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Monetary Policy under Fiscal Risk

By Mauricio Villamizar-Villegas, Oscar Valencia, Andres F. Prado and Nicolás Aya*

Fiscal stance and sovereign credibility shape monetary policy transmission even outside fiscal dominance. Using a panel of advanced and emerging economies since the mid-1990s, we show that sovereign-risk regimes differ less by headline debt than by borrowing costs, debt composition, and interest burdens. Elevated sovereign risk weakens the transmission of monetary policy, foreign-exchange intervention, macroprudential tools, and capital-flow measures to prices, exchange rates, and output. A small open-economy model with a fiscal block can rationalize these patterns. Emerging markets operate under tighter fiscal constraints, rely more on multi-instrument configurations, and face a narrower stabilization frontier, including cases in which conventional tightening loses its disinflationary effect.

JEL Classification: E52, E62, F31, F34.
Keywords: monetary policy transmission; sovereign risk; fiscal space; foreign-exchange intervention; macroprudential policy.

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Política monetaria bajo riesgo fiscal

Mauricio Villamizar-Villegas, Oscar Valencia, Andres F. Prado y Nicolás Aya

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Resumen

La posición fiscal y la credibilidad soberana condicionan la transmisión de la política monetaria incluso en ausencia de dominancia fiscal. Utilizando un panel de economías avanzadas y emergentes desde mediados de la década de 1990, mostramos que los regímenes de riesgo soberano difieren menos por los niveles de deuda pública que por los costos de financiamiento, la composición de la deuda y la carga de intereses. Un mayor riesgo soberano debilita la transmisión de la política monetaria, la intervención cambiaria, las medidas macroprudenciales y los controles a los flujos de capital sobre los precios, el tipo de cambio y la actividad económica. Un modelo de economía pequeña y abierta con un bloque fiscal permite racionalizar estos resultados. Las economías emergentes operan bajo restricciones fiscales más estrechas, dependen en mayor medida de combinaciones de instrumentos y enfrentan una frontera de estabilización más limitada, incluyendo episodios en los que un endurecimiento monetario convencional pierde su efecto desinflacionario.

Códigos JEL: E52; E62; F31; F34.

Palabras clave: transmisión de la política monetaria; riesgo soberano; espacio fiscal; intervención cambiaria; política macroprudencial.

"*There is no such thing as an unbalanced federal budget. You're paying for it. If you're not paying for it in the form of explicit taxes, you're paying for it indirectly in the form of inflation or in the form of borrowing.*" –Milton Friedman, remarks on government spending, taxation, and deficits

I. Introduction

Fiscal conditions shape monetary policy even when fiscal dominance is absent. Central banks choose interest rates, foreign-exchange intervention, and macro-financial tools in environments where sovereign risk affects funding costs, exchange-rate expectations, bank balance sheets, and the credibility of stabilization policy. Yet most empirical work treats fiscal space as background: relevant for debt sustainability, but not as a state variable governing the transmission of monetary and financial instruments. We show that fiscal space changes the transmission of the policy instruments themselves.

We study a panel of advanced economies (AEs) and emerging market economies (EMEs) since the mid-1990s and ask whether sovereign risk changes the transmission of three policy instruments: conventional monetary policy (MPR), foreign-exchange intervention (FXI), and macroprudential and capital-flow management measures (MPCFM). The main result is that sovereign risk reduces the stabilization delivered by a given policy tightening. When fiscal space is tight, the same policy action has smaller effects and, in some cases, responses with the opposite sign. These reversals should not be interpreted as an inverse policy prescription. They indicate that adverse fiscal-risk feedbacks can offset or dominate conventional transmission, narrowing what monetary policy can achieve without credible fiscal backing. Our estimates identify conditional responses to policy shocks, not the optimal policy rule.

We proceed in two steps. First, we document that differences in fiscal regimes are driven less by headline debt ratios than by borrowing costs, debt composition, and interest burdens. Debt-to-GDP ratios overlap substantially across AEs and EMEs, but the market price and balance-sheet structure of that debt differ sharply. EMEs face higher sovereign spreads, larger foreign-currency debt shares, higher interest payments relative to revenues, and greater joint exposure to currency, banking, and sovereign stress. These facts motivate our use of sovereign risk, rather than public debt alone, as the conditioning variable in the transmission estimates. Headline debt ratios miss the relevant constraint: what matters for policy transmission is the price, composition, and debt-service burden of public liabilities.

Second, we estimate smooth-transition local projections in which impulse responses vary continuously with sovereign risk, measured by CDS spreads. Under low sovereign stress, tightening shocks have the expected signs: monetary tightening lowers inflation and output, FXI (measured as net U.S. dollar sales) appreciates the domestic currency, and macroprudential and capital-flow measures

restrain financial conditions. Under high sovereign stress, these responses move toward zero and, in some cases, change sign.

The magnitudes are large enough to matter for policy. In AEs under low sovereign stress, a 100 basis point contractionary monetary surprise lowers prices by about 1.7 percent, measured as the cumulative log change in CPI, around quarter 4 and contracts output. Under high stress, the same shock produces essentially no disinflation and no output contraction. In EMEs, baseline monetary transmission is weaker even in tranquil times, and under high stress the inflation response turns positive. FXI shows a similar dependence on fiscal conditions. A USD 1 billion reserve sale appreciates the exchange rate under low stress, but the response is substantially attenuated when sovereign risk is elevated. MPCFM tightening generates more heterogeneous responses, but its stabilizing effects also weaken under stress.

These patterns are consistent with a set of mechanisms that the literature has studied separately, each a different manifestation of a common force through which fiscal space and sovereign risk shape policy transmission. Bringing them into a single framework, conditioned on sovereign risk, is what allows us to see them as facets of the same constraint rather than as isolated channels.

The first mechanisms operate on conventional monetary policy, through the banking sector and through prices. As government borrowing expands, banks may substitute loans for sovereign securities, crowding out credit to firms and households, often those most vulnerable (Gennaioli et al., 2014; Önder et al., 2024). Alongside this quantity channel, a price channel operates through the fiscal theory of the price level, which formalizes how insufficient fiscal backing can be inflationary, so that fiscal slippages ultimately impose costs on households through higher inflation (Woodford, 2001). The two combine into a feedback loop that is central to our results: tighter monetary policy feeds back into debt-service burdens, bank balance sheets, and risk premia, weakening its own transmission. Larger output losses are then required to achieve a given reduction in inflation, consistent with a flatter Phillips curve, and weak fiscal credibility compounds this by eroding the credibility of monetary policy itself and raising the sacrifice ratio further, the logic reflecting the need for credible fiscal backing to control inflation (Sargent et al., 1981).

These forces are amplified where fiscal conditions also shape external adjustment. When current-account deficits rely on portfolio inflows into sovereign bonds rather than on more stable sources such as foreign direct investment, sovereign risk becomes a central driver of external financing conditions. As fiscal positions deteriorate, investors demand higher risk compensation, raising spreads, amplifying capital-flow volatility, and tightening domestic financial conditions; in environments marked by currency mismatches and high exchange-rate pass-through, disinflation becomes more costly (Clark and Kassimatis, 2015). This external margin is also where foreign-exchange intervention operates. Fiscal space and public-sector balance-sheet strength condition both the capacity and the effec-

tiveness of FXI, since sterilized interventions generate quasi-fiscal costs that become increasingly difficult to sustain when public debt and sovereign risk premia are high (Adler and Mano, 2016). Heavily managed exchange-rate regimes can temporarily relax fiscal constraints but tend to amplify vulnerabilities and force sharper adjustments when underlying fiscal weaknesses persist (Daniel, 2001), and recent work emphasizes that FXI interacts with financial stability through public and private balance sheets, reinforcing the link between fiscal capacity and exchange-rate policy effectiveness (Hofmann et al., 2019; Davis et al., 2023; Agénor et al., 2025).

The third set of mechanisms concerns macroprudential and capital-flow management measures, which carry a fiscal footprint of their own. Tools that steer bank portfolios toward government securities or impose binding liquidity requirements can lower sovereign rollover risk and borrowing costs by raising captive demand for public debt, often at the expense of private credit and risk sharing, and operating as a form of financial repression (Reinhart and Sbrancia, 2015). Regulatory and flow-based measures are, moreover, frequently deployed during episodes of fiscal stress or elevated sovereign risk, with effects that depend on public debt levels, liability structures, and fiscal sustainability (Forbes et al., 2015); when fiscal conditions deteriorate, the tightening or persistence of such measures can turn procyclical, constraining credit and amplifying downturns rather than supporting stability.

Our contribution is to estimate all three sets of channels within a common framework and to show that their strength varies systematically and continuously with sovereign risk. We also provide a model-based interpretation. We extend the small open-economy environment of Adrian et al. (2020) with a fiscal block that affects inflation expectations, sovereign risk premia, and monetary pass-through. The model is calibrated separately for AEs and EMEs and is not intended as a full quantitative validation. Its purpose is narrower: to ask whether standard open-economy mechanisms, once augmented with fiscal stress, can generate the qualitative patterns in the data. The model can reproduce weaker transmission under high stress, sharper trade-offs in EMEs, and more heterogeneous responses across instruments.

Overall, we contribute to the literature on fiscal–monetary interactions, sovereign risk, and macro-financial stabilization by shifting attention from episodes of outright fiscal dominance to the broader role of fiscal conditions as state variables.[1] Our contribution is to bring several mechanisms typically studied in isolation—the sovereign–bank nexus, the fiscal theory of the price level, the quasi-fiscal costs of intervention, and financial repression—into a common empirical framework. Using a broad panel of advanced and emerging economies, we show how the transmission of policy varies continuously with sovereign risk, rather than only during episodes of acute fiscal stress or fiscal dominance.

[1]We complement related work on regime shifts between monetary and fiscal dominance and on how debt conditions policy effectiveness (Corsetti et al., 2013; Campos et al., 2024).

The paper also speaks directly to the Integrated Policy Framework (IPF), which rationalizes the joint use of interest rates, FXI, capital-flow management measures, and macroprudential tools in financially open economies (Basu et al., 2020; Basu and Gopinath, 2024; Rey, 2015; Miranda-Agrippino and Rey, 2020). The IPF emphasizes financial frictions and external constraints. Our evidence suggests that fiscal space should be incorporated as an additional state variable: it shapes not only which instruments authorities use, but also how much stabilization each instrument can deliver.

II. Data and country groupings

We assemble a multi-country panel that brings together macro-fiscal indicators, sovereign risk measures, and policy tools for both advanced economies (AEs) and emerging market economies (EMEs). Country classifications follow IMF and BIS standards and are reported in Online Appendix Figure A.1. We merge IMF and BIS data with information on FX interventions from Adler and Mano (2016), macroprudential actions from the IMF's iMaPP database (Alam et al., 2019), and capital-flow measures from Acosta-Henao et al. (2025), at annual and higher frequencies. Coverage varies across variables: fiscal balances, debt, and revenues are available for most countries since the mid-1990s; sovereign credit default swap (CDS) spreads start in the mid-2000s; and some composition variables (such as the currency and investor base of public debt) are available only for the last decade.

