

Online Annexes 2.1 to 2.8 to Chapter 2 of the October 2025 World Economic Outlook lay out the data sources, sample coverage, variable definitions, and methodologies used in the main text. The first annex presents the sample of economies covered throughout the chapter and reports the data sources. The subsequent annexes follow the structure of the chapter and describe variable definitions and methodologies used in the exercises reported in the main text.

Online Annex 2.1. Sample Coverage and Data Sources

The analysis in the chapter covers 26 emerging markets (Online Annex Table 2.1.1) over the period 1997–2024, covering 88 percent of GDP of the ‘Emerging Markets and Middle-Income Economies’ group in the October 2025 World Economic Outlook. Within that group, the chapter only considers economies with (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.² The analysis uses the same criteria to select 30 advanced economies, accounting for almost 94 percent of GDP of the ‘Advanced Economies’ group in the October 2025 World Economic Outlook. The data sources and country coverage vary across different parts of the analysis. All data sources used in the chapter are listed in Online Annex Table 2.1.2.

Online Annex Table 2.1.1. Country Groups

Advanced Economies: Australia, Austria, Belgium, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States.

Emerging Markets: Argentina, Bolivia, Brazil, Bulgaria, Chile, China, Colombia, Hungary, India, Indonesia, Kazakhstan, Malaysia, Mexico, Pakistan, Paraguay, Peru, Philippines, Poland, Romania, Russia, Serbia, South Africa, Thailand, Türkiye, Ukraine, Vietnam.

Online Annex 2.2. Risk-off Episodes

Measuring risk-off episodes

Construction of the risk-on risk-off index. An extended version of the Risk-On Risk-Off Index (RORO) of Chari, Dilts Stedman, and Lundblad (2023) is used to identify risk-off episodes. The extended version of the index covers the period from 1997 to 2024 and excludes the Euro High Yield Index Option-Adjusted Spread, the VSTOXX index, the Libor-OIS spread,

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² Some countries that have recently experienced debt distress (e.g., Sri Lanka or Egypt) are not included due to data limitations.

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Online Annex Table 2.1.2. Data Sources

Variables	Data Sources
CFM Measures	Integrated Macprudential Policy database iMaPP
Commodity Terms of Trade	Gruss and Kebhaj 2019
Consumer Prices	IMF, <i>World Economic Outlook</i> ; 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, Grigoli, and Sandri 2024
EMBI Spread	Bloomberg; J.P. Morgan
Exports	IMF, <i>World Economic Outlook</i>
External Debt	IMF, <i>World Economic Outlook</i> ; World Bank Cross-Country Database of Fiscal Space
Fiscal Rule in Place	Davoodi and others 2022
FX Interventions	Adler and others 2024
FX Mismatch Ratio	Allen and Juvenal 2025
Government Bond Yields	Bloomberg; Haver Analytics
Government Revenues	IMF, <i>World Economic Outlook</i> ; World Bank Cross-Country Database of Fiscal Space
Inflation Expectations	Consensus Economics
Inflation Expectations Anchoring	Bems and others 2021
Inflation Targeting Framework in Place	Cobham 2025; Haver Analytics
Inflation Targets	Haver Analytics
Interest Expenditures	IMF, <i>World Economic Outlook</i> ; World Bank Cross-Country Database of Fiscal Space
Macprudential Regulations	Integrated Macprudential Policy database iMaPP
Military Expenditures	SIPRI Military Expenditure Database
Nominal Exchange Rate	Bloomberg; Consensus Economics; Haver Analytics
Nominal GDP	IMF, <i>World Economic Outlook</i>
Official Budget Forecast	IMF, <i>World Economic Outlook</i>
Output Gap	IMF, <i>World Economic Outlook</i>
Policy Rate	Haver Analytics
Portfolio Flows	IMF Balance of Payments Statistics
Primary Balance	IMF, <i>World Economic Outlook</i> ; World Bank Cross-Country Database of Fiscal Space
Private Sector Budget Forecast	Consensus Economics
Public Debt	IMF, <i>World Economic Outlook</i> ; World Bank Cross-Country Database of Fiscal Space
Real GDP	IMF, <i>World Economic Outlook</i>
Reserve Adequacy	IMF, <i>World Economic Outlook</i>
RORO Index	Bloomberg; Chari, Dilts Stedman, and Lundblad 2023; Haver Analytics
Sovereign Spreads	Haver Analytics; J.P. Morgan
Stock Prices	Bloomberg; Haver Analytics
Strength of Fiscal Rules	Alonso and others forthcoming
US Financial Conditions	Haver Analytics
US Monetary Policy Shock	Bauer and Swanson 2023

Note: CFM = capital flow management; EMBI = emerging markets bond index; FX = foreign exchange; RORO Index = Risk-On, Risk-Off Index.

and three G-spreads from its construction, which are only available starting in 1998, 1999, 2001, and 2003, respectively. Thus, this version of the RORO Index consists of the z-score of the first

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principal component of daily changes in a set of standardized variables reflecting changes in funding liquidity, credit risk, risk aversion, and prices of safe haven assets. Specifically, changes to funding liquidity are proxied using the daily average change in the G-spread on 2, 5, and 10-year Treasuries, along with the change in the TED spread, the LIBOR-OIS spread, and the bid-ask spread on 3-month Treasuries. Changes related to credit risk are captured using the change in the U.S. ICE BofA BBB Corporate Index Option-Adjusted Spread and the U.S. BAA corporate - 10Y Treasury spread. Changes in risk aversion emanating from advanced economy equity markets are captured using the daily total returns on the S&P 500, STOXX 600, and MSCI Advanced Economies Index, along with associated changes in option implied volatilities from the VIX index. Safe haven demand is captured using the growth rate of the trade-weighted U.S. Dollar Index against advanced foreign economies and the change in the price of gold.³

Identification of risk-off episodes. A set of criteria is used to identify 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. 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. The list of the 16 episodes identified according to these

Online Annex Table 2.2.1. Risk-off Episodes

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

³ Relative to the original RORO index, variables with tickers BAMLHE00EHYIOAS, V2X Index, FLOD3@DAILY - USSOC Curney, F10JOF@DAILY, F05JOF@DAILY, and F02JOF@DAILY are excluded. The exclusion of these variables for the construction of the extended RORO Index does not materially alter movements in the index: the correlation between the original index and the extended version is 98 percent.

criteria is reported in Online Annex Table 2.2.1, along with the main events that took place at that time.⁴

Characteristics of risk-off episodes

The analysis explores the nature of risk-off episodes along three dimensions: i) duration, calculated as the number of months between the start of the episode and the end of the episode; ii) magnitude, calculated as the average value of the RORO index during the months between the start and end of the risk-off episode; and iii) the relative contribution of liquidity, credit risk, risk aversion, and prices of safe haven assets in explaining the variation of the RORO index. Following Chari, Dilts Stedman, and Lundblad (2023), the proportion of RORO index's variation explained by four sub-indices is computed as:

$$Prop(S_{i,t}) = \frac{Cov(\widehat{RORO}_t, \hat{\beta}_i S_{i,t})}{Var(\widehat{RORO}_t)},$$

where $S_{i,t}$ represents the sub-indices including (1) spreads (credit risk), (2) advanced economy equity returns and implied volatility, (3) funding liquidity, and (4) currency and gold. $\widehat{RORO}_t$ is the fitted value from regressing the RORO index on the four sub-indices, and $\hat{\beta}_i$ is the estimated regression coefficient for each sub-index. The decomposition is run separately for the periods before and after the global financial crisis (GFC). The results are reported in Figure 2.2.3 in the main text, while Online Annex Table 2.2.1 contains the duration and magnitude for each episode.

