic simulations with the model under the pre-GFC and post-GFC calibrations, keeping the average distance from the external debt unchanged. The results of these simulations—reported in Figure A1 in Appendix A-II—indicate that the probability of a sudden stop drops by about a half (from about 3 percent to 1.5 percent). The severity of these events is also significantly lower as the average credit spread during sudden stops falls by 1 percentage point (from 6.2 percent to 5.2 percent).

5.4 Delayed monetary tightening with weak frameworks

The inflation surge after the pandemic period created a particularly challenging environment for EMs facing risk-off shocks. Depreciation coupled with global supply chain disruptions led to rapid price increases, to which many EMs responded with timely monetary policy tightening (English *et al.*, 2024). By contrast, adjustment by AE central banks came later than by EM central banks on average, reflecting amongst other factors policymakers' greater confidence in the stability of inflation expectations that was perceived to lower the cost of a wait-and-see approach to evolving inflation shocks.

The contrasting actions of EM and AE central banks lead us to ask how outcomes might be expected to differ if tightening were delayed in a weak policy framework EM jurisdiction facing circumstances similar to those seen after the pandemic. To this end, we conduct simulations of our quantitative model in which a combination of one-off shocks to capital flows and domestic costs affect the exchange rate and inflation. Two alternative monetary policy strategies are compared: Under the baseline strategy the central bank follows a simple policy rule in all periods; the alternative strategy is to deviate from the rule, first by keeping nominal interest rates lower than in the baseline for the year following the shocks, switching to policy rates that are higher than in the baseline thereafter. Crucially, the switch in policy strategy is not foreseen by the agents populating the model economy (or the central bank), but it is perfectly credible thereafter.[28] We interpret the alternative strategy as reflecting a period of wait-and-see followed by a pivot towards tighter policy consistent with a revision in the central bank's forecasts of inflation.

The results of our model simulations are presented in Figure 10. They reveal substantial costs to delayed tightening, both in terms of sustained higher inflation and a deeper contraction in domestic output. Under the baseline rule-following policy strategy, the trade-off between inflation and output stabilization is managed via a modest rise in real interest rates. We observe that under this strategy output converges to potential from below and inflation converges to target from above in a manner consistent with good policy (Svensson, 2010). Under the alternative strategy, real rates are initially low, preventing a decline in output. But removing some of the downward pressure that slack exerts on inflation, and so permitting larger price and wage increases than in the baseline, allows adverse expectational dynamics to take hold. Higher inflation is also stickier inflation, and stickier inflation requires greater countervailing policy force to be brought back to target. Although nominal policy rates under the alternative strategy rise 150bps above their level in the baseline, leading to a peak output decline that is around twice as large, outcomes for inflation remain inferior. In summary, our illustrative exercise validates the misgivings EM central bankers may have about 'looking through' the effects of supply shocks, and underscores the value of pre-commitment to a policy of robust inflation stabilization when policy fundamentals are relatively weak.