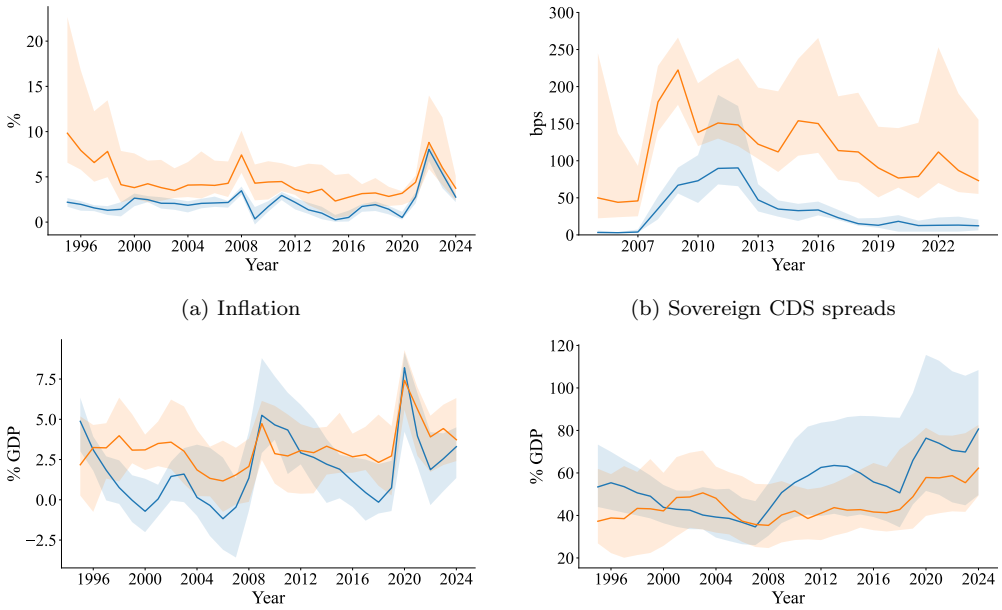
Our baseline sample runs from 1995 to 2025 at annual frequency, which is employed for the macro–fiscal stylized facts. This sample is supplemented with higher-frequency information where relevant (e.g. quarterly CDS). For each country and year, we observe inflation, public debt and deficits (total and primary), interest payments, government revenues, the share of public debt denominated in foreign currency, the share held by non-resident investors, and sovereign risk premia. Fiscal aggregates come from the IMF World Economic Outlook and Government Finance Statistics; prices and output from IMF International Financial Statistics, supplemented with national statistics where coverage is incomplete; exchange rates from the World Bank and BIS; and sovereign CDS spreads and central bank policy rates from Bloomberg. In Section III, we summarize cross-country differences by reporting medians and interquartile ranges (IQRs) for AEs and EMEs separately, and by comparing their pooled distributions. For the local projection estimate in Section IV, we construct a quarterly panel covering 2000Q1–2025Q4 that merges these macro outcomes with policy shock measures described in that section.

III. Fiscal Regimes and Sovereign Risk: AEs vs. EMEs

This section documents three stylized facts that define the macro-fiscal environment in which monetary and financial policies operate. Using pooled distributions and time-series medians for AEs and EMEs, we show that differences between the two groups lie less in headline fiscal aggregates than in risk premia, debt composition and cost, and crisis dynamics that shape policy effectiveness.

Stylized Fact 1. *Advanced and emerging market economies exhibit broadly similar public debt levels, yet emerging markets face systematically higher sovereign risk premia and higher inflation.*

We start by summarizing the macro-fiscal backdrop for AEs and EMEs in a single four-panel figure. Figure 1 plots, for each group, the median and interquartile range (IQR) of inflation, five-year sovereign Credit Default Swaps (CDS) spreads, overall fiscal deficits, and public debt-to-GDP ratios over time. This provides a compact view of how nominal conditions, sovereign risk, and fiscal aggregates evolved across global cycles.



(a) Inflation

(b) Sovereign CDS spreads

(c) Overall fiscal deficit

(d) Public debt-to-GDP

FIGURE 1. MACRO-FISCAL BACKDROP: AEs VS EMEs

Notes: Figure displays medians and interquartile ranges (IQRs) for AEs in blue solid lines and EMEs in orange solid lines. Shaded areas represent the IQR for each group. Inflation is measured as year-on-year CPI inflation; sovereign risk corresponds to 5-year CDS spreads; the fiscal balance is the overall general-government deficit; and public debt is general-government gross debt as a percent of GDP.

The top panels show that EMEs operate in a regime of systematically higher and more volatile inflation and sovereign risk. Median inflation in EMEs exceeds that of AEs over most of the sample, with a wider interquartile range and heavier tails. The post-pandemic inflation surge is marginally larger but substantially more dispersed across EMEs. Sovereign CDS spreads display an even sharper asymmetry: EMEs face higher premia in levels and much wider dispersion, with gaps that widen around global stress episodes such as the global financial crisis and the COVID-19 shock.

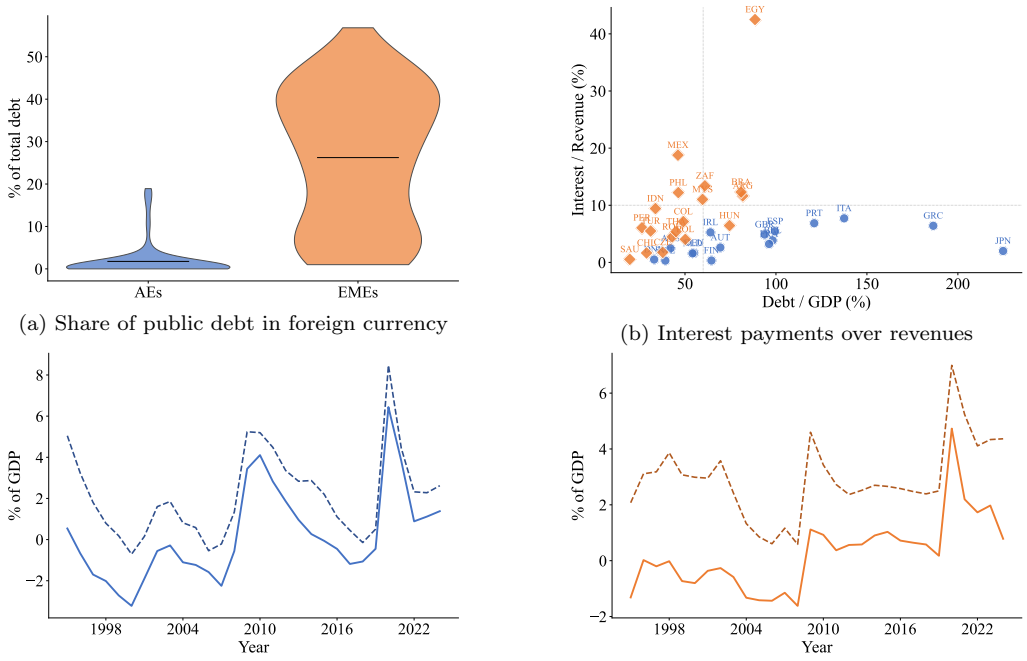
The bottom panels reveal a more nuanced picture for fiscal aggregates. Both AEs and EMEs widened fiscal deficits in response to major shocks and then consolidated, and their debt-to-GDP paths overlap over the sample. While some AEs carry very high debt ratios, median differences in debt and deficits between groups are modest when compared with the gaps in inflation and sovereign risk.

Stylized Fact 2. *Emerging market economies operate with more limited fiscal space and face tighter funding conditions.*

EMEs face tighter fiscal constraints due to both the composition and cost of their debt, which amplifies their exposure to exchange rate movements and sovereign risk premia. Figure 2 illustrates two key indicators. Panel (a) shows that a substantially larger share of public debt in EMEs is denominated in foreign currency, with median values several times higher than in AEs and considerable cross-country dispersion. While many EMEs have made progress in overcoming the so-called "original sin" problem, the inability to issue long-term debt in domestic currency, particularly acute in the 1990s (Eichengreen and Hausmann, 1999), reliance on foreign-currency-denominated liabilities remains significant. As a result, exchange rate depreciations directly worsen debt ratios and raise interest burdens in EMEs, tightening fiscal space precisely when global financial conditions deteriorate. By contrast, AEs issue debt almost entirely in domestic currency, largely insulating public finances from valuation effects.

Panel (b) plots interest payments as a share of government revenues against public debt as a percentage of GDP. The figure shows a clear separation between advanced economies (AEs) and emerging market economies (EMEs): for a given level of debt, EMEs face systematically higher interest burdens relative to their revenues. This is reflected in the steeper relationship between debt and interest payments for EMEs. By contrast, AEs cluster at lower levels of interest burdens, even at comparatively higher debt ratios, consistent with more favorable financing conditions.

This pattern suggests that EMEs face a higher effective cost of borrowing and a tighter link between debt accumulation and fiscal pressure. In practical terms, a given increase in debt translates more rapidly into higher interest service in EMEs than in AEs. From a fiscal-space perspective, this implies that EMEs have less room to expand debt without crowding out other expenditures, as a larger fraction of their revenues must be allocated to debt servicing.



(a) Share of public debt in foreign currency

(b) Interest payments over revenues

(c) Primary and Total Fiscal Deficit – AEs

(d) Primary and Total Fiscal Deficit – EMEs

FIGURE 2. FISCAL SPACE INDICATORS: AEs VS EMEs

Notes: Panel (a) reports the share of general-government debt denominated in foreign currency for AEs and EMEs from 2014-2024. Panel (b) plots interest payments as a percent of government revenues against general-government gross debt as a percent of GDP; each dot is a country average. Panel (c) displays median primary and total deficit as a percent of GDP for AEs (blue) and Panel (d) for EMEs (orange). The solid lines correspond to primary deficit while dashed are total deficit. The gap between them reflects interest burdens and financing pressures.

A complementary dimension is the composition of fiscal adjustment. Panels (c) and (d) of Figure Figure 2 plot median primary and total fiscal deficits by country group. At first sight, differences in overall deficits between AEs and EMEs are modest: both groups widen deficits around global shocks and consolidate afterward. The gap between primary and total balances, however, is much larger and more persistent in EMEs. Since the 2000s, many EMEs have run primary surpluses or small deficits, yet their total balances remain significantly negative because interest payments absorb a large share of revenues. AEs, by contrast, can sustain small primary deficits while keeping total deficits manageable, precisely because their interest burden is lower. In sum, EMEs need stronger primary efforts just to stabilize debt, and their ability to use fiscal policy countercyclically is tightly constrained by the combination of foreign-currency exposure and high interest-to-revenue ratios.

Stylized Fact 3. *Emerging market economies accumulate more crisis years and exhibit greater joint vulnerabilities, particularly through more frequent currency*

and banking crises, than advanced economies.

