Time-Consistent Fiscal Policy and Business-Cycle in Emerging Markets

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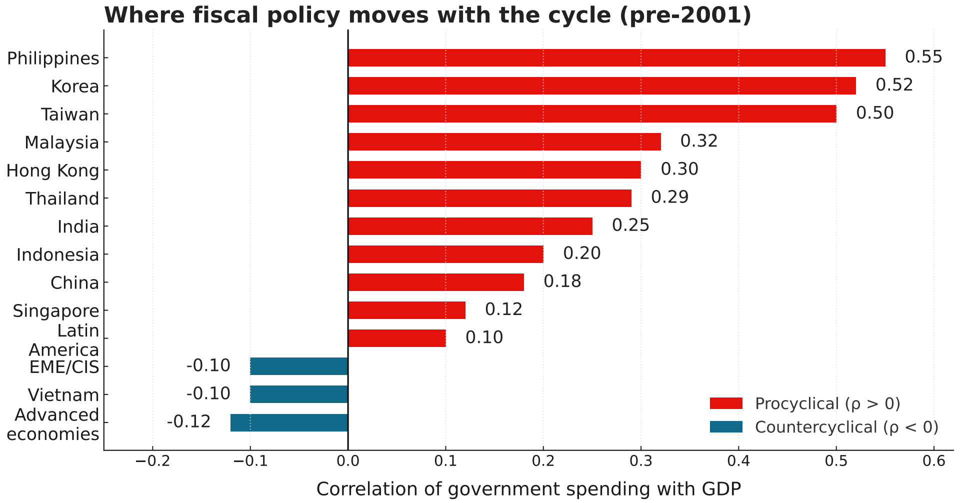
Roadmap

- Motivation and facts on procyclical government spending in Emerging Markets
- Model: time-consistent fiscal policy in a small open economy
- Calibration and solution strategy
- Results: mechanisms, moments, counterfactuals
- Policy implications and limits

Motivation

Procyclicality in Emerging Markets



Source: IMF. Positive = procyclical; negative = countercyclical.

Why it matters?

- G **(government purchases):** government *consumption* + *public investment*; transfers and interest are excluded. Provides public goods/services (education, health, infrastructure).
- Y **(output):** real gross domestic product (real GDP).
- **Procyclicality:** $\mathrm{corr}(Y, G)$ is the contemporaneous correlation of the *cyclical components* of Y and G; procyclical (> 0), acyclical (≈ 0), countercyclical (< 0).

Notation used throughout: G always denotes *government purchases*, not total outlays.

Why it matters

- **Stylized facts.** Government *purchases* are procyclical in both **advanced economies (AEs)** and **emerging market economies (EMEs)** ($\mathrm{corr}(Y, G) > 0$). In advanced economies, *total* spending can look acyclical because *countercyclical transfers* offset procyclical purchases. Volatility of purchases is markedly higher in **emerging market and developing economies** and in **low-income countries (LICs)** than in advanced economies.
- **Public-goods channel.** In recessions, household incomes fall while demand for public services rises; if G also falls, public-goods consumption contracts and welfare declines. Smoothing G stabilizes public-goods consumption and household utility.

Evidence: purchases vs. totals Ilzetzki and Végh, 2008; Lane, 2003; volatility gaps Marioli et al., 2024; welfare & market-incompleteness Pallage and Robe, 2003; Riascos and Vegh, 2003.

Research Question & Contributions

Research question

- **Question.** How does **procyclical government purchases**, chosen **without commitment**, shape macroeconomic **volatility** and **welfare** in a typical emerging market?
- **Environment.** Small open economy; the fiscal authority is **time-consistent** (Markov-perfect) and chooses next-period G subject to feasibility and prudential caps.

What we contribute?

- **Endogenous public goods.** Government purchases enter household utility, so even *optimal* discretionary policy can appear procyclical.
- **Multiple shocks.** Preference, world interest-rate, and productivity shocks jointly discipline co-movement and persistence.
- **Institutional realism.** A constant public-debt rule and simple feasibility caps (government spending cap) mirror emerging-market practice; we evaluate outcomes *within* limited commitment (Markov-perfect equilibrium).