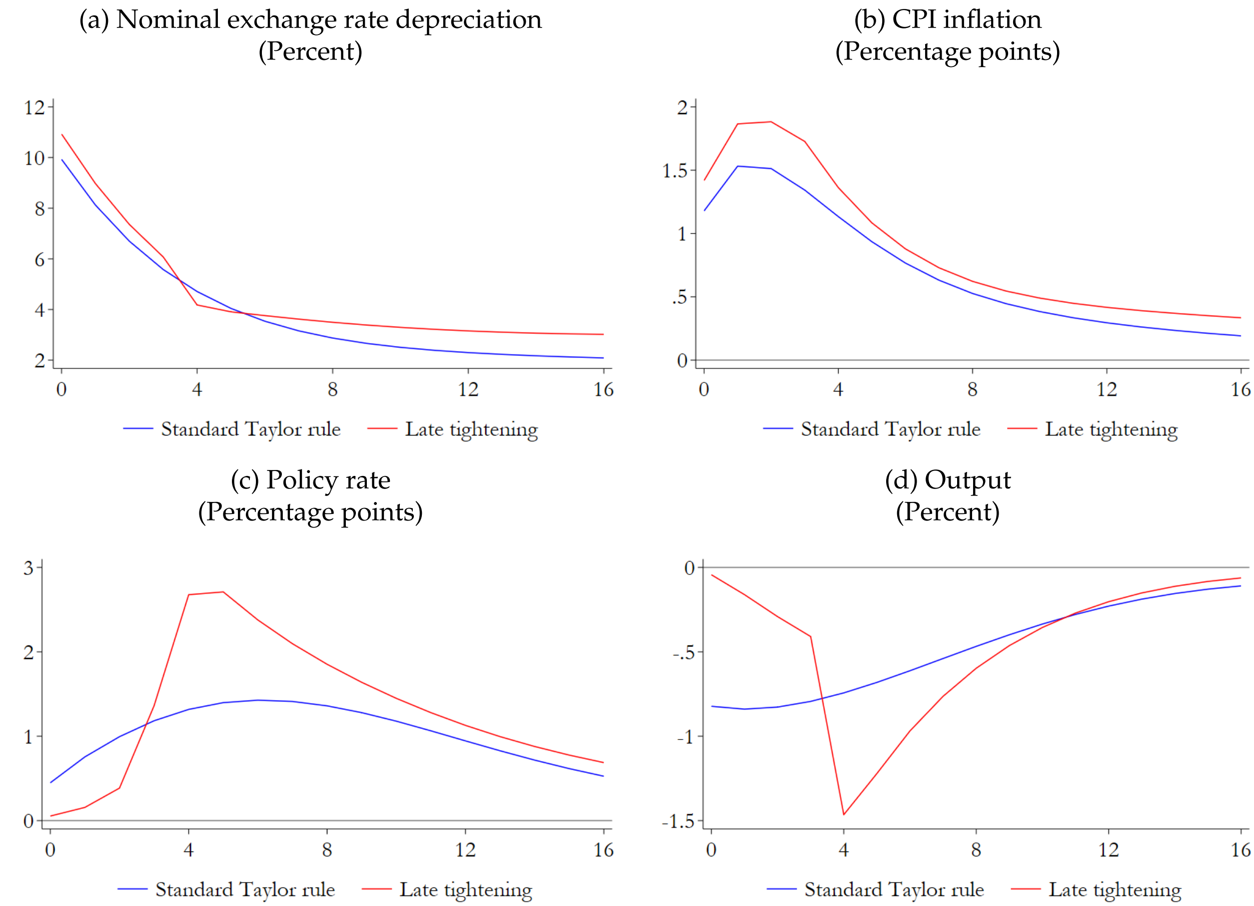
5.5 The role of FX interventions

We have seen that emerging markets may find it challenging to manage policy trade-offs induced by capital flow shocks using interest rate policy alone, especially if policy frameworks have not been strengthened. We therefore turn to the potential role that FX interventions may play in improving trade-offs, where adequate reserve buffers are present, contrasting the outcomes for EMs with different policy frameworks.[29] We calibrate a persistent risk-off shock to produce a nominal exchange rate

[28] Discretionary deviations from the rule are implemented as policy shocks that are anticipated within each of the pre- and post-switch sub-periods.

[29] Adrian *et al.* (2021) compare the effects of capital flow measures and FX interventions in a similar model setup. The simulations suggest that these tools offer similar advantages. While the analysis in the paper pertains to FX interventions, comparing countries with strong and weak policy frameworks, the conclusions can be extended to the use of capital flow measures.