Figure 3 reports crisis counts by type (banking, currency, sovereign) and the composition of overlapping patterns. EMEs accumulate more country–years with any crisis and, in particular, more currency and banking crises than AEs. Moreover, they display a larger share of years in which multiple crises occur simultaneously, especially combinations of currency and sovereign distress, while AEs experience more isolated episodes.

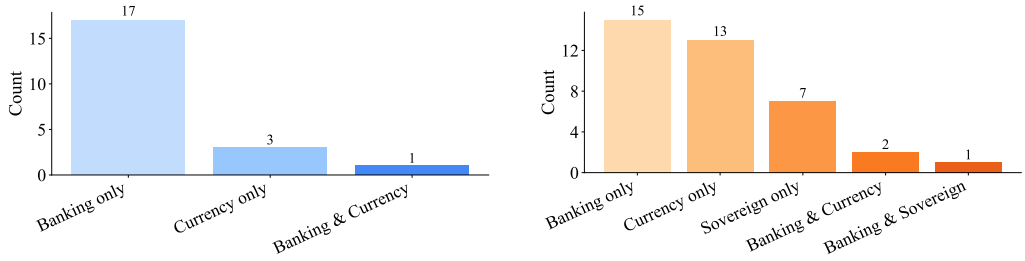


FIGURE 3. CRISIS INCIDENCE AND OVERLAP – AEs VS EMEs

Notes: The figure reports the incidence of different types of crises in AEs and EMEs. Crises are classified into banking, currency, and sovereign events. Bars show the count of country-years experiencing each crisis type, as well as combinations where two or more crises occur simultaneously (e.g., banking–currency, banking–sovereign, currency–sovereign, and all three).

IV. Policy Transmission under Sovereign Risk

This section examines whether fiscal conditions shape the effectiveness of monetary policy tools. We estimate state-dependent impulse responses for three instruments, monetary policy rate (MPR), foreign-exchange intervention (FXI), and macroprudential and capital-flow management measures (MPCFM), and assess whether transmission to prices, exchange rates, and output weakens when sovereign risk is elevated.[2]

A. Empirical framework

We use local projections (Jordà, 2005) with a smooth-transition interaction to allow impulse responses to vary continuously with fiscal conditions. For each policy instrument and outcome, we estimate

$$\Delta y_{i,t+h} = \alpha_i + \delta_t + \left[\beta_h + \gamma_h\, G(z_{it})\right] x_{it} + \lambda_h\, G(z_{i,t}) + \mathbf{W}'_{it}\boldsymbol{\phi}_h + \varepsilon_{i,t+h}, \tag{1}$$

[2]Sample coverage varies by instrument due to data availability: monetary policy and MPCFM estimations include 19 AEs and 13–14 EMEs, while FXI estimations include 8 AEs and 13–16 EMEs; country lists are reported in Online Appendix Table A.1

for horizons $h = 1, \ldots, 8$ quarters, where $\Delta y_{i,t+h} = y_{i,t+h} - y_{i,t-1}$ denotes the cumulative percent change in outcome Y (in log points $\times 100$). The terms α_i and δ_t are country and time fixed effects, x_{it} is the policy shock, and $\mathbf{W}_{it}$ is a vector of controls including lags of the outcome and the shock, with the full set detailed in Online Appendix Section B. The function $G(z_{it})$ is a logistic transition function of z_{it}, defined as the standardized CDS spread within AE and EME groups. It varies smoothly between zero, corresponding to low fiscal stress, and one, corresponding to high fiscal stress, so that β_h captures the impulse response under tranquil conditions and $\beta_h + \gamma_h$ captures the response under acute sovereign stress. The impulse responses are evaluated at $z = -0.5$ and $z = +0.5$, which correspond approximately to the lower and upper quartiles of each country's own historical CDS distribution ($G(-0.5\kappa) \approx 0.08$, $G(+0.5\kappa) \approx 0.92$). The country-specific standardization ensures that a given value of z captures unusual stress relative to each country's own baseline, rather than comparing CDS levels across countries with structurally different sovereign risk premia.

Policy shocks. All shocks are signed so that positive values denote tightening.[3]

1) Monetary policy surprise: deviation of the actual policy rate change from the Bloomberg median survey expectation, in percentage points. A one-unit shock corresponds to an unexpected 100-basis-point tightening.[4]

2) FX intervention: net foreign-currency sales, measured in billions of U.S. dollars, are constructed from the broad FXI proxy in Adler and Mano (2016), which combines spot and derivative interventions. A one-unit shock corresponds to USD 1 billion in net reserve sales, interpreted as reserve drawdowns intended to appreciate the domestic currency.

3) Macroprudential and capital-flow management measures: the quarterly sum of net macroprudential policy actions from the IMF iMaPP database (Alam et al., 2019) and net capital-control changes from Acosta-Henao et al. (2025). A one-unit shock corresponds to one additional net tightening action.

Outcomes. The dependent variables are core CPI, the nominal exchange rate, and real GDP. All responses are cumulative log changes from $t-1$, multiplied by 100, and can be read as cumulative percent changes. We refer to the CPI response as inflation throughout the text. The exchange rate is the end-of-period rate in local currency per U.S. dollar, so a positive response denotes a cumulative percent depreciation.

[3]Because the policy shock enters the baseline specification linearly, the estimates impose symmetry between equally sized positive and negative shocks within each stress state. The baseline impulse responses therefore do not provide an empirical test of whether tightening and easing have asymmetric effects. Nor do they identify the optimal policy response.

[4]We exclude crisis windows (2007Q1–2009Q4, 2020Q1–2021Q4) from monetary policy estimations to avoid conflating conventional and unconventional policy.

B. Results

Figure 4 presents the 18 estimated impulse responses, corresponding to three policy instruments, two country groups, and three outcomes, under low stress (circles) and high stress (diamonds). Several patterns emerge.

General pattern. Across most of the 18 cells, the low-stress IRFs (solid lines) display the expected negative responses to a tightening shock: prices and output fall, and the exchange rate appreciates. Under high fiscal stress (dashed lines), these responses are systematically attenuated, that is, the dashed path lies closer to zero than the solid path over most of the horizon. This dampening is our central result: sovereign risk weakens the transmission of all three policy instruments, though the degree and timing of attenuation vary across policies, outcomes, and country groups.

Monetary policy. In AEs, monetary tightening under low sovereign stress produces a persistent decline in prices: a 100 basis point contractionary monetary surprise lowers the CPI response by about 1.7 percent, measured as the cumulative log change in CPI, around quarter 4. Similarly, output contracts and the exchange rate appreciates. Under high stress, these responses are markedly attenuated. The same monetary surprise delivers essentially no disinflation and no output contraction. One interpretation is fiscal-theory logic: monetary tightening raises interest burdens on predominantly local-currency debt, weakening the conventional disinflationary channel (Cochrane, 2023). The exchange-rate appreciation is also somewhat weaker.

In EMEs, baseline monetary transmission is weaker than in AEs even under low stress. A 100 basis point contractionary monetary surprise lowers the CPI response by about 0.12 percent around quarter 4. This smaller response is consistent with, though not direct evidence of, weaker financial-market depth and monetary pass-through in EMEs (Brandao-Marques et al., 2020). Under high fiscal stress, the CPI response turns positive, reaching 0.57 percent around quarter 3. We interpret this reversal as the net result of two opposing forces. The conventional demand and exchange-rate channels would ordinarily make monetary tightening disinflationary. At the same time, tighter policy raises public debt-service costs and can intensify sovereign-risk premia, depreciation pressures, and expectations of future fiscal accommodation. The positive net response is consistent with these fiscal-risk feedbacks dominating the conventional channel locally. The GDP and exchange-rate responses, by contrast, lose statistical significance, suggesting that sovereign stress substantially weakens the real and external transmission channels of monetary policy.

Foreign exchange intervention. FXI tightening, defined as net reserve sales, is followed by exchange-rate appreciation under low sovereign stress in both AEs and EMEs. A USD 1 billion net sale is associated with an appreciation of about 0.18 percent in AEs and 0.14 percent in EMEs. The inflation response is more

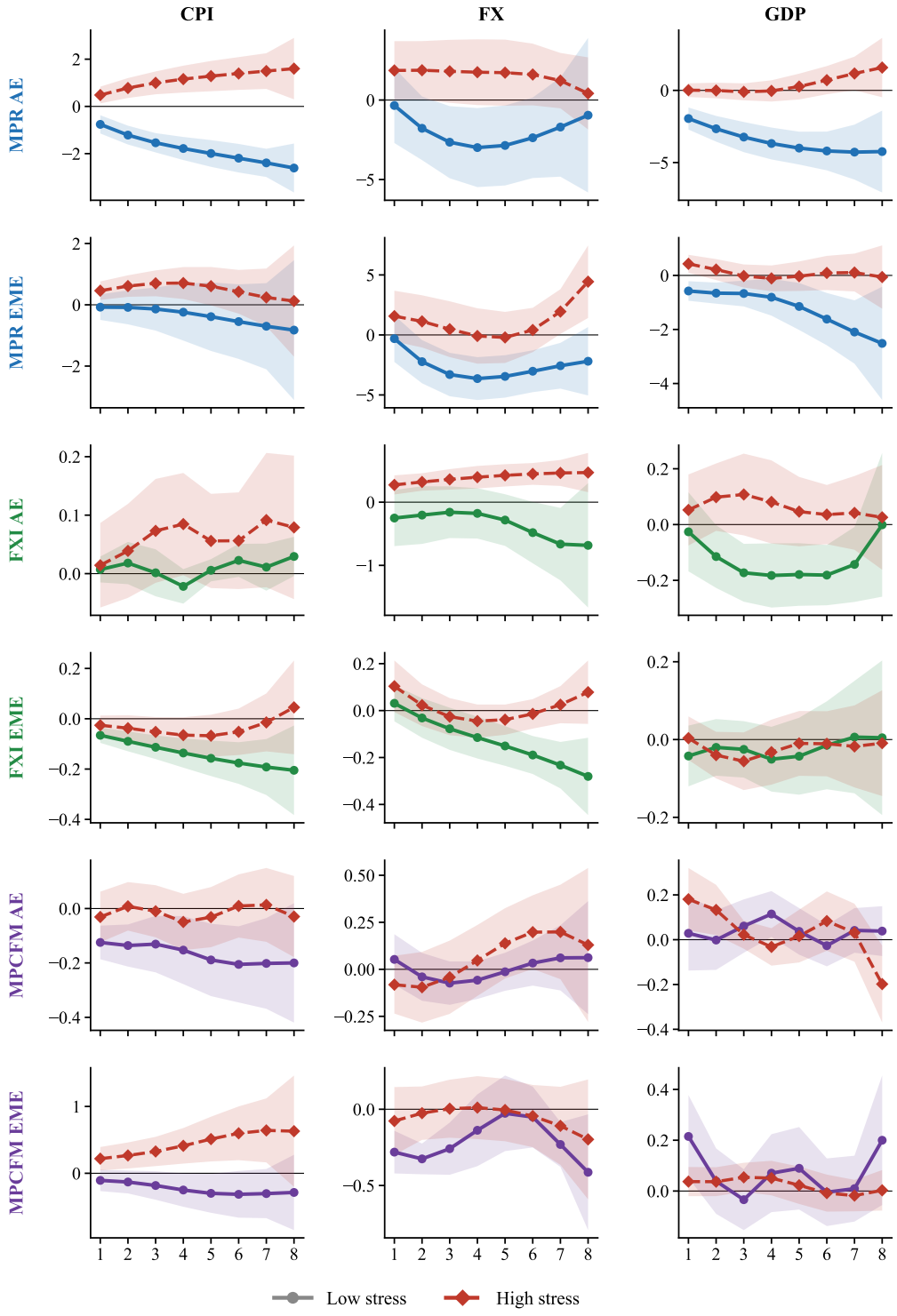


FIGURE 4. STATE-DEPENDENT IMPULSE RESPONSES TO POLICY TIGHTENING SHOCKS

Notes: Each panel shows the cumulative response (percent) of the column variable to a one-unit tightening shock in the row policy (100 bps monetary surprise, $1 bn FXI sale, or 1 net MPCFM tightening), estimated via Equation (1). Circles (solid lines): low fiscal stress. Diamonds (dashed lines): high fiscal stress. Vertical bars: 90% confidence intervals (two-way clustered standard errors). Horizons in quarters.

visible in EMEs than in AEs, consistent with higher exchange-rate pass-through in emerging markets (Bems et al., 2020). Output responses are small and less precisely estimated. Overall, the low-stress estimates suggest that FXI operates primarily through the exchange rate, with more limited evidence of downstream effects on prices and activity.