Resilience during risk-off episodes

To assess the change in financial and economic indicators—portfolio outflows, EMBI spread, real GDP, and consumer prices—during risk-off episodes, the analysis estimates the following equation at the monthly and quarterly frequency, depending on the frequency of the dependent variable:

$$y_{i,t+h} - y_{i,t-1} = \sum_{r=-L_{RO}}^{R_{RO}} \beta^h RO_{t+r} + \gamma^h POST_t + \delta^h RO_t \times POST_t + \sum_{r=1}^{R_X} \eta^{r,h} X_{i,t-r} + \alpha_i^h + \epsilon_{i,t}^h,$$

where $y_{i,t+h}$ is the log level of the variable of country i measured h months or quarters after the start of the risk-off episode; RO_t is a dummy variable denoting 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 episode; $POST_t$ is a dummy variable equal to one for the period from 2010 onwards; $X_{i,t-r}$ is a vector of controls including lags of the changes in the dependent variable, log real GDP and log CPI; and $\alpha_{i,h}$ denotes

⁴ 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.

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country fixed effects.⁵ Following the “clean controls” approach of Dube and others (2023), the observations corresponding to the year 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. All dependent variables are winsorized at 1 percent tails. Online Annex Table 2.2.2 reports the regression output. The results are robust to omitting one risk-off episode at the time.

Online Annex Table 2.2.2. Effects of Risk-off Shocks

	<i>t</i> = 3	<i>t</i> = 6	<i>t</i> = 9	<i>t</i> = 12
	(1)	(2)	(3)	(4)
Portfolio Outflows				
Risk-off Episode	0.102*** (0.035)	0.155*** (0.043)	0.106** (0.041)	0.073** (0.035)
Risk-off Episode x Post-GFC	0.054 (0.062)	0.121* (0.064)	0.050 (0.067)	-0.025 (0.087)
Observations	1,151	1,151	1,151	1,151
<i>R</i> ²	0.183	0.242	0.236	0.232
Nominal Exchange Rate				
Risk-off Episode	0.034*** (0.008)	0.081*** (0.017)	0.100*** (0.022)	0.065*** (0.020)
Risk-off Episode x Post-GFC	0.005 (0.010)	-0.049*** (0.018)	-0.092*** (0.024)	-0.080*** (0.021)
Observations	4,224	4,224	4,224	4,224
<i>R</i> ²	0.241	0.309	0.343	0.373
EMBI Spread				
Risk-off Episode	1.464*** (0.192)	2.009*** (0.307)	1.579*** (0.285)	1.314*** (0.276)
Risk-off Episode x Post-GFC	-0.718*** (0.224)	-1.593*** (0.332)	-1.368*** (0.318)	-1.046*** (0.332)
Observations	4,175	4,170	4,162	4,152
<i>R</i> ²	0.220	0.252	0.254	0.264

The exchange rate pass-through to inflation during risk-off episodes is estimated using the following specification:

$$p_{i,t+h} - p_{i,t-1} = \beta_1^h \Delta \hat{e}_{i,t} + \beta_2^h POST_t \times \Delta \hat{e}_{i,t} + \sum_{j=1}^J \gamma_j^h X_{i,t-j} + \alpha_i^h + \tau_t^h + \epsilon_{i,t}^h,$$

⁵ The equation is estimated at the monthly frequency for the nominal exchange rate and EMBI spread, and at the quarterly frequency for real GDP, consumer prices, and portfolio flows. The analysis sets $R_{RO} = 11$, $L_{RO} = 12$, and $R_X = 12$ for the monthly specification and $R_{RO} = L_{RO} = R_X = 4$ for the quarterly specification.

Online Annex Table 2.2.2. Effects of Risk-off Shocks (*continued*)

	Real GDP			
Risk-off Episode	-0.006*** (0.002)	-0.019*** (0.003)	-0.028*** (0.004)	-0.030*** (0.005)
Risk-off Episode x Post-GFC	0.006* (0.003)	0.009* (0.005)	0.011* (0.006)	-0.017 (0.011)
Observations	1,524	1,524	1,524	1,524
R^2	0.150	0.229	0.299	0.332
	Consumer Prices			
Risk-off Episode	0.007*** (0.002)	0.009** (0.004)	0.009* (0.005)	0.007 (0.006)
Risk-off Episode x Post-GFC	-0.002 (0.003)	-0.012** (0.006)	-0.015* (0.008)	-0.016* (0.010)
Observations	1,523	1,522	1,521	1,520
R^2	0.632	0.656	0.691	0.705

Sources: Bloomberg; Haver Analytics; Federal Reserve Board; IMF Balance of Payment Statistics; J.P. Morgan; and IMF staff calculations.

Note: The table reports the change in variables three, six, nine, and twelve months after the start of risk-off episode compared to similar time windows with no risk-off episodes. Portfolio outflows are expressed in terms of percent of initial GDP. The nominal exchange rate, real GDP and consumer prices are expressed in log points. The EMBI spread is expressed in percentage points. The specifications control for past real GDP growth, consumer price inflation, leads and lags of the RORO Index, and country fixed effects. Risk-off episodes are identified using an extended version of the RORO Index of Chari, Dilts Stedman, and Lundblad (2023). The pre-GFC period is 1997–2009, and the post-GFC period is 2010–24. Robust standard errors in parentheses. EMBI = emerging market bond index; GFC = global financial crisis; RORO Index = Risk-On Risk-Off Index.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

where $p_{i,t+h} - p_{i,t-1}$ is the cumulative percentage change in the consumer price index of country i measured h months after time t ; $\Delta \hat{e}_{i,t}$ is the monthly exchange rate depreciation against the dollar instrumented with the RORO index, allowing for country-specific sensitivity; $POST_t$ is a dummy variable equal to one for the period from 2010 onwards; X_{it} is a vector of controls, which includes 12 lags of inflation, exchange rate depreciation, and policy rate; and α_i^h and τ_t^h are country and time fixed effects. The results are reported in Online Annex Table 2.2.3.

Online Annex Table 2.2.3. Effects of Risk-off Shocks: Exchange Rate Pass-through to Inflation

	$t = 3$	$t = 6$	$t = 9$	$t = 12$
	Inflation			
	(1)	(2)	(3)	(4)
FX Depreciation	0.292* (0.173)	0.610** (0.270)	0.885*** (0.313)	1.156*** (0.353)
FX x Post-GFC	-0.256 (0.170)	-0.629** (0.285)	-1.007*** (0.360)	-1.492*** (0.461)
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,069	5,009	4,949	4,889
Adjusted R^2	0.289	0.241	0.193	0.122

Sources: Bloomberg; Haver Analytics; J.P. Morgan; and IMF staff calculations.

Note: 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 RORO Index, allowing for country-specific sensitivity. Standard errors are clustered at the month level and reported in parentheses. FX = foreign exchange; GFC = global financial crisis; RORO Index = Risk-On Risk-Off Index.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Online Annex 2.3. Monetary Policy Frameworks

The chapter examines improvements in monetary policy frameworks by focusing on the monetary policy reaction function, market perceptions of the reaction function, fiscal dominance, and monetary policy autonomy with respect to US monetary policy actions.

Monetary policy reaction function. This analysis estimates Taylor rule coefficients from a standard monetary policy reaction function, augmented with changes in the nominal effective exchange rate (NEER) to capture fear-of-floating concerns:

$$r_{i,t} = \rho r_{i,t-1} + (1 - \rho) \left[\alpha_i + \beta_1 E_t \bar{\pi}_{i,t+h} + \gamma_1 \bar{y}_{i,t-3} + \delta_1 \Delta e_{i,t} + POST_t \left(\beta_2 E_t \bar{\pi}_{i,t+h} + \gamma_2 \bar{y}_{i,t-3} + \delta_2 \Delta e_{i,t} \right) \right] + \tau_t + \varepsilon_{i,t},$$

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 real-time GDP output gap, and $\Delta e_{i,t}$ is the NEER appreciation, $POST_t$ is a dummy variable equal to one for the period from 2010 onwards, with country fixed effects α_i and time-specific fixed effects τ_t .⁶ Expected inflation, the output gap, and the NEER appreciation are interacted with a dummy for the period after the

⁶ The real-time output gap is computed using real GDP data available up to period t and WEO forecasts for the following five years, reflecting data available to the policymakers at the time in which monetary policy decisions are taken (Orphanides and Van Norden 2002).