Figure 10: Costs of delaying monetary tightening in EMs with weak policy frameworks

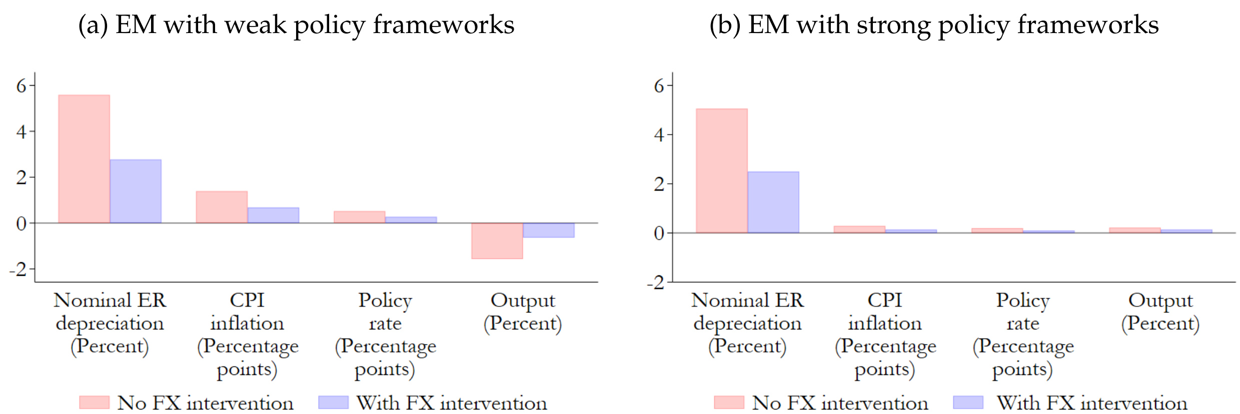


Notes: Panels (a) to (d) show model simulation results following a capital outflow shock combined with a cost-push shock. The EM with weak policy frameworks is calibrated according to the characteristics of the average EM during the pre-GFC period, while the EM with strong policy frameworks is calibrated to the characteristics of the average EM during the post-GFC period.

depreciation of 10 percent on impact, in the absence of intervention, as in Subsection 5.3. That outflow amounts to around 6 percent of GDP. The FX intervention is modeled as an unexpected foreign exchange sale worth 3 percent of GDP, followed by a slow re-build of reserves to pre-shock levels that is anticipated by all agents.

Figure 11 reports the results of the simulations. When the central bank intervenes it helps counter the adverse effects capital outflows by easing the strain placed on the balance sheet of financiers (Subsection 5.1), limiting the rise in the uncovered interest parity risk premium and halving the magnitude of the exchange rate depreciation.[30] As the central bank offsets roughly half the capital outflow with its own FX sales, the effect of the intervention is to halve the magnitude of the exchange rate depreciation. An ancillary benefit of this action is to reduce pass-through to the CPI to around 0.7 percent (versus 1.4 percent without intervention), moderating the need for monetary tightening and reducing the associated output loss. By contrast, for EMs with strong policy frameworks the benefits of FX intervention are less notable. Given better-anchored inflation expectations, the intervention leads consumer prices to be only 0.15 percentage points lower than otherwise, while output is marginally higher in spite of the monetary policy tightening as the nominal depreciation boosts net exports. We conclude that, where reserves are adequate and when capital flows are driven by shifting sentiment rather than fundamentals, interventions can be beneficial in economies whose policy frameworks are relatively weak. In contrast, this type of policy becomes less helpful for countries with strong policy frameworks.

Figure 11: Effects of FX interventions



Notes: Panels (a) and (b) show model simulation results following a capital outflow shock in the absence and in presence of FX interventions for an EM with weak policy frameworks and an EM with strong policy frameworks, respectively. The FX interventions scenarios involve a decline in FX reserves by 3 percent of annual GDP. The EM with weak policy frameworks is calibrated according to the average characteristics of the pre-GFC EM, while the EM with strong policy frameworks is calibrated to the average characteristics of the post-GFC EM. The figure reports the cumulative change over the two years following the shock for CPI inflation and output, and the two-year average for the nominal exchange rate depreciation and policy rate changes.

[30]The effectiveness of FX interventions in offsetting the nominal exchange rate depreciation depends on the depth of FX markets (Γ). Recall that we assume the same depth whether EMs have weak or strong policy frameworks.