Under high sovereign stress, the exchange-rate response to FXI is substantially attenuated in both groups. The price and output responses also become weaker and are generally not statistically distinguishable from zero. This attenuation is consistent with the view that sovereign stress reduces the credibility, persistence, or perceived effectiveness of reserve sales. One possible channel is quasi-fiscal: sterilized interventions become more costly when domestic interest rates and sovereign risk premia are elevated. We interpret this mechanism cautiously, since the estimates speak directly to weaker FXI transmission under stress rather than to the precise source of that weakening.

Macroprudential and capital-flow management measures. MPCFM tightening generates more heterogeneous responses than monetary policy or FXI, with generally modest magnitudes across regimes. Under low sovereign stress, the responses point in a stabilizing direction: AEs show a decline in inflation, while EMEs show a transitory exchange-rate appreciation. These effects, however, are smaller and less persistent than those estimated for the other instruments. Under high sovereign stress, MPCFM transmission weakens and becomes less systematic. In AEs, the responses are generally not statistically distinguishable from zero, suggesting that fiscal stress limits even the modest stabilizing effects of these measures. In EMEs, the CPI response turns positive, reaching about 0.41 percent around quarter 4 after a tightening action. This reversal is consistent with the broader result that elevated sovereign risk can impair the transmission of stabilization tools, including macroprudential and capital-flow measures (Biljanovska et al., 2023).

Overall, the evidence shows that sovereign stress changes not only the strength of policy transmission but, in some cases, its direction. When sovereign risk is low, monetary policy, FXI, and macroprudential and capital-flow measures generally produce the expected stabilizing responses. When sovereign risk is high, these responses become smaller, less stable, or cross zero. The sign reversals are best interpreted as evidence that adverse fiscal-risk feedbacks can dominate conventional transmission at the margin. They should not be interpreted as a recommendation to invert the direction of monetary policy: the estimates identify the conditional response to an unexpected policy shock, not the welfare-maximizing policy stance or the optimal joint monetary-fiscal response. Fiscal conditions therefore shape the effective policy frontier, limiting what central banks can accomplish with the same instruments acting on their own.

C. *Model-based interpretation*

We next compare the empirical impulse responses with those implied by a quantitative small open-economy model calibrated separately for AEs and EMEs. This exercise is not a robustness check in the usual econometric sense. Its purpose is to ask whether a model with explicit fiscal and financial channels can generate the same qualitative patterns documented above: weaker transmission under sovereign stress, sharper trade-offs in EMEs, and heterogeneous responses across instruments. The comparison therefore provides a disciplined interpretation of the empirical results, rather than a formal test of the model.

An important limitation is that the model is linearized within each stress regime. It can rationalize why a tightening shock becomes inflationary under high sovereign stress, but it does not test asymmetric responses to tightening and easing and is not designed to derive the optimal policy rule. We therefore use the model to interpret the competing transmission channels behind the sign reversal, not to conclude that policy easing would necessarily be stabilizing.

Model. We build on the linearized New Keynesian small open-economy model of Adrian et al. (2020), which features discounted Euler and Phillips equations following Gabaix and Maggiori (2015), sticky prices and wages, and an endogenous UIP risk premium. We extend the model by adding a fiscal block with three stress-state channels. First, a fiscal-theory term enters inflation expectations in the Phillips curve, so that elevated public debt, measured relative to each country group's baseline, raises expected partial monetization. Second, the UIP risk premium increases in high-debt states, generating depreciation pressure when sovereign risk is elevated. Third, monetary pass-through to private lending rates becomes state dependent, consistent with the crowding-out evidence from the local projections. The model is then shocked with the three policy instruments used in the empirical analysis: a monetary policy surprise, a foreign-exchange intervention shock normalized to a USD 1 billion reserve sale, and a macroprudential and capital-flow management tightening shock.

Calibration. Parameters common to both country groups follow Adrian et al. (2020). AEs are calibrated with public debt equal to 80 percent of GDP, higher monetary-policy inertia, and a somewhat steeper Phillips curve. The latter choice is motivated by recent evidence of steeper Phillips curves in advanced economies during the post-pandemic inflation episode, although estimates of the Phillips-curve slope remain sensitive to sample period and specification (Ari et al., 2023; Gudmundsson et al., 2024). EMEs are calibrated with lower public debt, 45 percent of GDP, faster policy-rate normalization, and a flatter supply curve. The high-stress configuration activates the fiscal-monetization channel, raises the sovereign-risk component of the UIP premium, and reduces the effective Taylor-rule response, capturing the weaker room for monetary tightening when fiscal

constraints bind. FXI effectiveness is allowed to vary by stress state. In line with the local projections, the portfolio-balance coefficient is moderate under low stress but close to zero under high stress, reflecting the weak exchange-rate response of reserve sales when sovereign risk is elevated. The full calibration is detailed in Online Appendix Section C.

Figure 5 reports the model-implied responses under low and high fiscal stress. The model is able to reproduce the main qualitative pattern in the data. Across instruments, transmission is stronger under low stress and weaker under high stress. For monetary policy, the model captures the large disinflationary response in AEs under low stress and its attenuation, or reversal, when sovereign risk is elevated. In EMEs, the model generates weaker baseline monetary transmission and a positive inflation response under high stress, consistent with tighter fiscal constraints and weaker credibility. For FXI, the model produces exchange-rate appreciation under low stress in both country groups and little exchange-rate response under high stress. For macroprudential and capital-flow measures, the model generates more modest and heterogeneous responses, as in the empirical estimates.

The exercise should be read as a model-based interpretation, not as a full quantitative validation. The model matches the main signs, rankings, and differences across stress states, but it is not estimated to fit the full path of each impulse response. Its value is to show that a standard small open-economy environment, once augmented with fiscal stress channels, can rationalize the central empirical finding: sovereign risk weakens the transmission of monetary, foreign-exchange, and macro-financial tools. Because the model is locally linear within each regime, it does not establish whether positive and negative policy shocks have different effects.

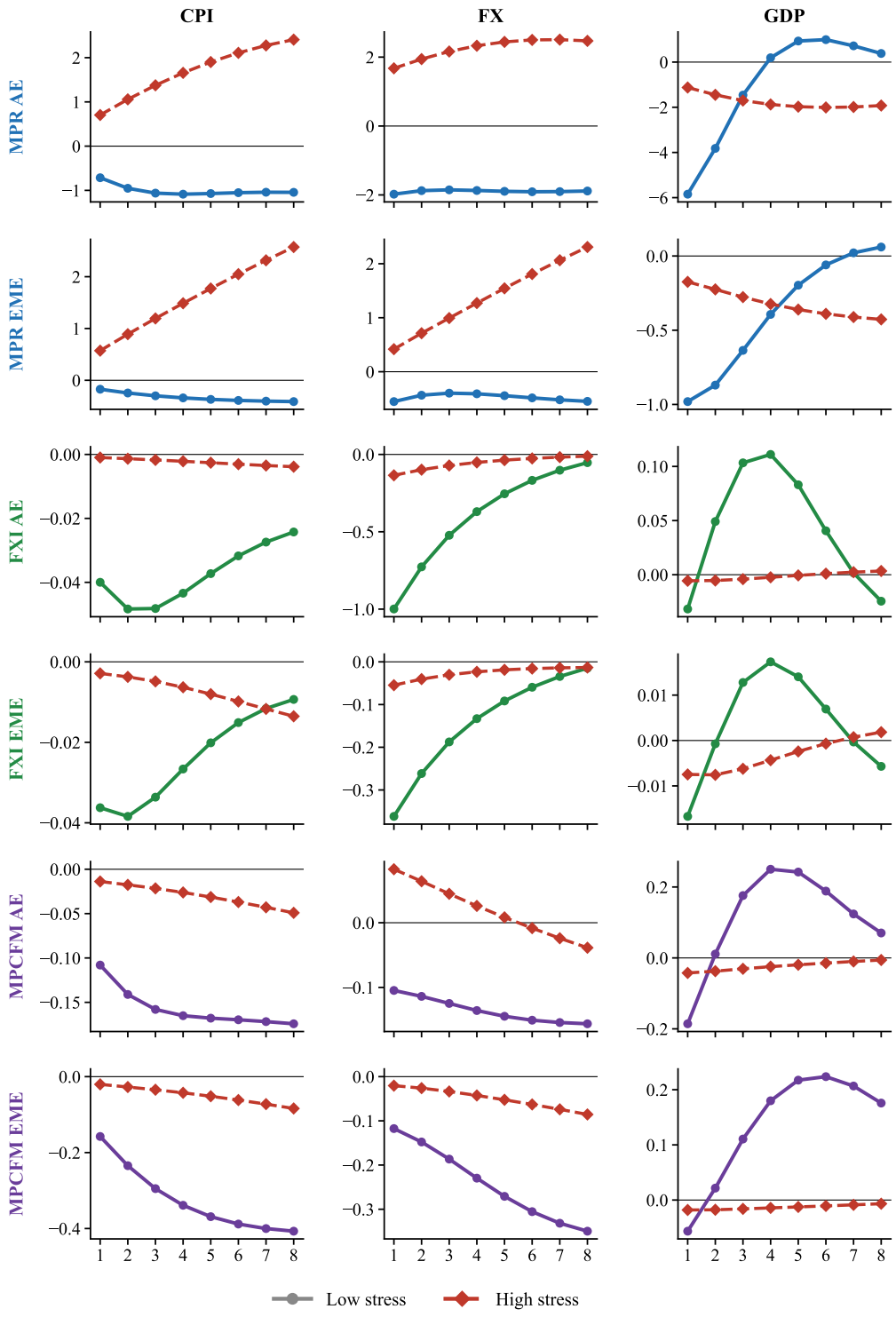


FIGURE 5. MODEL IMPULSE RESPONSES

Notes: Model-implied impulse responses from the extended Adrian et al. (2020) framework, calibrated to AE (top rows) and EME (bottom rows) characteristics. Solid lines: low-stress regime. Dashed lines: high-stress regime. Columns: CPI inflation, nominal exchange rate (positive = depreciation), and GDP. Monetary shock normalized to 100 bps; FXI shock to $1 bn reserve sale; MPCFM shock to a one-standard-deviation tightening. Horizons in quarters.