GFC to examine changes in the related coefficients with respect to the period prior to it. Following Carvalho et al. (2021), the regressions are estimated with OLS, using country-by-month panel data. Standard errors are double clustered at the country and month level. The sample 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 advanced economies, the Taylor rule coefficients are estimated over the entire sample period.

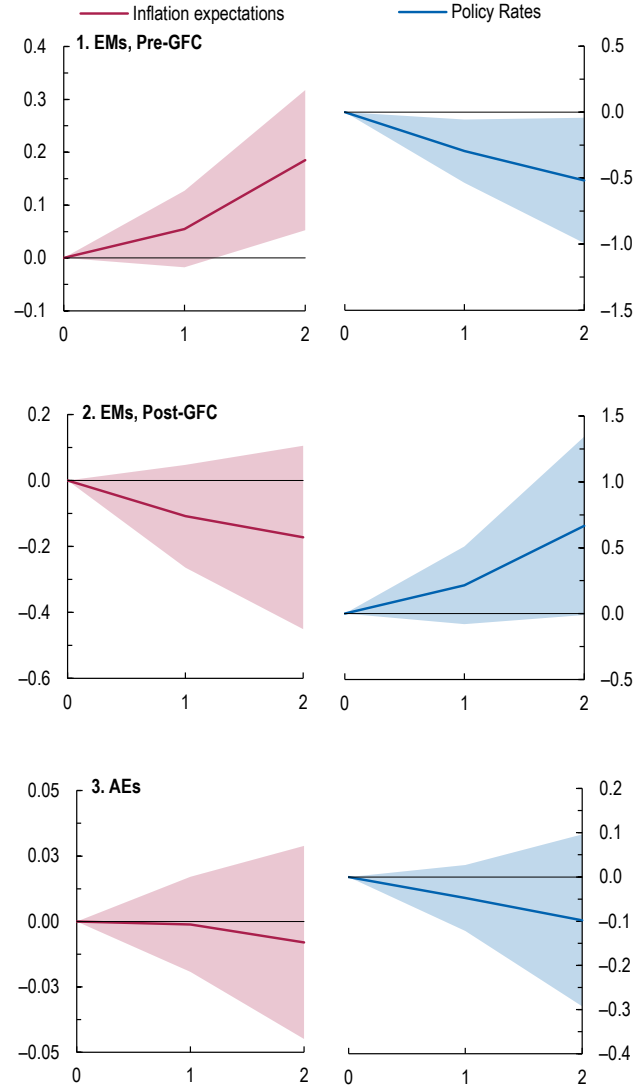
The results are plotted in Figure 2.4.1 in the main text and are also reported in Online Annex Table 2.3.1. As discussed in the main text, in the post-GFC period policymakers have become less concerned about exchange rate fluctuations. At the same time, the weight associated with deviations of inflation expectations from the target has declined and central banks have shifted their attention to curbing output fluctuations.

Markets' perceptions of monetary policy reaction function. Following Bauer, Pflueger, and Sunderam (2024), the analysis estimates the Taylor rule coefficients from a specification for the perceived monetary policy reaction function using forecaster-country level data. Specifically, for each forecast year, the analysis estimates the following equation:

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

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

Online Annex Figure 2.3.1. Responses of Inflation Expectations and Policy Rates to Fiscal Spending Shocks
(Percent; Years since the fiscal spending shock on the x-axis)



Sources: Consensus Economics; Haver Analytics; and IMF staff calculations.
Note: The figure shows the responses of five-year ahead inflation expectations and policy rates to a one percent increase in government primary expenditures estimated with a SVAR system including log GDP, exchange rate depreciation, policy rates, five-year ahead inflation expectations, and log government primary expenditures. Shaded areas denote 90 percent confidence intervals. AEs = advanced economies; EMs = emerging markets; GFC = global financial crisis; SVAR = structural vector autoregression.

GDP forecast, and η^j denotes forecaster fixed effects.⁷ 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 are plotted in Figure 2.4.2 of the main text and also reported in Online Annex Table 2.3.2. The coefficients reveal a progressive decline of the weight associated with expected inflation over time, and a marginal increase of the weight on output gap, pointing to gains in monetary policy credibility.

Online Annex Table 2.3.1. Estimates of Actual Monetary Policy Reaction Function

	EMs		AEs
	Pre-GFC	Post-GFC	
	(1)	(2)	(3)
Inflation Gap	2.251*** (0.806)	1.279*** (0.401)	1.383*** (0.358)
Output Gap	-0.104 (0.626)	0.487** (0.213)	0.269* (0.149)
NEER Appreciation	-0.514*** (0.121)	-0.247** (0.109)	0.220*** (0.051)
Observations	3,455	3,455	2,709
R^2	0.993	0.993	0.996

Sources: Consensus Economics; Haver Analytics; and IMF staff calculations.

Note: This table reports the Taylor rule coefficients from a regression of the policy rate on its lag, the deviation of the one-year ahead inflation expectations from the target, the real-time output gap, the NEER appreciation, and country and time fixed effects. The pre-GFC period is 1997–2009, and the post-GFC period is 2010–24. Standard errors are double clustered at the country and month level and reported in parentheses. AEs = advanced economies; EMs = emerging markets; GFC = global financial crisis; NEER = nominal effective exchange rate.

*** p<0.01; ** p<0.05; * p<0.1.

⁷ The dependent and the independent variables used in the estimation of the perceived reaction function are not the same as the ones used in the estimation of the actual reaction function, reflecting the information elicited in the Consensus Economics surveys. The Taylor rule coefficients are obtained by dividing the short-run coefficient by $(1 - \rho)$.

Online Annex Table 2.3.2. 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

Sources: Consensus Economics; Haver Analytics; and IMF staff calculations.

Note: The table reports the Taylor rule coefficients from regressions of the one-year ahead forecast of the three-month saving rate on next year inflation expectations, next year real GDP growth forecast, and forecaster fixed effects; the results are reported for years with the one-year ahead forecast of the three-month saving rate on next year inflation expectations, next year real GDP growth forecast, and at least 1,000 observations. The sample excludes EMs with fixed exchange rate regimes, Argentina, Türkiye, and Ukraine. Standard errors clustered at the country and year level. EMs = emerging markets.

*** p<0.01; ** p<0.05; * p<0.1.

Fiscal dominance. To assess the extent to which fiscal dominance continues to pose challenges to central bank independence in emerging markets, the analysis examines the response of policy rates and long-run inflation expectations in the year after an unexpected increase in military spending, comparing the pre-GFC to the post-GFC period:

$$Y_{i,t+h} = \beta FiscalShock_{i,t-1} + \gamma FiscalShock_{i,t-1} POST_t + \gamma X_{i,t-1} + \alpha_i + \tau_t + \epsilon_{i,t},$$

where $Y_{i,t+h}$ is either the two-year ahead inflation expectation or the next year policy rate of country i ; $FiscalShock_{i,t-1}$ is measured as military spending growth; $POST_t$ is a dummy variable equal to one for the period from 2010 onwards; $X_{i,t-1}$ 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. The model includes country fixed effects α_i and year fixed effects τ_t . Standard errors are clustered at the country and year level.

The results are reported in Figure 2.5.1 of the main text and in Online Annex Table 2.3.3. The findings are suggestive of fiscal dominance in the pre-GFC period, when spending increases were followed by monetary easing and higher inflation expectations. Contrary to the pre-GFC period, in the post-GFC one central banks increased policy rates, leaving long-run inflation expectations close to target, similar to central banks in advanced economies.

CHAPTER 2 EMERGING MARKETS' RESILIENCE: GOOD LUCK OR GOOD POLICIES?