6 Conclusions

Since the GFC, most EMs have shown remarkable resilience to risk-off events, including in the aftermath of the COVID-19 pandemic and the inflation surge that followed it. An empirical analysis of the evolution of policy frameworks in EMs reveals substantial progress over time, which helped narrow the gap with AEs. *De facto* improvements improvements in monetary policy implementation and credibility have reduced reliance on FX interventions and CFM measures, and stricter macroprudential regulation also contributed to less FX interventions. Also, central banks have become less sensitive to fiscal interference and hold sway over domestic borrowing conditions. Taken together, the observed resilience to risk-off episodes, the reduced marginal benefits of FX interventions (and capital flow measures) where policy frameworks are strong, and the evidence of greater domestic monetary policy autonomy all point to a gradual shift away from the dilemma (Rey, 2015) toward the classic Mundell-Fleming trilemma.

Results from model simulations indicate that EMs with strong frameworks are better positioned to navigate the adverse consequences of risk-off events. These economies benefit from easier policy trade-offs and face a lower risk of sudden stops. In contrast, countries with weaker frameworks should resist the temptation to delay monetary tightening, which can de-anchor inflation expectations and increase output losses. In these economies, FX interventions can provide temporary relief. However, they are costly and should neither substitute nor postpone necessary efforts to anchor inflation expectations and reduce balance sheet mismatches. More broadly, FX interventions should not hinder the warranted adjustment of macroeconomic policies, including of the exchange rate.

Looking forward, efforts to strengthen policy frameworks should be sustained, as these enhance EMs' ability to withstand risk-off shocks by easing policy trade-offs and reducing the likelihood of sudden stops. Despite significant progress, EMs' resilience will continue to be tested, as external conditions can quickly deteriorate and policy backsliding could undermine hard-won credibility. In particular, clear communication of policy objectives and of the central bank's reaction function can help to anchor inflation expectations and enhance credibility. This, in turn, eases policy trade-offs, allowing the central bank to focus more on output stabilization. In addition, reinforcing and safeguarding central bank independence are essential to ensure that policy decisions remain insulated from political pressures and to mitigate the risk of fiscal dominance. This continues to be relevant in the current context, in which inflation expectations are anchored and fiscal demands are mounting, tempting policymakers to yield to political pressure. FX interventions can play a stabilizing role for less-resilient EMs, but the benefits diminish as policy frameworks strengthen. Given the costs associated with FX interventions, efforts to anchor inflation expectations and reduce balance sheet mismatches—including through the implementation of macroprudential frameworks—should be promoted, lessening the need for intervention in the FX market.

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Online Appendix for:
"Emerging Market Resilience: Good Luck or Good Policies?"

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A-I Data

Table A1 reports the sources for the data used in the paper.

Table A1: Data sources

Variables	Sources
CFM measures	Integrated Macroprudential Policy database iMaPP
Commodity terms of trade	Gruss and Kebhaj (2019)
Consumer prices	IMF, World Economic Outlook; Haver Analytics
Cyclically-adjusted balance	World Bank Cross-Country Database of Fiscal Space
De jure central bank independence	Romelli (2024)
Domestic monetary policy shock	Checo *et al.* (2024)
EMBI spread	Bloomberg; J.P. Morgan
External debt	IMF, World Economic Outlook; World Bank, Cross-Country Database of Fiscal Space
FX interventions	Adler *et al.* (2025)
FX mismatches	Allen and Juvenal (2025)
Government bond yields	Bloomberg; Haver Analytics
Government revenues	IMF, World Economic Outlook; World Bank, Cross-Country Database of Fiscal Space
Inflation expectations	Consensus Economics
Inflation expectations anchoring	Bems *et al.* (2021)
Inflation targets	Haver Analytics
Macroprudential policy	Integrated Macroprudential Policy database iMaPP
Military expenditures	SIPRI Military Expenditure Database
Nominal exchange rate	Bloomberg; Consensus Economics; Haver Analytics
Nominal GDP	IMF, World Economic Outlook
Output gap	IMF, World Economic Outlook
Policy rate	Haver Analytics
Portfolio flows	IMF Balance of Payments Statistics
Real GDP	IMF, World Economic Outlook
Reserve adequacy	IMF, World Economic Outlook
RORO index	Bloomberg; Chari *et al.* (2023); Haver Analytics
Sovereign spreads	Haver Analytics; J.P. Morgan
Stock prices	Bloomberg; Haver Analytics
US financial conditions	Haver Analytics
US monetary policy shock	Bauer and Swanson 2023