V. Discussion: Fiscal space as a policy constraint

A standard view treats monetary policy, foreign-exchange intervention, and macroprudential and capital-flow measures as instruments that can be deployed conditional on macroeconomic and financial conditions, but largely separately from the sovereign balance sheet. Our results suggest that this separation is incomplete. When sovereign risk is low, policy responses have the expected signs: monetary tightening lowers inflation and output, FXI appreciates the currency, and macroprudential and capital-flow measures restrain financial conditions. When sovereign risk is high, the responses become smaller, less precise, or change sign. Fiscal space is therefore not only a constraint on fiscal policy. It also affects the feasible set of monetary and macro-financial policies.

This has immediate practical relevance. Under tight fiscal conditions, monetary tightening activates two opposing forces. The conventional channel reduces demand and inflation. At the same time, higher interest rates increase public debt-service costs and can intensify sovereign-bank exposures, risk premia, depreciation pressures, and expectations of future fiscal accommodation. As fiscal stress rises, these feedbacks reduce the disinflationary return to additional tightening and can eventually dominate the conventional channel. In that case, the problem is no longer adequately described as merely a higher sacrifice ratio: the sign and shape of the inflation-output trade-off itself become state dependent. Importantly, this finding does not imply that the central bank should mechanically cut rates when sovereign risk is high. Our estimates identify the conditional response to an unexpected tightening, not the optimal policy rule. Moreover, because the baseline specification is linear in the policy shock, an equally sized easing shock is mechanically assigned the opposite response. That symmetry is a modeling restriction, not an independent empirical finding about the consequences of easing. A sustained change in the policy stance could also alter exchange-rate expectations, sovereign risk, fiscal behavior, and the stress regime itself, mechanisms that are outside the local experiment.

The appropriate policy implication is therefore not to invert the monetary-policy rule, but to recognize that the central bank's unilateral stabilization frontier narrows under fiscal stress. Simply tightening more may deliver progressively less disinflation and, in severe cases, amplify adverse fiscal-risk feedbacks. Restoring conventional monetary transmission then requires credible fiscal backing and may require a coordinated mix of monetary, foreign-exchange, and macro-financial instruments. Similarly, FXI may have only short-lived effects when markets perceive reserve losses or sterilization costs as fiscally difficult to sustain.

Our findings connect directly to the IMF's Integrated Policy Framework (IPF), which rationalizes the joint use of interest rates, FXI, capital-flow management measures, and macroprudential tools in financially open economies (Basu et al., 2020; Basu and Gopinath, 2024; Rey, 2015; Miranda-Agrippino and Rey, 2020). In its current form, the IPF gives limited explicit role to fiscal space and sovereign risk as state variables conditioning policy transmission. Our evidence suggests

that incorporating such variables, including interest-to-revenue ratios, foreign-currency debt shares, and sovereign spreads, would help explain why similar policy actions produce different outcomes across countries. It would also clarify why EMEs rely more heavily on multi-instrument configurations and why, under severe sovereign stress, the problem may extend beyond a steeper conventional trade-off to a deterioration of the transmission mechanism itself.

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Online Appendix

This online appendix accompanies "Monetary Policy under Fiscal Risk." Appendix A describes the country groups and the sources and construction of all variables. Appendix B details the state variable, the sample windows, the cell-by-cell control sets, and the robustness of the estimates to the choice of controls. Appendix C documents the calibration of the model and the sources for each parameter.

Data Sources and Country Groups

We assemble a panel of advanced economies (AEs) and emerging market economies (EMEs) since the mid-1990s, listed in Figure A.1. The effective sample used in each regression is a subset of this universe, determined by three factors: (i) coverage of the policy shocks, which differ across sources and starting dates; (ii) availability of the outcome variables—core CPI, the nominal exchange rate, and real GDP; and (iii) representation of the euro area, which is proxied by Germany in the exchange-rate regressions.

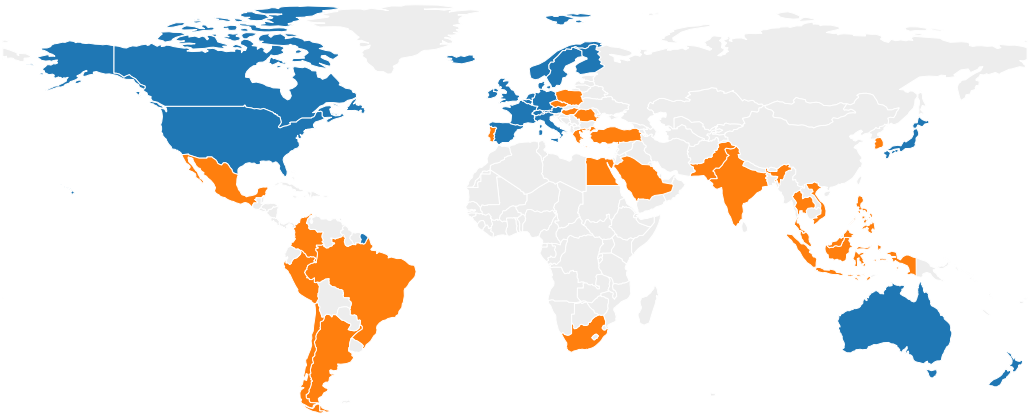


Figure A.1. Country groups

Notes: Advanced economies (AEs) are shaded in blue and emerging market economies (EMEs) in orange; countries in grey are outside the sample. AEs: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, and United States. EMEs: Argentina, Brazil, Chile, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Portugal, Romania, Saudi Arabia, South Africa, South Korea, Thailand, Turkey, and Vietnam.

Accordingly, the annual panel 1995–2025 is employed for the macro–fiscal stylized facts, while the quarterly panel 2000Q1–2025Q4 is used in the local projection estimates. Tables A.1 and A.2 describe the construction of each variable

and its source: Table A.1 covers the quarterly estimation panel and Table A.2 the annual macro–fiscal panel. The policy shocks combine Bloomberg policy-rate surveys, the FX intervention proxies of Adler et al. (2019), the IMF integrated Macroprudential Policy (iMaPP) database (Alam et al., 2019), and the capital-control measures of Acosta-Henao et al. (2025). Monthly series are aggregated to quarterly frequency by summing within the quarter.

Table A.1—Data sources and variable definitions: quarterly estimation panel

Variable	Source	Construction / definition	Frequency & coverage
Monetary policy surprise	Bloomberg policy-rate decision surveys	Policy rate at each decision minus the median survey expectation, in percentage points; monthly surprises summed within the quarter.	Monthly → quarterly sum; 2003 onward.
FX intervention	Adler et al. (2019)	Broad proxy: spot intervention plus changes in derivatives positions, in U.S. dollars; rescaled to USD billions in estimation.	Monthly → quarterly sum.
Macroprudential actions	IMF iMaPP database (Alam et al., 2019)	Net number of tightening minus loosening actions summed across 17 macroprudential instrument categories.	Monthly → quarterly sum.
Capital controls	Acosta-Henao et al. (2025)	Net changes in five components (reserve requirements, unremunerated and FX reserve requirements, taxes on inflows and outflows), each coded ±1, summed.	Quarterly.
Sovereign CDS spreads (5-year)	Bloomberg	Five-year sovereign CDS spreads, in basis points; gaps of up to two months filled by linear interpolation.	Monthly; mid-2000s onward.
Headline and core CPI	World Bank global inflation database (Ha et al., 2023)	Consumer price indices (headline and core); core CPI is the baseline price measure.	Quarterly.
Nominal exchange rate	BIS US dollar exchange rates (WS_XRU)	End-of-period bilateral exchange rate, local currency per U.S. dollar; an increase denotes a depreciation.	Monthly → end-of-quarter.
Real GDP	IMF quarterly national accounts	Gross domestic product at constant prices, seasonally adjusted; supplemented with national sources for Peru and Malaysia.	Quarterly.
Policy rate	Bloomberg	Central bank policy rate level, in percent; monthly observations averaged within the quarter. Used as a control variable.	Monthly → quarterly average.

Notes: The combined macroprudential-plus-capital-controls indicator used in the estimation is the sum of the quarterly iMaPP net tightening actions and the quarterly capital-control net changes. FX intervention shocks are signed so that a positive shock corresponds to a policy tightening. The CPI, exchange-rate, and GDP indices are rebased to 100 at the first observation per country and log-transformed.

Table A.2—Data sources and variable definitions: annual macro–fiscal panel

Variable	Source	Construction / definition	Frequency & coverage
Fiscal aggregates	IMF WEO and GFS	Overall balance ob, primary balance pb, gross debt, and revenues rev, in percent of GDP. Interest payments: $int = pb - ob$; interest burden: $100 \times int/rev$.	Annual; 1995–2025.
Inflation	IMF IFS	Annual CPI inflation, in percent; supplemented with national statistics where coverage is incomplete.	Annual; 1995–2025.
FX share of public debt	World Bank Fiscal Space Database (Kose et al., 2022)	General government debt denominated in foreign currency, in percent of the total.	Annual; last decade.
Crisis indicators	Laeven and Valencia (2020)	Banking, currency, and sovereign debt crisis indicators.	Annual.

Local Projections: State Variable, Samples, and Controls

This appendix documents the elements of the local-projection design that are not fully specified in the main text: the smooth-transition sample split into low- and high-stress states, the construction of the sovereign-stress state variable, the sample windows, the cell-by-cell control sets, and the robustness of the estimates to the choice of controls.

B1. Estimating equation: appendix conventions

The impulse responses are estimated from the smooth-transition local projection of Equation (1) in the main text, following Auerbach and Gorodnichenko (2013). Relative to the compact statement in the text, two conventions are worth making explicit. First, advanced-economy (AE) and emerging-market (EME) responses are estimated on separate samples, so all coefficients are group-specific, and standard errors are clustered two-way, by country and by quarter. Second, the reported low- and high-stress responses are linear combinations of β_h and γ_h evaluated half an interquartile range below and above the country-specific median of the state, $z = \mp 0.5$:

$$\beta_h^{\text{low}} = \beta_h + G(-\kappa/2)\,\gamma_h, \tag{B.1}$$

$$\beta_h^{\text{high}} = \beta_h + G(+\kappa/2)\,\gamma_h, \tag{B.2}$$

with standard errors computed from the joint covariance matrix of (β_h, γ_h). The paper displays horizons $h = 1$ through 8, smoothed following Barnichon and Brownlees (2019).