Online Annex Table 2.3.3. Responses of Inflation Expectations and Policy Rates to Fiscal Spending Shocks

	EMs		AEs	
	Expected Inflation	Policy Rates	Expected Inflation	Policy Rates
	(1)	(2)	(3)	(4)
Fiscal Spending Shock	0.024** (0.010)	-0.099** (0.041)	0.001 (0.001)	0.003 (0.004)
Fiscal Spending Shock x Post-GFC	-0.028* (0.014)	0.124** (0.050)		
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	468	438	610	615
Adjusted R^2	0.849	0.833	0.800	0.924

Sources: Consensus Economics; Haver Analytics; SIPRI Military Expenditure Database; and IMF staff calculations.

Note: The table reports the coefficients of regressions of two-year ahead inflation expectations and next year's policy rates on previous year's military spending growth, controlling 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. AEs = advanced economies; EMs = emerging markets; GFC = global financial crisis.

*** p<0.01; ** p<0.05; * p<0.1.

The analysis alternatively employs a structural vector autoregression approach (SVAR). Specifically, it estimates the following system of equations:

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

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 a given country i and year t ; C_k is a matrix of the lagged coefficients with $k = 3$ years; matrix B is diagonal, so that $u_{i,t}$ 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 identification strategy follows Blanchard and Perotti (2002) and Ilzetzi, Mendoza, and Végh (2013). This is based on a Cholesky decomposition, which assumes a lagged response of government primary expenditure to other macroeconomic variables. The ordering of the variables is as follows: log GDP, exchange depreciation, policy rates, five-year ahead inflation expectations, and log government primary expenditure.

Online Annex Figure 2.3.1 shows the responses of inflation expectations and policy rates to a one percent increase in primary expenditure. The results indicate that in the pre-GFC period monetary policy was eased in response to spending increases, and expected inflation increased, pointing to fiscal dominance. In the post-GFC 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-GFC dynamics resemble those of advanced economies.

Monetary policy autonomy. Following Grigoli and others (forthcoming), the analysis assesses how U.S. and domestic monetary policy shocks affect emerging markets' financial

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markets—including government bond yields, stock prices, spreads, and exchange rates—the day following a policy announcement:

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

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

The results are plotted in Figure 2.5.2 of the main text and reported in Online Annex Table 2.3.4. The results indicate 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, while US monetary policy shocks show a considerably smaller pass-through. However, the effects on the 10-year yields—where risk premia 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.⁸

Online Annex table 2.3.4. Responses of Government Bond Yields, Stock Prices, Exchange Rates, and EMBI Spreads to Monetary Policy Shocks

	Government Bond Yields		Stock Price	Nominal Exchange Rate	EMBI Spread
	3 month	10 year			
	(1)	(2)	(3)	(4)	(5)
Domestic Monetary Policy Shock	0.104*** (0.031)	0.028*** (0.008)	-0.090** (0.037)	-0.066* (0.038)	0.122 (0.116)
US Monetary Policy Shock	0.024 (0.017)	0.021*** (0.006)	-0.244*** (0.047)	0.148*** (0.030)	0.569*** (0.139)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	2,610	4,063	5,845	6,131	5,261
Adjusted R^2	0.014	0.014	0.008	0.010	0.003

Sources: Bloomberg; Checo, Grigoli, and Sandri 2024; and IMF staff calculations.

Note: The table reports the responses of government bond yields, nominal exchange rates, stock prices, and EMBI spreads to a one standard deviation domestic and US monetary policy shocks, one day after the shock, controlling for country fixed effects. Domestic monetary policy shocks are identified as in Checo, Grigoli, and Sandri (2024) and US monetary policy shocks are identified as in Bauer and Swanson (2023). The sample varies by country according to data availability for domestic monetary policy shocks, which in most cases covers only the post-GFC period. Robust standard errors are reported in parentheses. EMBI = emerging markets bond index; GFC = global financial crisis.

*** p<0.01; ** p<0.05; * p<0.1.

Online Annex 2.4. FX interventions

Economies with better anchored inflation expectations or tighter FX macroprudential regulation may allow UIP deviations caused by risk-off shocks to run their course rather than

⁸ The results are robust to including lags of the dependent variable.

leaning against them. To test this hypothesis, the analysis estimates the following local projections:

$$FXI_{i,t+h} = \beta^h \widehat{UIP}_{i,t} + \delta^h \widehat{UIP}_{i,t} \times PF_i + \sum_{j=1}^J \gamma_j^h X_{i,t-j} + \alpha_i^h + \tau_t^h + \varepsilon_{i,t}^h,$$

where $FXI_{i,t+h}$ denotes the cumulative FX interventions (i.e., net sales of FX) relative to GDP of country i measured h months after time t ; α_i^h denotes country fixed effects and τ_t^h is month fixed effects; $\widehat{UIP}_{i,t}$ denotes the 12-month uncovered interest parity (UIP) deviations, instrumented by $RORO_t$; $X_{i,t}$ is a vector of controls, which includes 12 lags of inflation, exchange rate against the dollar, UIP deviation, and FX interventions; PF_i is a proxy for the quality of policy framework of country i . To measure the quality of the policy framework, the analysis relies on the inflation expectation anchoring index of Bems and others (2021) averaged at the country level to mitigate endogeneity concerns, as well as the cumulative net tightening of macroprudential regulation (including FX exposure related capital requirements, loan and other position restrictions) as of the previous month, similar to Bergant and others (2024). The

Online Annex Table 2.4.1. Use of FX Interventions in Response to UIP Deviations

	(1)	(2)
Inflation Expectations Anchoring x UIP	-1.214*** (0.376)	
Macroprudential Net Tightening x UIP		-0.353*** (0.127)
Country Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
Observations	2,032	2,379
Adjusted R^2	-0.143	-0.128

Sources: Bems and others 2021; Bloomberg; FX Intervention Dataset (Adler and others 2024); Haver Analytics; IMF, Integrated Macprudential Policy Database; J.P. Morgan; and IMF staff calculations.

Note: The table reports the responses of cumulative FX interventions (measured as net sales) 12 months after a one percentage point increase in the UIP deviation instrumented with the RORO Index, conditional on inflation expectations anchoring or the stringency of macroprudential regulation. The regressions control for lagged inflation, nominal exchange rate vis-à-vis the USD, UIP deviations, FX interventions, capital flow management measures, and country and time fixed effects. The inflation expectations anchoring index is measured as in Bems and others (2021). The stringency of macroprudential regulation is measured as the net cumulative tightening in FX-related capital requirements, loan, and other position restrictions. Standard errors are clustered at the month level and reported in parentheses. FX = foreign exchange; RORO Index = Risk-On Risk-Off Index; UIP = uncovered interest rate parity.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

regressions are estimated using country-month panel data.

The results are reported in Figure 2.6 of the main text and Online Annex Table 2.4.1. The findings indicate that emerging markets with well-anchored inflation expectations intervene less in FX markets in response to UIP deviations triggered by risk-off episodes. Similarly, emerging markets with strong policy frameworks are more likely to allow deviations from UIP to play out rather than counteracting them through foreign currency sales.

⁹ For illustration, the Online Annex presents FX interventions as net sales of foreign exchange, while the main text presents it as net purchases.

Online Annex 2.5. Fiscal Policy Frameworks

The chapter focuses on the credibility, cyclical, and responsiveness to debt sustainability pressures of fiscal policies.

Fiscal policy credibility. To assess the anchoring of private sector expectations of the fiscal balance, the analysis regresses these on official projections of the same fiscal balance (see also the October 2021 Fiscal Monitor; End and Hong 2022; End 2023):

$$E_{Apr,t}^{private} fb_{i,t} = \beta E_{Apr,t}^{official} fb_{i,t} + \alpha_i + \epsilon_{i,t},$$

where $E_{Apr,t}^{private} fb_{i,t}$ is the private sector forecast of the fiscal balance of country i for year t , as of April of the same year; $E_{Apr,t}^{official} fb_{i,t}$ is the corresponding official forecast, also as of April; and α_i denotes country fixed effects. Thus, β captures the elasticity of private sector forecasts to official forecasts.