A-II Additional Tables and Figures

Table A2 reports the list of the 16 risk-off episodes identified according to the algorithm-based approach, along with their duration and magnitude, and the main events that took place at that time. Table A3 shows the regression results of the effects of the risk-off shocks on key macroeconomic variables before and after the GFC. Table A4 presents the results of the exchange rate pass-through estimations. Table A5 shows the annual estimates of the perceived monetary policy reaction function. Table A6 and Table A7 report the estimates about the use of FX interventions and CFM measures when inflation expectations are anchored and when macroprudential policy is stringent. Table A8 presents the regression results of the one-year change in real GDP and consumer prices following the start of a risk-off episode on policy variables. Table A9 reports the results of the robustness tests about the contributions of policy frameworks and external factors to the EM resilience to risk-off events, both in terms of real GDP growth and CPI inflation. Figure A1 shows the reduction in the likelihood and severity of sudden stops due to stronger policy frameworks.

Table A2: Dates, magnitude and duration, and events during risk-off episodes

Start	End	Magnitude (SD)	Duration (Months)	Main events
1997m8	1997m10	0.5	3	Asian financial crisis
1998m7	1998m9	1.7	3	Russian financial crisis; Long-Term Capital Management collapse
2000m9	2001m3	0.8	7	Unraveling of dotcom bubble
2001m6	2001m9	1.3	4	Worsening of dotcom slump; September 11 attacks
2002m4	2002m9	1.3	6	Enron and WorldCom corporate scandals
2002m12	2003m2	0.5	3	Iraq war; Severe Acute Respiratory Syndrome epidemic
2007m6	2008m4	0.8	10	Collapse of Bear Stearns and BNP Paribas subprime funds
2008m6	2008m11	2.6	6	Failures of Indymac, Fannie Mae, Freddie Mac and Lehman Brothers
2010m4	2010m6	1.0	3	Start of Greek sovereign debt crisis; 2010 flash crash
2011m5	2011m9	1.1	5	US rating downgrade; worsening of European sovereign debt crisis
2012m4	2012m5	1.1	2	Peak of European sovereign debt crisis
2015m5	2016m2	0.4	10	China growth slowdown; commodity price collapse
2018m8	2018m12	0.6	5	Escalation of US-China trade tensions; concerns over Fed tightening
2019m3	2019m5	0.3	3	Lingering US-China trade tensions; global manufacturing slowdown
2020m1	2020m3	2.9	3	COVID-19 pandemic
2022m4	2022m6	0.7	3	Rising global inflation and monetary policy tightening; Russia-Ukraine war

Table A3: Macroeconomic dynamics during risk-off episodes

	$h=1$	$h=2$	$h=3$	$h=4$
	(1)	(2)	(3)	(4)
Panel A. *Portfolio outflows (percent of GDP)*				
Risk-off episode, pre-GFC	-0.102***	-0.155***	-0.106**	-0.073**
	(0.035)	(0.043)	(0.041)	(0.035)
Risk-off episode, post-GFC	-0.048	-0.033	-0.056	-0.098
	(0.058)	(0.058)	(0.058)	(0.082)
Observations	1,151	1,151	1,151	1,151
R^2	0.183	0.242	0.236	0.232
Panel B. *Nominal exchange rate depreciation (percent)*				
Risk-off episode, pre-GFC	2.108***	8.789***	12.260***	10.035***
	(0.813)	(1.633)	(2.247)	(2.163)
Risk-off episode, post-GFC	3.884***	6.106***	4.384**	3.058
	(0.908)	(1.395)	(2.079)	(2.232)
Observations	1,302	1,302	1,302	1,302
R^2	0.277	0.358	0.382	0.398
Panel C. *EMBI spread (percent)*				
Risk-off episode, pre-GFC	0.794***	1.633***	1.496***	1.146***
	(0.135)	(0.303)	(0.353)	(0.346)
Risk-off episode, post-GFC	0.678***	0.959**	0.876	1.185*
	(0.189)	(0.370)	(0.679)	(0.705)
Observations	1,293	1,291	1,289	1,286
R^2	0.250	0.278	0.267	0.288
Panel D. *Real GDP growth (percent)*				
Risk-off episode, pre-GFC	-0.647***	-1.867***	-2.803***	-3.021***
	(0.172)	(0.278)	(0.437)	(0.480)
Risk-off episode, post-GF	-0.020	-1.000*	-1.741***	-4.716***
	(0.329)	(0.422)	(0.549)	(1.075)
Observations	1,524	1,524	1,524	1,524
R^2	0.150	0.229	0.299	0.332
Panel E. *CPI inflation (percent)*				
Risk-off episode, pre-GFC	0.682***	0.878**	0.943*	0.747
	(0.244)	(0.360)	(0.485)	(0.595)
Risk-off episode, post-GF	0.437*	-0.309**	-1.521	-0.891
	(0.327)	(0.468)	(0.655)	(0.887)
Observations	1,523	1,522	1,521	1,520
R^2	0.632	0.656	0.691	0.705