B2. State variable

The fiscal-stress state is based on five-year sovereign credit default swap (CDS) spreads. To capture persistent rather than transient stress, we smooth the spread with an eight-quarter backward moving average, $\text{CDS}_{i,t}^{MA8} = \frac{1}{8}\sum_{j=0}^{7} \text{CDS}_{i,t-j}$. The state entering the estimating equation is the one-quarter lag of this smoothed spread, normalized country by country:

$$z_{i,t} = \frac{\text{CDS}_{i,t-1}^{MA8} - \text{median}_i}{\text{IQR}_i}, \qquad G(z) = \frac{1}{1+e^{-\kappa z}}, \qquad \kappa = 5, \tag{B.3}$$

where median_i and IQR_i are the median and interquartile range of the lagged smoothed spread for country i, computed over the estimation sample of each cell. The logistic transition follows Auerbach and Gorodnichenko (2013) and Tenreyro and Thwaites (2016). Lagging the state one quarter mitigates contemporaneous feedback from the shock to measured stress. Country-specific normalization means that "high stress" is defined relative to each country's own history, so the state comparison is within country rather than across the very different CDS

levels of advanced and emerging economies; countries with a degenerate (non-positive) interquartile range are excluded. With $\kappa = 5$, the regime weights at the evaluation points $z = \mp 0.5$ are approximately 0.08 and 0.92, so the reported low- and high-stress responses are evaluated close to the two ends of the transition.

B3. Sample windows

The panel is quarterly and spans 2000Q1 through 2025Q4 for the advanced and emerging economies listed in Figure A.1; country and observation counts vary by cell with data availability, for the reasons given in Appendix A. Two sample windows are used. The full sample uses all available quarters. The non-crisis sample excludes the global financial crisis (2007Q1–2009Q4) and the COVID-19 pandemic (2020Q1–2021Q4). As recorded in Table B.1, all six FXI and all six MPCFM cells use the full sample, because interventions and regulatory actions are concentrated in turbulent periods and excluding those periods would discard much of the identifying variation. All six MPR cells use the non-crisis sample, since during the two crisis windows policy decisions and survey expectations were dominated by common global shocks.

Country composition adjustments. Two adjustments apply to specific cells. First, euro-area members share a single exchange rate against the dollar; to avoid replicating the same currency movement across countries, the euro area keeps a single representative in the exchange-rate cells: only Germany is retained in the advanced-economy exchange-rate cells for MPR and FXI shocks (the "euro-collapsed" AE sample). Second, in the MPR–AE–XR cell, Norway and Iceland are excluded: leave-one-country-out diagnostics identified them as influential outliers, reflecting oil-price exposure and the 2008 banking collapse, respectively.

B4. Control sets by baseline cell

Table B.1 records, for each of the 18 baseline cells (3 policies $\times$ 2 country groups $\times$ 3 outcomes), which blocks of controls enter the vector $W_{i,t}$ and the sample window. Controls are drawn from a common set: the sovereign CDS spread; the level of the policy rate; the change in the policy rate; exchange-rate growth; CPI inflation; and lags of the dependent variable. The table marks which blocks are active; in every cell the active blocks enter with one or two lags.

B5. Choice of control sets

The relevant conditioning set differs across policies and outcomes: MPR regressions require conditioning on sovereign risk and the stance of policy, exchange-rate regressions require lags of the dependent variable, and data coverage varies across instruments. We therefore select the control blocks cell by cell from the common set of Section B.B4, applying the same procedure to every cell; sample windows are uniform within each policy (Section B.B3).

Table B.1—Control blocks and sample window for the 18 baseline local-projection cells

Policy	Cell	CDS spread	Policy rate	ΔPolicy rate	XR growth	CPI growth	Dep. var.	Sample
MPR	AE–CPI	✓	✓			✓		Non-crisis
MPR	AE–XR[a,b]	✓	✓				✓	Non-crisis
MPR	AE–GDP	✓	✓					Non-crisis
MPR	EME–CPI	✓	✓	✓				Non-crisis
MPR	EME–XR	✓	✓	✓	✓	✓	✓	Non-crisis
MPR	EME–GDP	✓	✓			✓		Non-crisis
FXI	AE–CPI	✓						Full
FXI	AE–XR[a]	✓	✓				✓	Full
FXI	AE–GDP	✓	✓					Full
FXI	EME–CPI	✓						Full
FXI	EME–XR	✓					✓	Full
FXI	EME–GDP	✓	✓					Full
MPCFM	AE–CPI					✓		Full
MPCFM	AE–XR	✓	✓		✓	✓	✓	Full
MPCFM	AE–GDP						✓	Full
MPCFM	EME–CPI		✓					Full
MPCFM	EME–XR	✓	✓		✓	✓	✓	Full
MPCFM	EME–GDP	✓		✓	✓	✓	✓	Full

Notes: Each row is one baseline cell. A checkmark indicates that the corresponding control block enters $W_{i,t}$ in that cell. Active blocks enter with one or two lags; contemporaneous values are included only for the CDS spread and the policy-rate level. "Dep. var." denotes lags of the horizon-specific long-differenced dependent variable, and "ΔPolicy rate" denotes the first difference of the policy rate. All controls enter linearly, in addition to country and quarter fixed effects, the shock, and its interaction with $G(z)$. "Non-crisis" excludes 2007Q1–2009Q4 and 2020Q1–2021Q4; "Full" uses all quarters. [a] Euro-area members are represented by Germany only. [b] Norway and Iceland are excluded. Blocks are selected as described in Section B.B5.

For each cell, we estimate all combinations of control blocks from the menu and keep those that satisfy the conditioning and minimum-sample requirements; the conditioning requirements follow the specification lessons in Ha et al. (2025) for monetary transmission in emerging markets. Among the admissible specifications, the baseline is chosen on economic interpretability, stability across horizons, precision, and parsimony; in a few cells a close admissible alternative replaces the top-ranked specification, and Table B.2 reports both. Table B.1 lists the selected blocks, and Section B.B6 shows that the estimates are insensitive to this choice.

B6. Robustness to the choice of controls

Table B.2 reports the responses under three alternative control-set choices, holding samples, state variable, and country groups fixed: (i) uniform, one common control set for all price and output cells and one for all exchange-rate cells; (ii) statistical, which ranks the admissible candidates on stability, precision, and parsimony only; and (iii) top rank, the top-ranked specification in every cell. Because estimates at any single horizon are noisy, the table summarizes each impulse response with a trajectory-weighted average over horizons $h = 1$–8, $\bar{\beta} = \sum_h w_h \beta_h / \sum_h w_h$ with weights $w = (0.5, 0.8, 1, 1, 1, 0.8, 0.6, 0.4)$, which emphasize the middle horizons—where the responses are most precisely estimated—over the short and long ends.

In 15 of 18 cells the sign of the low-stress response is the same in all four columns; the three exceptions are cells whose baseline estimates are statistically indistinguishable from zero. The main results are stable: the advanced-economy MPR CPI reversal (-1.8 under low stress, $+0.9$ to $+1.1$ under high stress), the MPR GDP contraction (-3.6 in all four columns), and the MPCFM–EME CPI reversal appear in every variant. Where the alternatives differ from the baseline (for example, MPR–EME–XR), the differences concern magnitudes rather than the low-/high-stress configuration.

Figure B.1 plots the smoothed impulse responses for the two policy–outcome pairs of interest—MPR and core CPI, FX intervention and the exchange rate—under the baseline and the three alternativesk. The baseline, statistical, and uniform paths are close to indistinguishable.

Another check we perform is to test whether the results depend on any particular period of the sample. Figure B.2 reports a leave-one-year-out jackknife: for the policy–outcome pairs of interest we re-estimate the trajectory-weighted response $\bar{\beta}$ twenty-six times, each time dropping one calendar year from 2000 to 2025. The markers are the full-sample estimates and the bars span the range across the twenty-six subsamples. For the monetary CPI response, the low-stress disinflation and its high-stress reversal keep their sign across the subsamples. For the FXI exchange-rate response the same stability emerges. The only ranges that cross zero are those of the emerging market CPI responses, which tend to be imprecise in the full sample as well. No single year drives the results.

Table B.2—Robustness of the baseline cells to the choice of controls (weighted average, $h = 1$–8)

		$\bar{\beta}^{\text{low}}$				$\bar{\beta}^{\text{high}}$			
Policy	Cell	Base	Unif.	Stat.	Top	Base	Unif.	Stat.	Top
MPR	AE–CPI	−1.79	−1.66	−1.79	−1.79	1.13	0.93	1.13	1.13
MPR	AE–XR	−2.58	−1.61	2.07	−2.58	1.51	1.56	−0.38	1.51
MPR	AE–GDP	−3.59	−3.59	−3.59	−3.59	0.35	0.35	0.35	0.35
MPR	EME–CPI	−0.34	−0.10	−0.05	−0.05	0.55	0.33	−0.18	−0.18
MPR	EME–XR	−2.82	−0.09	−2.26	−2.26	0.96	0.46	1.65	1.65
MPR	EME–GDP	−1.13	−0.96	−1.13	−1.13	0.05	−0.14	0.05	0.05
FXI	AE–CPI	0.01	−0.00	−0.05	−0.05	0.06	0.02	0.04	0.04
FXI	AE–XR	−0.40	−0.40	−0.40	−0.40	0.44	0.44	0.44	0.44
FXI	AE–GDP	−0.14	−0.14	−0.14	−0.14	0.07	0.07	0.07	0.07
FXI	EME–CPI	−0.14	−0.02	−0.14	−0.14	−0.04	0.01	−0.04	−0.04
FXI	EME–XR	−0.15	−0.04	−0.04	−0.04	0.01	−0.01	−0.01	−0.01
FXI	EME–GDP	−0.03	−0.09	−0.09	−0.09	−0.02	0.01	0.01	0.01
MPCFM	AE–CPI	−0.17	−0.06	−0.07	−0.07	−0.02	−0.09	−0.07	−0.07
MPCFM	AE–XR	−0.00	0.17	0.45	0.45	0.09	0.21	−0.11	−0.11
MPCFM	AE–GDP	0.04	0.38	0.04	0.04	0.04	0.17	0.04	0.04
MPCFM	EME–CPI	−0.24	−0.51	−0.47	−0.47	0.44	0.82	0.81	0.81
MPCFM	EME–XR	−0.19	−0.44	−0.55	−0.55	−0.06	−0.16	−0.27	−0.27
MPCFM	EME–GDP	0.07	0.22	0.04	0.04	0.02	0.20	0.01	0.01

Notes: Trajectory-weighted low- and high-stress responses, $\bar{\beta} = \sum_h w_h \beta_h / \sum_h w_h$ over $h = 1$–8, with weights $w = (0.5, 0.8, 1, 1, 1, 0.8, 0.6, 0.4)$, under four specifications. All specifications use the same samples, state variable, and country groups as the baseline. "Base" is the baseline specification reported in Table B.1. "Unif." replaces the cell-specific control blocks with a common control set for price and output cells (CDS and policy rate) and a common set for exchange-rate cells (CDS and policy-rate lags plus two lags of the dependent variable). "Stat." ranks the admissible candidates based only on stability, precision, and parsimony. "Top" uses the top-ranked specification in every cell. The sign of $\bar{\beta}^{\text{low}}$ is identical across all four specifications in 15 of 18 cells. The three exceptions (MPR–AE–XR, FXI–AE–CPI, and MPCFM–AE–XR) have baseline estimates that are statistically indistinguishable from zero.