The analysis uses a similar regression to study the extent of anchoring of planned fiscal adjustments:

$$E_{Apr,t}^{private} \Delta fb_{i,t+1} = \alpha_i + \beta E_{Apr,t}^{official} \Delta fb_{i,t+1} + \epsilon_{i,t},$$

where $\Delta fb_{i,t+1}$ is the change in the fiscal balance between the current year and the next year. The analysis is restricted to observations with planned fiscal tightening (i.e., $\Delta fb_{i,t+1} > 0$). Online Annex Table 2.5.1 contains the regression outputs, which correspond to Figure 2.7.2 of the main text.

Fiscal policy cyclical. To assess changes in the cyclical of fiscal policy, the analysis computes the correlation between changes in primary government expenditures to GDP and changes in the output gap, both for the pre-GFC period and the post-GFC period, and reports the results in Figure 2.8 of the main text. The improvements in countercyclical are also corroborated in a regression framework:

$$\Delta px_{i,t} = \beta \Delta y_{i,t} + \gamma POST_t + \delta \Delta y_{i,t} \times POST_t + \eta d_{i,t-1} + \alpha_i + \epsilon_{i,t},$$

where $\Delta px_{i,t}$ is the change in primary government expenditures to GDP, $\Delta y_{i,t}$ is the change in the output gap, $POST_t$ is a dummy variable equal to one for the period from 2010 onwards, and α_i denotes country fixed effects. The analysis controls for debt sustainability pressures using the lagged public debt to GDP ratio $d_{i,t-1}$. Online Annex Table 2.5.2 reports the results. Improvements in countercyclical are most pronounced in the years following risk-off events and are present in both commodity importers and commodity exporters.

CHAPTER 2 EMERGING MARKETS' RESILIENCE: GOOD LUCK OR GOOD POLICIES?

Online Annex Table 2.5.1. Anchoring of Fiscal Expectations

	Current Year Forecast, Private			Planned Adjustment, Private		
	EMs		AEs	EMs		AEs
	Pre-GFC	Post-GFC		Pre-GFC	Post-GFC	
	(1)	(2)	(3)	(4)	(5)	(6)
Current Year Forecast, Official	0.669*** (0.072)	0.825*** (0.076)	0.788*** (0.036)			
Planned Adjustment, Official				0.389*** (0.032)	0.694*** (0.063)	0.566*** (0.056)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	122	211	431	99	174	335
R ²	0.896	0.782	0.918	0.665	0.446	0.586

Sources: Consensus Economics; IMF, *World Economic Outlook*; and IMF staff calculations.

Note: The table reports the coefficients of a regression of private sector forecasts on official forecasts, controlling for country fixed effects. Current year forecasts refer to the current year budget balance and planned adjustment refers to the expected change in the budget balance between the current year and next year, both submitted in April. Planned adjustments are restricted to observations with a planned fiscal tightening (i.e., $\Delta fb_{i,t+1} > 0$). Robust standard errors in parentheses. AEs = advanced economies; EMs = emerging markets; GFC = global financial crisis.

*** p<0.01; ** p<0.05; * p<0.1.

Online Annex Table 2.5.2. Cyclicity of Fiscal Policy

	EMs					AEs
	All	Crisis Years	Non-Crisis Years	Commodity Importers	Commodity Exporters	
	(1)	(2)	(3)	(4)	(5)	
Change in Output Gap	-0.087 (0.054)	-0.106 (0.067)	0.136* (0.081)	-0.06 (0.059)	-0.123 (0.098)	-0.461*** (0.038)
Change in Output Gap x Post-GFC	-0.242*** (0.074)	-0.357*** (0.094)	-0.278** (0.111)	-0.312*** (0.082)	-0.160 (0.129)	-0.245*** (0.089)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	625	312	313	370	255	825
R ²	0.143	0.235	0.141	0.157	0.147	0.352

Sources: IMF, *World Economic Outlook*; World Bank, Cross-Country Database of Fiscal Space; and IMF staff calculations.

Note: The table reports the coefficients of a regression of the change in the primary government expenditures to GDP ratio on the change in the output gap, controlling for country fixed effects and the lagged public debt to GDP ratio. Crisis years are defined as years following a risk-off episode. Robust standard errors in parentheses. AEs = advanced economies; EMs = emerging markets; GFC = global financial crisis.

*** p<0.01; ** p<0.05; * p<0.1.

Fiscal reaction function. To assess changes in the responsiveness of fiscal policy to debt sustainability pressures, the analysis estimates fiscal reaction functions following Bohn (1998), Mendoza and Ostry (2008), and Mauro et al. (2015). The first version of the fiscal reaction function is estimated as:

$$pb_{i,t} = \beta z_{i,t-1} + \gamma POST_t + \delta POST_t \times z_{i,t-1} + \eta_y y_{i,t} + \eta_u u_{i,t} + \alpha_i + \tau_t + \epsilon_{i,t},$$

where $pb_{i,t}$ is the primary balance to GDP ratio and $z_{i,t-1}$ is the lagged public debt to GDP or the lagged interest bill to GDP; $POST_t$ is a dummy variable equal to one for the period from 2010 onwards; $y_{i,t}$ and $u_{i,t}$ are the output gap and unemployment rate, which control for the

Online Annex Table 2.5.3. Fiscal Reaction Functions

	EMs		AEs	EMs		AEs
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged Public Debt	0.043*** (0.010)	0.031** (0.013)	0.036*** (0.006)			
Lagged Public Debt x Post-GFC	0.028** (0.011)					
Lagged Public Debt x Fiscal Rule		0.034*** (0.013)				
Interest Bill				0.499*** (0.091)	0.417*** (0.159)	0.774*** (0.118)
Interest Bill x Post-GFC				0.478*** (0.124)		
Interest Bill x Fiscal Rule					0.487*** (0.173)	
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	588	422	835	612	438	835
R^2	0.566	0.533	0.629	0.576	0.534	0.633

Sources: IMF, *World Economic Outlook*; World Bank, Cross-Country Database of Fiscal Space; and IMF staff calculations.

Note: The table reports the coefficients for a regression of the primary balance to GDP ratio on the lagged interest bill (interest expenses to GDP ratio) and the lagged public debt to GDP ratio, controlling for the output gap, the unemployment rate, and country and time fixed effects. Robust standard errors in parentheses. AEs = advanced economies; EMs = emerging markets; GFC = global financial crisis.

*** p<0.01; ** p<0.05; * p<0.1.

business cycle like in Bohn (1998); and α_i and τ_t are country and time fixed effects. The analysis also estimates fiscal reaction functions for countries with and without fiscal rules:

$$pb_{i,t} = \beta z_{i,t-1} + \gamma FR_{i,t} + \delta FR_{i,t} \times z_{i,t-1} + \eta_y y_{i,t} + \eta_u u_{i,t} + \alpha_i + \tau_t + \epsilon_{i,t},$$

where $FR_{i,t}$ is a dummy variable which equals one if a country has a fiscal rule in place. Online Annex Table 2.5.3 reports the results of the estimations. Columns (1), (3), (4) and (6) correspond to Figure 2.9.1 in the main text. Columns (2) and (5) show that emerging markets with fiscal rules have more aggressive reaction functions.

Sensitivity of sovereign spreads to debt burdens. To assess changes in the sensitivity of sovereign spreads to debt burdens, the analysis estimates:

$$s_{i,t} = \beta z_{i,t} + \gamma POST_t + \delta POST_t \times z_{i,t} + \eta_y y_{i,t} + \eta_u u_{i,t} + \alpha_i + \epsilon_{i,t},$$

where $s_{i,t}$ is the log of the average sovereign spread for country i during year t ; $z_{i,t}$ denotes the public debt to GDP ratio or the external debt to exports ratio; and $POST_t$ is a dummy variable equal to one for the period from 2010 onwards. The specification controls for the output gap $y_{i,t}$ and the unemployment rate $u_{i,t}$, and includes country fixed effects α_i . Online Annex Table 2.5.4 reports the regression output, which corresponds to Figure 2.9.2 of the main text.