Notes: The table reports the coefficients of regressions of the change in portfolio outflows (panel A), the nominal exchange rate depreciation (panel B), the EMBI spread (panel C), the real GDP growth (panel D), and CPI inflation (panel E). All regressions include controls for real GDP growth, inflation, the lags of the dependent variable, and country fixed effects. The pre-GFC period is 1997–2009 and the post-GFC period is 2010–24. Robust standard errors are reported in parentheses. ***, **,* denote statistical significance at 1, 5, and 10 percent levels.

Table A4: Exchange rate pass-through to inflation

	$h=6$ (1)	$h=12$ (2)	$h=24$ (3)	$h=36$ (4)
Exchange rate depreciation	0.332***	0.704***	1.358***	1.767***
	(0.121)	(0.206)	(0.403)	(0.608)
Exchange rate depreciation × post-GFC	-0.319**	-0.529**	-1.189**	-1.956**
	(0.144)	(0.258)	(0.510)	(0.787)
Observations	5,291	5,171	4,931	4,691
Adjusted R^2	0.662	0.672	0.682	0.720

Notes: The table reports the exchange rate pass-through estimated as the cumulative percentage change in the consumer price index in response to a one percentage point depreciation of the nominal exchange rate vis-à-vis the USD, with country fixed effects, time fixed effects, and lagged controls. The exchange rate depreciation is instrumented using the change between the day before and the day after scheduled monetary policy announcements by the US Federal Reserve Board. The pre-GFC period is 1997–2009 and the post-GFC period is 2010–24. Standard errors are clustered by time and reported in parentheses. ***, **,* denote statistical significance at 1, 5, and 10 percent levels.

Table A5: Estimates of perceived monetary policy reaction function

Year	Expected, inflation, coefficient	Expected inflation, standard error	Expected real GDP growth, coefficient	Expected real GDP growth, standard error	R^2	Observations
2004	2.360	0.440	-0.120	0.160	0.900	1,009
2005	2.800	0.810	0.260	0.210	0.870	1,189
2006	1.550	0.450	0.460	0.210	0.880	1,311
2007	2.610	0.190	0.220	0.180	0.880	1,604
2008	2.990	0.150	-0.350	0.120	0.900	1,951
2009	2.080	0.220	-0.180	0.120	0.890	2,123
2010	2.270	0.230	-0.210	0.160	0.920	2,163
2011	2.390	0.190	-0.450	0.150	0.910	2,251
2012	2.470	0.170	-0.950	0.200	0.950	2,185
2013	2.110	0.230	-0.710	0.150	0.940	2,139
2014	2.410	0.210	-0.590	0.100	0.940	2,509
2015	1.670	0.120	-0.240	0.100	0.920	2,695
2016	1.100	0.060	-0.070	0.070	0.820	2,736
2017	0.970	0.130	-0.020	0.220	0.900	2,882
2018	1.310	0.180	0.440	0.240	0.910	2,818
2019	1.350	0.140	0.540	0.150	0.870	2,976
2020	1.900	0.150	0.160	0.270	0.790	2,733
2021	1.880	0.120	0.210	0.180	0.820	2,703
2022	1.510	0.140	0.020	0.060	0.880	2,548
2023	1.240	0.080	0.310	0.110	0.790	2,586
2024	1.330	0.120	0.580	0.140	0.830	2,713