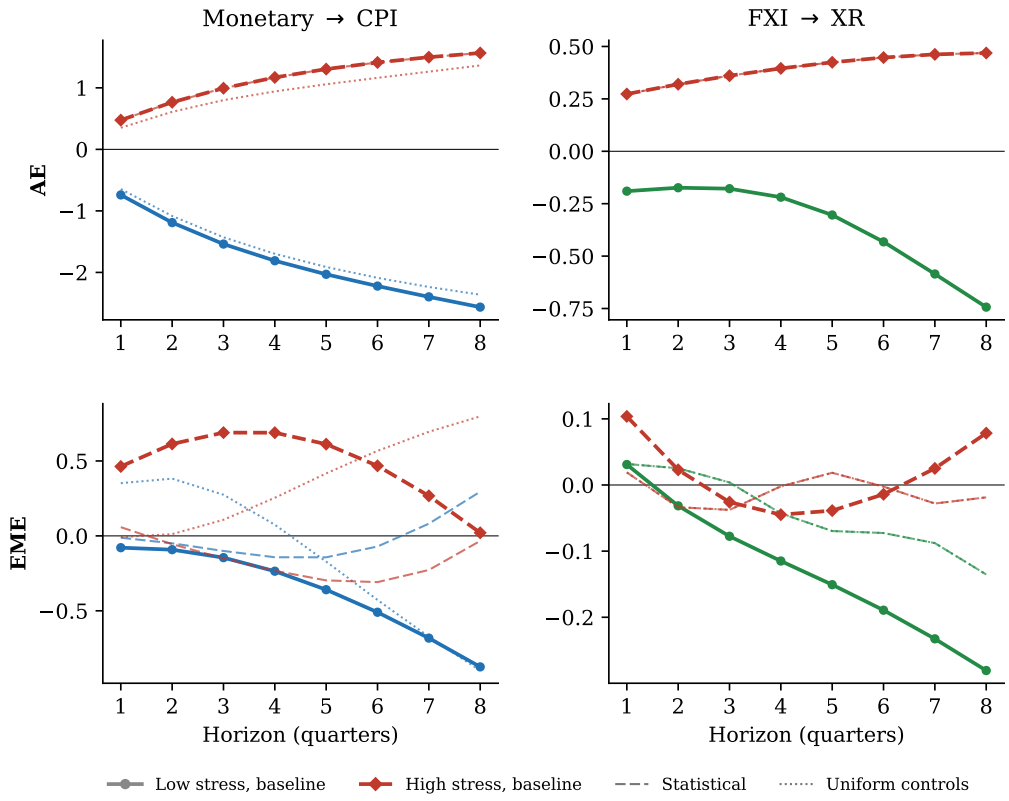


FIGURE B.1. IMPULSE RESPONSES UNDER ALTERNATIVE CONTROL SETS

Notes: Impulse responses of core CPI to the MPR shock and of the exchange rate to the FXI shock for advanced economies (top) and emerging economies (bottom), smoothed as in the main-text figures. Markers denote the baseline specification (circles: low stress; diamonds: high stress). Thin lines show the statistical and uniform alternatives reported in Table B.2.

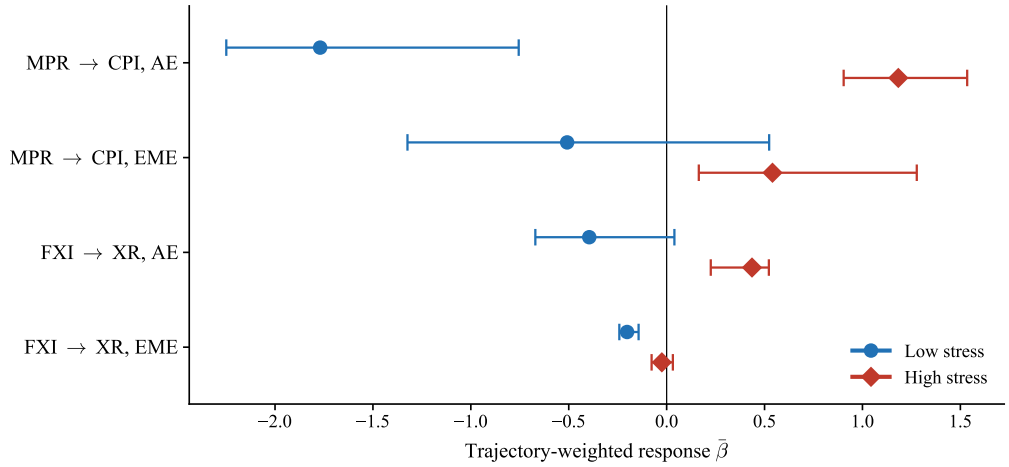


FIGURE B.2. LEAVE-ONE-YEAR-OUT TEMPORAL JACKKNIFE

Notes: Trajectory-weighted responses $\bar{\beta} = \sum_h w_h \beta_h / \sum_h w_h$ over horizons $h = 1$–8, for the monetary shock on core CPI and the FXI shock on the exchange rate, in advanced (AE) and emerging (EME) economies. Circles and diamonds mark the full-sample estimates under low and high fiscal stress; the bars span the range across the twenty-six estimates that each drop one calendar year (2000–2025).

Model Calibration

This appendix documents the calibration of the small open economy New Keynesian model used to interpret the state-dependent transmission patterns estimated in Appendix B. The model extends the quantitative Integrated Policy Framework model of Adrian et al. (2021) with a forward-looking sovereign risk premium, a fiscal block with monetary–fiscal regime switching, and quasi-fiscal costs of FX intervention. It is linearized around a zero-growth steady state and solved at quarterly frequency, and comprises: (i) an IS block with external consumption habit and quasi-GHH preferences, in which the marginal utility of consumption is $\lambda_{c,t} = -\sigma_\lambda(c_t - \kappa_c c_{t-1})$, so that the semi-elasticity of consumption to the real borrowing rate is $1/\sigma_\lambda$ (Neumeyer and Perri, 2005; Aguiar and Gopinath, 2007); (ii) a hybrid New Keynesian Phillips curve with backward indexation ι_d and slope κ_{mc}, together with Calvo-style import- and export-price Phillips curves (stickiness ξ_M, ξ_X) and a hybrid wage Phillips curve; (iii) an inertial Taylor rule that responds, with smoothing γ_i, to an eight-quarter window of CPI inflation—the average of expected inflation over the next four quarters and realized inflation over the current and previous three—and to output with coefficient γ_y; (iv) an uncovered interest parity (UIP) condition augmented with a forward-looking sovereign risk premium, $\sigma_{sov,t} = \theta_{sov}\,\mathbb{E}_t[b_{g,t+1}]$, which loads onto the currency risk premium with elasticity λ_q and onto private borrowing spreads with pass-through λ_ψ, in the spirit of Corsetti et al. (2013); (v) a foreign-exchange intervention (FXI) block in which reserve sales lower the currency premium with loading γ_{fx} but carry a quasi-fiscal sterilization cost that the market prices at the sovereign-risk sensitivity θ_{sov}; (vi) a capital-flow-management (CFM) tax that enters the UIP premium with loading γ_τ and domestic inflation with loading κ_{cfm}; and (vii) a government budget constraint in which inherited nominal debt is carried at the ex-post real rate, so that surprise inflation revalues outstanding debt—the fiscal-theory valuation channel (Cochrane, 2023)—with a tax rule responding to lagged debt with coefficient τ_t.

The model is calibrated separately for advanced economies (AE) and emerging market economies (EME), and each economy switches between two fiscal–monetary regimes that mirror the low- and high-stress states of the local projections. The normal regime is the standard active-money/passive-fiscal configuration; the high sovereign-stress regime is passive-money/active-fiscal, i.e., fiscal dominance in the sense of Leeper (1991) and Sargent et al. (1981), with regime-dependent expectations as in Bianchi and Melosi (2017) and the valuation mechanics emphasized by Cochrane (2023). The calibration strategy proceeds in three tiers. Tier 1 fixes standard structural parameters at values from the literature (Table C.1) and group-specific parameters at values that respect documented AE/EME orderings (Table C.2). Tier 2 calibrates the sovereign-risk premium to our own CDS–debt panel, estimated separately by group and stress state (Table C.4). Tier 3 matches the policy-instrument loadings (FXI and CFM) to the low-stress local-projection responses of Appendix B; their high-stress behavior

then follows from the measured sovereign-risk convexity and is not refit. The policy-stance parameters that define the high-stress regime are fixed at theory priors—the inflation response falls from $\gamma_\pi = 1.5$ to 0.9 and the fiscal response from $\tau_t = 0.6$ to 0—with no search over the parameter space (Table C.3); the only exception is the AE smoothing coefficient γ_i, which is constrained by equilibrium determinacy as discussed below. The model also nests an intermediary carry wedge in the UIP condition (Gabaix and Maggiori, 2015), with sensitivity χ_{fx}; the baseline sets $\chi_{fx} = 0$.

C1. Common structural parameters

Table C.1 reports the parameters held common across the two economies. Preferences, technology, and expenditure shares are standard for small open economy New Keynesian models; the Phillips-curve architecture follows the hybrid formulation of Galí and Gertler (1999) and the open-economy framework of Adrian et al. (2021), and the quasi-GHH preference specification follows the emerging-market business-cycle literature (Neumeyer and Perri, 2005; Aguiar and Gopinath, 2007).

C2. Group-specific parameters

Table C.2 reports the parameters that differ between advanced and emerging economies. The orderings are anchored in the literature rather than fit to the impulse responses: the Phillips curve is flatter in advanced economies (Galí and Gertler, 1999; Adrian et al., 2021), import and export prices are stickier and more indexed in advanced economies, the import content of the CPI is lower in EMEs once non-traded distribution margins are accounted for (Burstein et al., 2003), and steady-state government debt is higher in advanced economies.

C3. Regime-dependent policy stance

Table C.3 reports the policy-stance parameters in the two fiscal–monetary regimes. In the normal (low sovereign stress) regime, monetary policy is active ($\gamma_\pi = 1.5$) and fiscal policy is passive ($\tau_t = 0.6$): taxes respond to debt and the Taylor principle holds. In the high sovereign-stress regime, the stance flips to passive money/active fiscal: γ_π falls to 0.9 and the tax response to debt shuts down ($\tau_t = 0$), so that the price level—not surpluses—must absorb fiscal imbalances (Leeper, 1991; Sargent et al., 1981; Cochrane, 2023).