Fiscal consolidation speed. The analysis computes the time implied by the estimated fiscal reaction functions required to reduce half of the increase in public debt to GDP after an unexpected shock to the stock of public debt. Figure 2.9.3 in the main text plots the results of an

illustrative simulation using coefficients from the estimated reaction function for debt. The exercise assumes a stable initial public debt ratio $\bar{d}$ coupled with a shock that sends debt higher in a single year. The simulation assumes a low interest-growth differential $r - g$ of zero percent and a high interest-growth differential of 2 percent. The path of debt is simulated by treating the estimated fiscal reaction function of the primary balance to the lagged public debt ratio as a differential equation. Specifically, the simulation uses:

$$d_t - \bar{d} = (d_{t-1} - \bar{d})(1 + (r - g) - \hat{\beta}),$$

where $\hat{\beta}$ is the estimated coefficient on the lagged debt ratio. The simulation sets $d_0 = \bar{d}$ and $d_1 = d_0 + \epsilon$, where ϵ is a positive shock to debt. The implied half-lives do not depend on the levels of $\bar{d}$ or ϵ .

Online Annex Table 2.5.4. Sensitivity of Spreads to Debt Burdens

	(1)	(2)
Public Debt	0.019*** (0.002)	
Public Debt x Post-GFC	-0.005* (0.003)	
External Debt		0.004*** (0.000)
External Debt x Post-GFC		-0.001** (0.001)
Country Fixed Effects	Yes	Yes
Observations	516	528
R^2	0.671	0.646

Sources: IMF, *World Economic Outlook*; J.P. Morgan; and IMF staff calculations.
Note: The table reports the coefficients of a regression of the log of sovereign EMBI spreads on the public debt to GDP ratio or external debt to exports ratio, controlling for the output gap, the unemployment rate, and country fixed effects. Robust standard errors in parentheses. EMBI = emerging markets bond index; GFC = global financial crisis.
*** p<0.01; ** p<0.05; * p<0.1.

Online Annex 2.6. Drivers of EM Resilience

The analysis uses a regression framework to estimate emerging market resilience in the months following the start of a risk-off episode. First, it estimates the predicted change in real GDP growth and inflation during risk-off episodes for a country moving from the 25th to the 75th percentile of the distribution of a set of policy variables using:

$$y_{i,\tau+12} - y_{i,\tau-1} = \sum_{k=1}^K \beta^k P_{i,\tau-1}^k + \sum_{j=1}^J \gamma_j \Delta X_{i,\tau-j} + \alpha_\tau + \epsilon_{i,\tau},$$

where $y_{i,\tau+12} - y_{i,\tau-1}$ is the cumulative change in the log real GDP or log CPI 12 months after the start of risk-off episode τ ; $P_{i,\tau-1}^k$ is a set of seven pre-determined policy variables, indexed using k , during the year before the start of the risk-off episode (anchoring of inflation expectations, reserve adequacy, FX mismatches, macroprudential regulations, external debt burden, and the cyclically-adjusted fiscal balance, and net tightening of capital flow management measures); $\Delta X_{i,\tau-j}$ denotes six lags of the changes in log real GDP and log CPI to control for pre-trends; and α_τ denotes episode fixed effects which ensure that the exercise compares the

Online Annex Table 2.6.1. Policy Determinants of Resilience

	Real GDP Growth						Consumer Price Inflation					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Anchoring of Inflation Expectations	0.001 (0.005)						-0.023** (0.009)					
Reserve Adequacy		0.006** (0.003)						-0.005 (0.004)				
FX Mismatches			-0.009*** (0.003)						0.009** (0.005)			
Macroprudential Policy				0.005* (0.003)						-0.005** (0.003)		
External Debt Burden					-0.008*** (0.002)						0.011*** (0.004)	
Cyclically-adjusted Balance						0.004 (0.002)						-0.006* (0.003)
Episode Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	273	347	270	378	378	344	273	347	270	378	378	344
R ²	0.377	0.403	0.404	0.362	0.380	0.360	0.632	0.64	0.658	0.56	0.568	0.603

Sources: Allen & Juvenal 2025; Consensus Economics; Haver Analytics; IMF, Integrated Macprudential Policy Database; IMF, *World Economic Outlook*; World Bank, Cross-Country Database of Fiscal Space; and IMF staff calculations.

Note: The table reports coefficients of regressions of the 12-month change in log real GDP and log CPI following the start of a risk-off episode on pre-determined policy variables, controlling for past real GDP growth and inflation and episode fixed effects. Robust standard errors in parentheses. CPI = consumer price index; FX = foreign exchange.

*** p<0.01; ** p<0.05; * p<0.1.

resilience of emerging markets with varying quality of policy frameworks during the same risk-off episodes.¹⁰

Policy determinants. Online Annex Table 2.6.1 reports the regression output when including the policy variables one by one, expressed in standard deviations. For Figure 2.10.1 in the main text, the coefficients and standard errors are scaled such that the coefficients correspond to the predicted difference in the outcome variable for

Online Annex Table 2.6.2. External Conditions

	Real GDP Growth	Consumer Price Inflation
	(1)	(2)
Real GDP Growth, AEs	0.010 (0.006)	0.020** (0.007)
Commodity Terms of Trade	0.016* (0.009)	0.021* (0.010)
Financial Conditions Impulse on Growth (FCI-G)	-0.002 (0.009)	0.033*** (0.010)
Observations	16	16
R ²	0.488	0.539

Sources: Allen & Juvenal 2025; Consensus Economics; Gruss and Kebhaj 2019; Haver Analytics; IMF, Integrated Macprudential Policy Database; IMF, *World Economic Outlook*; World Bank, Cross-Country Database of Fiscal Space; and IMF staff calculations.

Note: The table reports the coefficients of regressions of the common component of the change in log real GDP or log CPI 12 months after the start of a risk-off episode on the 12-month change in real GDP growth in advanced economies relative to trend, commodity terms-of-trade shocks, and US financial conditions. Robust standard errors in parentheses. AEs = advanced economies; CPI = consumer price index;

*** p<0.01; ** p<0.05; * p<0.1.

¹⁰ The specification abstracts from potential interactions across policy frameworks. Also, stronger policy frameworks may be correlated with other unobserved country characteristics that evolve over time.

observations at the 75th and 25th percentile of the sample.

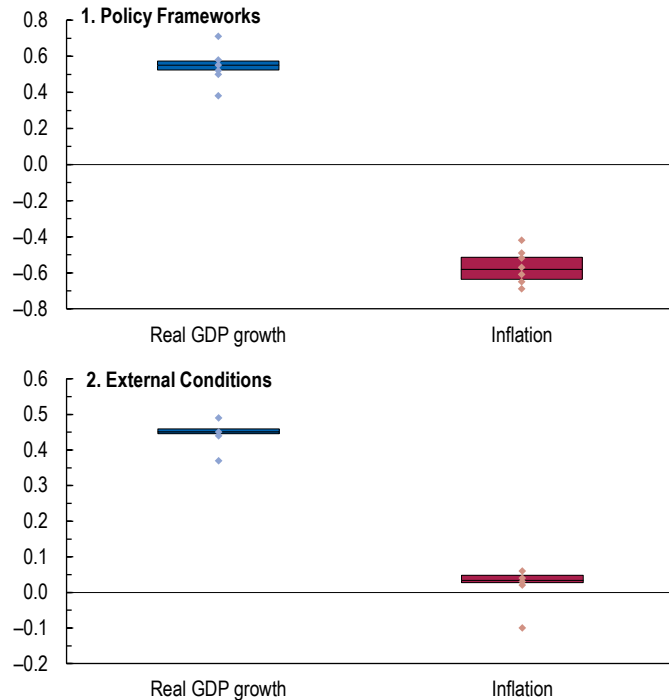
Contributions. The contributions of policy frameworks are computed as $\sum_{k=1}^K \hat{\beta}^k \Delta \bar{P}_{i,\tau}^k$ for the policy variables that are significant in the first stage, where $\Delta \bar{P}_{i,\tau-1}^k$ is the mean of the median value of policy variable k during the post-GFC episodes relative to the pre-GFC episodes.¹¹ The analysis estimates the contributions from external conditions using:

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

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 after extracting the contribution of policy frameworks; and G_τ^m is a set of three variables, indexed using 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, commodity terms-of-trade shocks, and US financial conditions. All variables are expressed in cumulative changes during the 12 months following the start of the risk-off episode. Online Annex Table 2.6.2 reports the results of the estimations. The contribution of external condition is computed as $\sum_{m=1}^M \hat{\beta}^m G_\tau^m$.