Notes: The table reports the Taylor rule coefficients of the perceived monetary policy reaction function. The sample include years with at least 1,000 observations and it excludes countries with fixed exchange rate regimes, Argentina, Türkiye, and Ukraine. All regressions include forecaster fixed effects. Standard errors are clustered at the forecaster level. ***, **,* denote statistical significance at 1, 5, and 10 percent levels.

Table A6: Use of FX interventions conditioning on policy frameworks
(Percent of GDP)

	$h = 3$	$h = 6$	$h = 9$	$h = 12$
	(1)	(2)	(3)	(4)
Panel A. *Conditioning on inflation expectation anchoring*				
UIP $\times$ inflation expectations anchoring	-0.838***	-1.289***	-1.305***	-1.214***
	(0.218)	(0.336)	(0.370)	(0.376)
Observations	2,034	2,032	2,032	2,032
Adjusted R^2	-0.467	-0.546	-0.321	-0.143
Panel B. *Conditioning on the stringency of macroprudential regulation*				
UIP $\times$ stringency of MPru regulation	0.035	-0.043	-0.195*	-0.353***
	(0.054)	(0.077)	(0.100)	(0.127)
Observations	2,390	2,385	2,382	2,379
Adjusted R^2	-0.013	-0.002	-0.041	-0.128

Notes: The table reports the coefficients of regressions of cumulative FX interventions (measured as net purchases) on the UIP deviation and its interaction with inflation expectation anchoring in panel A and its interaction with the stringency of macroprudential regulation in panel B. All regressions include controls for lagged inflation, exchange rate, UIP deviation, FX interventions, CFM measures, and country and time fixed effects. The measure of inflation expectation anchoring is from Bems *et al.* (2021); and the stringency of macroprudential regulation is measured as the net cumulative tightening in FX related capital requirements, loan, and other position restrictions. The sample excludes EMs with fixed exchange rate regimes. Standard errors are clustered at the month level and reported in parentheses. ***, **,* denote statistical significance at 1, 5, and 10 percent levels.

Table A7: Use of CFM measures conditioning on policy frameworks
(Index)

	$h = 3$ (1)	$h = 6$ (2)	$h = 9$ (3)	$h = 12$ (4)
Panel A. *Conditioning on inflation expectation anchoring*				
UIP × inflation expectations anchoring	-0.111***	-0.096	-0.162**	-0.230**
	(0.039)	(0.059)	(0.074)	(0.090)
Observations	2944	2902	2860	2818
Adjusted R^2	-0.130	-0.117	-0.122	-0.125
Panel B. *Conditioning on the stringency of macroprudential regulation*				
UIP × stringency of MPru regulation	-0.027	-0.052	-0.029	0.028
	(0.032)	(0.051)	(0.065)	(0.083)
Observations	3,557	3,557	3,557	3,557
Adjusted R^2	-0.137	-0.143	-0.093	-0.101

Notes: The table reports the coefficients of regressions of the cumulative net tightening of CFM measures on the UIP deviation and its interaction with inflation expectation anchoring in panel A and its interaction with the stringency of macroprudential regulation in panel B. All regressions include controls for lagged inflation, exchange rate, UIP deviation, CFM measures, and country and time fixed effects. The measure of inflation expectation anchoring is from Bems *et al.* (2021); the measure of CFM measures is from Bergant *et al.* (2025); and the stringency of macroprudential regulation is measured as the net cumulative tightening in FX related capital requirements, loan, and other position restrictions. The sample excludes Argentina, Türkiye, and Ukraine. Standard errors are clustered at the month level and reported in parentheses. ***, **,* denote statistical significance at 1, 5, and 10 percent levels.