These stance parameters are fixed at theory priors; no search over the parameter space is performed. The one exception is imposed by equilibrium determinacy: in the AE calibration, the passive-money/active-fiscal regime with high steady-state debt has no stable equilibrium at the structural smoothing coefficient $\gamma_i = 0.943$, so we set $\gamma_i = 0.70$ in the AE stress regime, the same value as the EME structural coefficient. In economic terms, fiscal dominance in a high-debt economy is incompatible with highly inertial interest-rate policy.

Table C.1—Common structural parameters

Parameter	Symbol	Value	Source / target
Preferences and technology			
Discount factor	β	0.995	Standard (quarterly)
Steady-state inflation (quarterly)	π_{ss}	0.005	2% annual inflation target
Risk aversion	σ	1	Log utility
Consumption habit	κ_c	0.85	Standard SOE-NK range
Marginal-utility curvature (normal)	σ_λ	0.20	Quasi-GHH; Neumeyer and Perri (2005)
Inverse Frisch elasticity	χ	2	Standard
Capital share	α	0.3	Standard
Expenditure shares and trade			
Import share in GDP	M_Y	0.20	National accounts, SOE average
Government spending share	G_Y	0.20	National accounts
Consumption share	C_Y	0.80	$1 - G_Y$
Import demand elasticity	ϵ_c	0.8	Standard SOE-NK
Export demand elasticity	ϵ_{c^*}	0.8	Standard SOE-NK
Price and wage setting			
Wage Phillips slope	κ_w	0.020	Standard value
Wage indexation	ι_w	0	—
Import/export price indexation	ι_M, ι_X	0.50	Standard
Euler discount factor	δ_c	0.95	Adrian et al. (2021)
Phillips discount factor	δ_π	0.92	Adrian et al. (2021)
Policy and financial block (common)			
Taylor output response	γ_y	0.398	Standard range
Expected-inflation weight in real rate	θ_{rb}	0.22	Moment-matched (MPR block)
External-debt premium elasticity	ϕ_d	0.02	Stationarity-inducing, small
Tax revenue share	τ_y	0.20	National accounts
Exogenous processes: persistence			
Fiscal, foreign demand, foreign rate	ρ_g, ρ_{c^*}, ρ_{r^*}	0.95	Standard
Risk-off shock	$\rho_{\bar{d}}$	0.90	Standard
Portfolio inflows	ρ_{bp}	0.90	Standard
FX reserves	ρ_{bm}	0.75	FXI persistence in panel
CFM tax	ρ_τ	0.90	Persistent regulatory changes
Monetary shock	ρ_i	0	i.i.d. policy surprise
Exogenous processes: standard deviations			
Monetary policy	σ_{ε_i}	0.0625	25 bp annualized
FXI	$\sigma_{\varepsilon_{fxi}}$	0.5	Scaled to LP shock size
CFM	$\sigma_{\varepsilon_{cfm}}$	0.01	Scaled to LP shock size
Preference, fiscal	σ_{ε_c}, σ_{ε_g}	1.5	Standard
Foreign demand	$\sigma_{\varepsilon_{c^*}}$	2.0	Standard
Foreign rate	$\sigma_{\varepsilon_{r^*}}$	0.25	Standard
Risk-off, portfolio	$\sigma_{\varepsilon_{\bar{d}}}$, $\sigma_{\varepsilon_{bp}}$	1.0, 0.5	Standard

Notes: All parameters are at quarterly frequency. The marginal-utility curvature $\sigma_\lambda = 0.20$ implies a semi-elasticity of consumption to the real rate of $1/\sigma_\lambda = 5$, consistent with quasi-GHH preferences (Neumeyer and Perri, 2005; Aguiar and Gopinath, 2007). The monetary shock standard deviation of 0.0625 percentage points at quarterly frequency corresponds to 25 basis points annualized. Model impulse responses are reported for a 100-basis-point annualized shock. FXI and CFM shocks are rescaled to the average shock sizes underlying the local projections in Appendix B.

TABLE C.2—GROUP-SPECIFIC PARAMETERS (ADVANCED VS. EMERGING ECONOMIES)

Parameter	Symbol	AE	EME	Source / rationale
Phillips-curve slope	κ_{mc}	0.02	0.045	Flatter AE Phillips curve (see notes)
Import-price stickiness	ξ_M	0.80	0.55	Higher EME import pass-through
Export-price stickiness	ξ_X	0.90	0.72	Deeper AE pricing-to-market
Domestic price indexation	ι_d	0.75	0.50	Stronger AE inflation inertia
Import share in CPI	M_C	0.20	0.15	Burstein et al. (2003)
Spread persistence	ρ_ψ	0.90	0.75	Financial-cycle persistence
Steady-state debt/GDP	$\bar{b}_g$	0.80	0.45	Panel averages by group
Interest-rate smoothing	γ_i	0.943	0.70	Estimated Taylor rules (AE); standard (EME)

Notes: The Phillips-curve ordering $\kappa_{mc}^{EME} > \kappa_{mc}^{AE}$ reflects more frequent repricing, less anchored expectations, and higher trend inflation in emerging markets. The AE value of 0.02 lies in the flat-Phillips-curve range of Adrian et al. (2021) and Galí and Gertler (1999). The gap between the CPI import share M_C and the raw import share $M_Y/(1-G_Y) = 0.25$ is consistent with the 40–60% non-traded distribution margin in consumer prices of traded goods estimated by Burstein et al. (2003). The structural smoothing coefficient γ_i applies in the normal regime; its high-stress value is determinacy-constrained for AEs, as reported in Table C.3.

TABLE C.3—REGIME-DEPENDENT POLICY STANCE: NORMAL VS. HIGH SOVEREIGN STRESS

		AE		EME	
Parameter	Symbol	Normal	Stress	Normal	Stress
Taylor inflation response	γ_π	1.50	0.90	1.50	0.90
Tax response to debt	τ_t	0.60	0.00	0.60	0.00
Interest-rate smoothing	γ_i	0.943	0.70	0.70	0.70

Notes: The normal regime features active monetary policy and passive fiscal policy, whereas the stress regime features passive monetary policy and active fiscal policy, corresponding to fiscal dominance (Leeper, 1991; Sargent et al., 1981; Bianchi and Melosi, 2017; Cochrane, 2023). All stress-regime parameters are fixed at theory-based priors and are not selected by grid search. For AEs, the stress-regime smoothing coefficient is set to $\gamma_i = 0.70$ to ensure determinacy. At the higher structural value $\gamma_i = 0.943$, the passive-monetary/active-fiscal regime is indeterminate given the high steady-state debt level.

C4. Data-calibrated and moment-matched parameters

Table C.4 reports the parameters calibrated to our own panel or matched to the local-projection moments of Appendix B.

Sovereign-risk sensitivity θ_{sov}. The semi-elasticity of sovereign CDS spreads to public debt is estimated in our quarterly panel:

$$\text{CDS}_{i,t} \;=\; \alpha_i + \delta_t + \theta^{raw}\, b_{i,t-1} + u_{i,t}, \tag{C.1}$$

where CDS is in annual basis points and debt b in percent of GDP, with country and quarter fixed effects and two-way clustered standard errors, estimated separately by group and by stress state on the subsamples below and above each country's median of the smoothed, lagged CDS state of Section B.B2. Model units convert as $\theta_{sov} = 0.25\,\theta^{raw}$: one model rate unit equals 400 annual basis points and debt enters the model as a fraction of GDP, so $\theta_{sov} = \theta^{raw} \times 100/400$. For EMEs the regressions yield $\theta^{raw} = 1.44$ ($t \approx 3.2$) under low stress and 4.40 ($t \approx 3.1$) under high stress, so $\theta_{sov} = 0.361$ and 1.101—a convexity of approximately 3, the shape predicted by fiscal-limit models (Bi, 2012) and estimated in the fiscal-fatigue literature (Ghosh et al., 2013). For AEs the within-country relationship is statistically insignificant, and the between-country relationship is generated by Greece, consistent with De Grauwe and Ji (2013). We therefore set the AE low-stress value to the ex-Greece between-country point estimate ($\theta_{sov} = 0.06$) and apply the EME convexity factor for the high-stress value ($\theta_{sov} = 0.18$); a zero sovereign channel leaves the AE high-stress regime without a determinate equilibrium. The AE values are a prior, not a data estimate.

Pass-throughs. The sovereign premium loads onto private borrowing spreads with $\lambda_\psi = 0.75$, in line with the sovereign-to-corporate pass-through evidence surveyed by Corsetti et al. (2013), and onto the currency risk premium with $\lambda_q = 1.0$.

FXI block. The FXI loading γ_{fx} and the quasi-fiscal sterilization cost ς are jointly identified from two restrictions: the effective low-stress loading, $\gamma_{fx} - \varsigma\,\theta^{lo}_{sov}$, matches the impact response of the exchange rate to FXI shocks in the low-stress local projections, and $\gamma_{fx} = \varsigma\,\theta^{hi}_{sov}$, so that effectiveness vanishes as sovereign risk reaches its high-stress level. The state-dependence of FXI effectiveness is therefore structural: it declines with sovereign risk at the rate given by the measured convexity of θ_{sov}, and is not refit across regimes.

CFM block. The CFM loadings $\kappa_{cfm} = 0.12$ (credit-demand/inflation channel) and $\gamma_\tau = 0.02$ (UIP-premium channel) are identified internally to the low-stress CPI and exchange-rate responses to macroprudential/capital-control shocks. In the stress regime both loadings are scaled down by the factor $\theta^{lo}_{sov}/\theta^{hi}_{sov}$, so the loss of effectiveness under stress is tied to the same measured convexity; capital controls are easier to evade when the risk premium is large.

Table C.4—Data-calibrated and moment-matched parameters

Parameter	Symbol	AE	EME	Target / identification
Sovereign-risk sensitivity, low stress	θ_{sov}^{lo}	0.06	0.361	CDS–debt panel semi-elasticity
Sovereign-risk sensitivity, high stress	θ_{sov}^{hi}	0.18	1.101	CDS–debt panel, stress split
Sovereign → private spreads	λ_{ψ}	0.75	0.75	Corsetti et al. (2013)
Sovereign → currency premium	λ_{q}	1.00	1.00	Set to 1
FXI loading on UIP premium	γ_{fx}	0.375	0.0893	LP low-stress FXI→XR impact
Sterilization cost	ς	2.083	0.0811	$\gamma_{fx} = \varsigma\, \theta_{sov}^{hi}$ (high-stress decay)
CFM inflation loading	κ_{cfm}	0.12	0.12	LP low-stress CFM→CPI moment
CFM UIP-premium loading	γ_{τ}	0.02	0.02	LP low-stress CFM→XR moment

Notes: The estimation of θ_{sov} and its unit conversion are reported in equation (C.1). The effective FXI loading in state s is $\gamma_{fx} - \varsigma\, \theta_{sov}^{s}$. In the stress regime, the CFM loadings are scaled by the ratio $\theta_{sov}^{lo}/\theta_{sov}^{hi}$.