Robustness. To check robustness to individual risk-off episodes, the analysis estimates the sensitivity of growth and inflation performance to pre-determined policy variables including the taper tantrum episode (starting in June 2013) and then dropping one episode at the time. The newly estimated coefficients are then used to compute the

Online Annex Figure 2.6.1. Contributions of Policy Frameworks and External Conditions after Excluding Individual Risk-off Episodes and Including the Taper Tantrum (Percent)



Sources: Allen and Juvenal 2025; Consensus Economics; Haver Analytics; IMF, Integrated Macprudential Policy Database; IMF, *World Economic Outlook*; World Bank, Cross-Country Database of Fiscal Space; and IMF staff calculations.

Note: The figure reports the distribution of the estimated contributions of policy frameworks and external conditions to real GDP growth and inflation during risk-off episodes for the median emerging market in the sample. The dots denote estimates excluding one episode at the time. The boxes denote the interquartile range, and the horizontal lines denote medians. Variables proxying for external conditions include real GDP growth in advanced economies, commodity terms-of-trade shocks, and Financial Conditions Impulse on Growth (FCI-G) index.

¹¹ Missing observations for the policy variables are imputed using the median values during a specific risk-off episode.

contributions of policy frameworks as $\sum_{k=1}^K \hat{\beta}^k \Delta \bar{P}_{i,\tau-1}^k$. Similarly, the contributions from external conditions are re-estimated. Online Annex Figure 2.6.1 shows the distribution of these estimates, corroborating the baseline results.

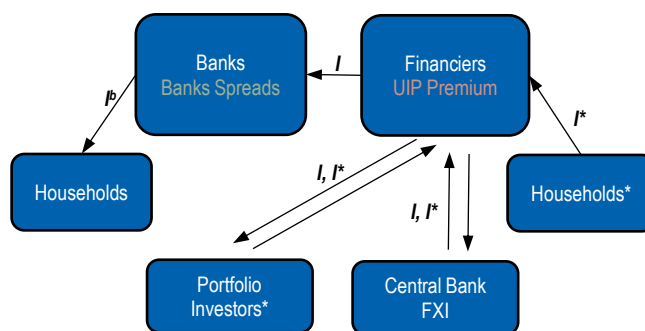
Online Annex 2.7. The Q-IPF Model

Model description

The Quantitative Integrated Policy Framework (Q-IPF) model extends the two-country New Keynesian workhorse by considering jointly the role of monetary, FX, and macroprudential policies in small open economies, while accounting explicitly for real and nominal rigidities and imperfections in financial markets that generate inefficient fluctuations in risk premia, persistent pass-through from exchange rate to domestic inflation, and sudden stops due to occasionally binding external debt limit.

The structure of financial intermediation in our model is summarized in Online Annex Figure 2.7.1, which shows how funds flow from foreign to domestic households and financial conditions are affected by international capital flows (i.e. portfolio investors) and the central bank. The grey asterisks next to Financiers and Portfolio Investors highlight that these entities may be co-owned by domestic and foreign households, where the ownership structure determines who ends up bearing exchange rate risk. A brief description of the structure of the Q-IPF model is provided below. More details are available in Basu and others (Forthcoming), Basu and Gopinath (2024), Adrian and others (2020, 2021), and Adrian, Gaspar, and Vitek (2022).

Online Annex Figure 2.7.1. Financial Market Structure



Source: Adrian and others 2020, 2021, and 2022; IMF staff compilation.
Note: FXI = foreign exchange intervention; UIP = uncovered interest parity.

Households provide labor, derive utility from consumption and leisure, and are rationally forward looking.

Households can trade in bonds issued in local currency paying risk-free nominal interest I^b . Labor supplied by individual households is differentiated with a constant elasticity of substitution between individuals, and the aggregate labor supply is given by the Dixit and Stiglitz (1977) formula. Wages are set by households in a staggered Calvo style. Each period household h faces a fixed probability of being able to reoptimize its wage, while the remaining fraction of households mechanically indexes its wages based on past wage, past inflation, and steady state inflation. The model is modified to allow for endogenous inflation expectations de-anchoring.

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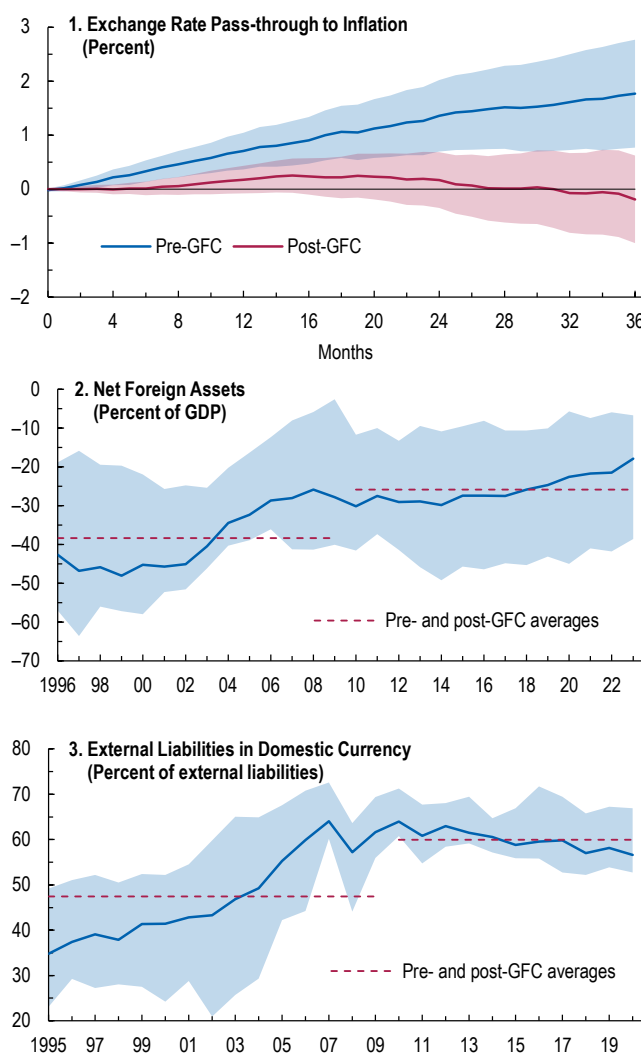
Specifically, the degree of inflation expectation anchoring depends inversely on the extent to which inflation deviates from its target.¹²

Financiers intermediate cross-border borrowing and currency conversion by actively trading the FX markets and absorbing a portion of currency risk originated from imbalanced global capital flows. Financiers hold symmetric nominal positions in domestic bonds with a yield I and in foreign bonds with a yield I^* to maximize the present value of their profits. Financiers have a finite risk-bearing capacity. An increase in global imbalances requiring financiers to raise their bond holdings has to be associated with a contemporaneous depreciation and a UIP risk premium to compensate them for their greater risk exposure. The sensitivity of UIP premium to fluctuations in the capital flows is governed by FX market depth. Home households own a fraction of financiers.

Banks transfer funds in domestic currency between financiers and households and subject to a borrowing constraint proportional to the nominal size of the economy. When the debt limit is reached, there is a positive credit spread of domestic bond yield I over domestic risk-free interest I^b . Banks are entirely held by domestic households.