Table A8: Policy determinants of resilience to risk-off events

	$X =$ Inflation expectation anchoring (1)	$X =$ Macropru policy stringency (2)	$X =$ External debt burden (3)	$X =$ Reserve adequacy (4)	$X =$ FX mismatches (5)	$X =$ Cyclically-adjusted balance (6)	$X =$ CFM measures (7)
Panel A. *Real GDP growth*							
X	0.138	0.475*	-0.834***	0.614**	-0.948***	0.363	0.144
	(0.538)	(0.268)	(0.243)	(0.253)	(0.332)	(0.242)	(0.216)
Observations	273	378	378	347	270	344	348
Adjusted R^2	0.306	0.311	0.331	0.350	0.335	0.303	0.308
Panel B. *CPI inflation*							
X	-2.349**	-0.529**	1.122***	-0.451	0.939**	-0.591*	-0.567
	(0.932)	(0.261)	(0.365)	(0.408)	(0.464)	(0.320)	(0.504)
Observations	273	378	378	347	270	344	348
Adjusted R^2	0.590	0.525	0.533	0.609	0.619	0.568	0.524

Notes: Panel A and panel B report the coefficients of regressions of the one-year real GDP growth and one-year CPI inflation, respectively, following the start of a risk-off episode on pre-determined policy variables, controlling for past lagged GDP growth, lagged inflation, and episode fixed effects. GDP growth and inflation are expressed in percentage points (100 $\times$ log points). Policy variables are expressed in standard deviations. The measure of inflation expectation anchoring is from Bems *et al.* (2021); the stringency of macroprudential regulation is measured as the net cumulative tightening in FX related capital requirements, loan, and other position restrictions; the external debt burden is measured as the stock of external debt as a percentage of exports; reserve adequacy is measured as the stock of FX reserves as a percentage of short-term external debt; FX mismatches are measured as foreign currency liabilities as a percentage of exports; and the measure of CFM measures is from Bergant *et al.* (2025). Robust standard errors are reported in parentheses. ***, **,* denote statistical significance at 1, 5, and 10 percent levels.

Table A9: Robustness of the contributions of policy frameworks and external conditions

Excluded episode	Policy frameworks		External conditions	
	Real GDP growth	CPI inflation	Real GDP growth	CPI inflation
1997m8	0.55	-0.69	0.46	0.03
1998m7	0.56	-0.52	0.50	-0.10
2000m9	0.57	-0.51	0.47	0.03
2001m6	0.55	-0.59	0.45	0.03
2002m4	0.54	-0.71	0.44	0.02
2002m12	0.58	-0.61	0.43	0.01
2007m6	0.55	-0.51	0.45	0.03
2008m6	0.38	-0.49	0.49	0.05
2010m4	0.58	-0.63	0.45	0.06
2011m5	0.53	-0.65	0.45	0.04
2012m4	0.50	-0.57	0.45	0.03
2015m5	0.52	-0.59	0.45	0.04
2018m8	0.62	-0.56	0.45	0.04
2019m3	0.71	-0.68	0.50	0.05
2020m1	0.46	-0.42	0.37	0.08
2022m4	0.55	-0.33	0.45	0.06
Mean	0.55	-0.57	0.45	0.03
Median	0.55	-0.58	0.45	0.03
Including Taper Tantrum	0.55	-0.56	0.45	0.03

Notes: The table reports the estimated contributions of policy frameworks and external conditions to real GDP growth and inflation during risk-off episodes excluding one episode at the time, or including all episodes and the 2013 Taper Tantrum episode. The excluded episodes are identified using the month in which they started. Variables proxying for external conditions include real GDP growth in advanced economies, commodity terms-of-trade shocks, and the US FCI-G index.

Figure A1: Likelihood and severity of sudden stops

(Percent)

Notes: Panel (a) and (b) show the stochastic simulation results for the probability of sudden stops and the change in the credit spread during sudden stops, respectively. The credit spread is computed as the borrowing rate minus policy rate.

PUBLICATIONS

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