Portfolio investors take positions in bonds denominated in the home country's currency, financed by issuing foreign currency bonds of the same value. Stochastic variations in the corresponding transactions are

Online Annex Figure 2.7.2. Model Calibration



Sources: Allen and Juvenal 2025; Bloomberg; Consensus Economics; Haver Analytics; External Wealth of Nations Dataset; Federal Reserve Bank of San Francisco; IMF, *World Economic Outlook*; J.P. Morgan; and IMF staff calculations. Note: The exchange rate pass-through 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, 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. Shaded areas denote 90 percent confidence intervals in panel 1 and the range between 25th and 75th percentiles in panels 2 and 3. The pre-GFC period is 1997–2009, and the post-GFC period is 2010–24. The shaded areas denote 90 percent confidence intervals. Net foreign assets are in percent of GDP. GFC = global financial crisis.

¹² This mechanism is similar to the one employed in Erceg, Lindé, and Trabandt (2024). In the chapter, it is modified to include a “ratchet effect” on indexation (that is, quick to rise and slow to fall). The purpose of this modification is to create a dynamic trade-off for “wait-and-see” type policies.

interpreted as exogenous capital flows driven by global risk-off shocks. Domestic households own a fraction of portfolio investors.

Firms and price-settings. Both final domestic output goods and final export goods are produced by perfectly competitive firms using a continuum of differentiated intermediate goods as specified in Kimball (1995). Intermediate goods are produced by monopolistically competitive firms according to a Cobb-Douglas production function. Intermediate goods' producing firms set prices in staggered, Calvo-style contracts with a constant probability of being able to reoptimize the price it charges on the domestic market. Firms which do not reoptimize mechanically index their price according to past prices, past domestic PPI inflation, and steady-state domestic PPI inflation. Export prices are set in the currency of destination market (local currency price) and in a similar Calvo-style. Non-optimizing firms are assumed to index their price according to past export prices, past export inflation, and steady-state export inflation.

Monetary policy. The benchmark model specification comprises a standard Taylor rule for the short-term interest rate I . The central bank minimizes deviations of inflation from the target, as well as deviations of output from its potential level. The central bank can also engage in sterilized FX interventions by taking non-negative positions in foreign bonds and issuing domestic (sterilization) bonds. The financial outcome of FX interventions is fully borne by the fiscal authority.

Fiscal policy. The aggregate public consumption is assumed to be exogenous and comprised of both domestically and foreign produced goods. The government keeps its budget balanced using lump sum taxes levied on households.

Market clearing includes 1) the domestically produced intermediate and final goods, 2) the domestic labor and capital markets, 3) the financial market where positions taken by financiers must match net demand for foreign currency, which implies that domestic bond holdings by financier, home households, and portfolio investors equals to sterilization bonds issued by the monetary authority when it engages in FX interventions.

FX mismatches. The fraction of financiers owned by home households effectively controls the currency denomination of net foreign liabilities and jointly determines the degree of FX mismatches in the economy with the fraction of portfolio investors owned by home households.

Calibration

The Q-IPF model is calibrated to two small open emerging markets: i) the average emerging market in the pre-GFC period, and ii) the average emerging market in the post-GFC period. These economies differ in two key dimensions. The first dimension reflects better anchored inflation expectations as in the post-GFC period. The second dimension reflects smaller balance sheet mismatches observed after the GFC, which in turn are reflected in higher net foreign

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assets and a larger share of external liabilities denominated in domestic currency.¹³ All other parameters are calibrated based on Adrian and others (2021).

Online Annex Table 2.7.1. Exchange Rate Pass-through to Inflation

	$t + 6$	$t + 12$	$t + 24$	$t + 36$
	(1)	(2)	(3)	(4)
FX Depreciation	0.332*** (0.121)	0.704*** (0.206)	1.358*** (0.403)	1.767*** (0.608)
FX Depreciation x Post-GFC	-0.319** (0.144)	-0.529** (0.258)	-1.189** (0.510)	-1.956** (0.787)
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,291	5,171	4,931	4,691
Adjusted R^2	0.662	0.672	0.682	0.720

Sources: Bloomberg; Consensus Economics; Federal Reserve Bank of San Francisco; Haver Analytics; IMF, *World Economic Outlook*; J.P. Morgan; and IMF staff calculations.

Note: 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. Standard errors are clustered by time and reported in parentheses. FX = foreign exchange; GFC = global financial crisis.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Exchange rate pass-through to inflation. Following Adrian and others (2021), the analysis employs an indirect inference procedure, targeting empirical evidence that highlights the differing inflation responses of emerging markets to exogenous exchange rate depreciations in the pre- and post-GFC periods. The exchange rate pass-through to inflation is estimated as illustrated in Annex 2.2. However, in this case $\Delta \hat{e}_{i,t}$ denotes the exchange rate depreciation against the dollar between the day before and the day after scheduled monetary policy announcements by the Federal Reserve board in the US. The results are reported in Online Annex Figure 2.7.2.1 and Online Annex Table 2.7.1. The parameters governing price and wage formation in the model are set to match higher exchange rate pass-through in the pre-GFC emerging market relative to the post-GFC emerging market.

Balance sheet mismatches. The share of portfolio investors assets to GDP and the share of financiers and portfolio investors owned by domestic households are set to be lower in the post-GFC period. These adjustments are made to match empirically observed increases in net foreign assets and the share of external liability in domestic currency (Online Annex Figure 2.7.2.2 and Online Annex Figure 2.7.2.3).

¹³ Ideally, the model could also be calibrated to match changes in the degree of FX market risk-bearing capacity. However, data limitation makes this calibration challenging. Intuitively, increased FX market depth would make responses to a given capital outflow weaker for the average emerging market in the post-GFC period.

The analysis then conducts model simulations to illustrate the policy tradeoffs and the appropriate mix and timing of policy responses in emerging markets with varying quality of policy frameworks. Also, the analysis estimates the frequency of sudden stops with reduced financial frictions using stochastic simulations. Specifically, the model is first calibrated to match selected second moments of a median emerging market, incorporating both risk-off shocks and conventional demand and supply shocks. These shocks are then used to simulate the model under the two alternative calibrations representing emerging markets with weaker and stronger policy frameworks. The external borrowing constraint in the pre-GFC calibration is set such that the economy remains in the constrained regime approximately 3 percent of the time.¹⁴

Online Annex 2.8. Is the cycle still the trend?

The analysis replicates key statistics in Aguiar and Gopinath (2007) that summarize the income process, consumption volatility, and the cyclical nature of the trade balance in emerging markets compared to advanced economies. The results in Online Annex Table 2.8.1 confirm that, prior to the GFC, emerging markets exhibited higher income volatility, more volatile consumption relative to output, and a more counter-cyclical trade balance than advanced economies. In the post-GFC sample, however, income shocks in emerging markets have become less pronounced and the trade balance has become less procyclical. Despite this convergence, differences with advanced economies remain.

Online Annex Table 2.8.1. Key Macroeconomic Statistics in Emerging Markets and Advanced Economies

	EMs		AEs
	Pre-GFC	Post-GFC	
SD(ln Y _t)	2.75	2.01	1.69
SD(Δln Y _t)	1.87	1.37	1.04
SD(ln C _t)	2.71	2.53	1.52
SD(TB _t)	4.33	4.27	3.54
ρ(ln Y _t , ln Y _{t-1})	0.74	0.76	0.80
ρ(Δln Y _t , Δln Y _{t-1})	0.08	-0.08	0.06
SD(ln C _t) / SD(ln Y _t)	1.01	1.25	0.89
ρ(TB _t , ln Y _t)	-0.29	-0.17	-0.06

Sources: IMF, *World Economic Outlook*; and IMF staff calculations.

Note: The table reports key statistics from Aguiar and Gopinath (2007) for the emerging markets in the sample pre-GFC and post-GFC and compares these statistics to advanced economies. The pre-GFC period is 1997–2009, and the post-GFC period is 2010–24. AEs = advanced economies; C = real consumption; EMs = emerging markets; GFC = global financial crisis; SD = standard deviation; TB = trade balance to GDP ratio; Y = real GDP; ρ = correlation.

¹⁴ Simulations are run by keeping the distance between the steady-state external debt and its limit constant across simulations.

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