What we solve?

- **Setting.** A small open economy with mobile capital and distortionary taxes. The government chooses next period's public spending; households choose current consumption and next period's savings.
- **State and signals.** The state includes household assets, productivity, the world interest rate. Agents observe today's fundamentals and the one-period-ahead signal and choose forward-looking actions.
- **Timing.** The government (leader) announces a rule mapping today's state to next period's spending; households then choose consumption and savings; shocks realize; the state updates for the next period.
- **Equilibrium.** Markov-perfect (dynamic Stackelberg) strategies for government and households: mutual best responses; constraints and feasibility hold; policies depend only on the current state.

Equations and transition laws appear next.

How we solve it?

- **Fixed point.** Compute the equilibrium as the fixed point of "government best response to the households' best response."
- **Households' best response.** Endogenous Grid Method builds expectations from signals, delivers savings and consumption rules, enforces feasibility and borrowing limits.
- **Government's best response.** Choose next period's spending while internalizing effects on consumption and savings; impose fiscal rules and convex adjustment costs; verify subgame perfection.
- **Convergence.** Iterate the policy rule until the maximum change is below the tolerance; approximate policy and value functions with low-dimensional polynomial under ridge regularization.

Implementation details appear later.

Why the Philippines & External Validity?

Why the Philippines & external validity

- **Representative EM:** near medians on income, trade openness, and external positions.
- **Institutional match:** debt anchors/deficit ceilings; no structural-balance rule $\Rightarrow$ procyclical bias.
- **Data standards & comparability:** IMF **GFSM 2014** (Government Finance Statistics Manual) + IMF **SDDS** (Special Data Dissemination Standard) $\Rightarrow$ consistent fiscal mapping, transparent releases/metadata, replicable moments.

Generalizes to EMs with limited commitment similar market access, institutions, and standards.

Model

Key model features & assumptions

- **Time-consistent** government: no commitment to future G (Markov-perfect equilibrium). (Bachmann and Bai, 2013a; Fernández-Villaverde et al., 2015; Klein et al., 2008)
- **Borrowing & spending limits**: Government spending cap always respected (constrain G in busts/booms).
- **Open economy**: households trade assets internationally at r^* (perfect capital mobility) (Corsetti and Müller, 2013; Mendoza, 1991; Obstfeld and Rogoff, 1996).
- **Adjustment cost**: convex cost $\frac{\Omega}{2}(G_{t+1} - G_t)^2$ on changing G (smooths fiscal policy changes) (Bachmann and Bai, 2013b).

Households — preferences & budget

Equations

$$u(C_t, G_t) = \theta_t \log C_t \; + \; (1-\theta_t) \log G_t \tag{1}$$

$$C_t + A_{t+1} = (1-\tau_{\ell,t})\, w_t L \; + \; \big(1 + (1-\tau_A)\, r_t^*\big) A_t \tag{2}$$

Intuition

- (1): intratemporal trade-off between private consumption and the public good via the time-varying taste weight θ_t.
- (2): disposable resources = after-tax labor income $(1-\tau_{\ell,t}) w_t L$ plus after-tax asset returns $\big(1 + (1-\tau_A) r_t^*\big) A_t$.
- Perfect capital mobility: the intertemporal margin is pinned to the world rate r_t^*.

Symbols: C_t consumption; G_t public good; A_t foreign assets; w_t wage; L labor (inelastic); θ_t taste weight; $\tau_{\ell,t}$ labor-income tax; τ_A asset-income tax; r_t^* world interest rate.

Firms & SOE closure — technology & factor prices

Equations

$$Y_t = z_t\, K_t^{\alpha} L^{\,1-\alpha}, \qquad \alpha \in (0,1) \tag{3}$$

$$r_{k,t} = \alpha\, z_t \left(\frac{K_t}{L}\right)^{\alpha-1}, \quad w_t = (1-\alpha)\, z_t \left(\frac{K_t}{L}\right)^{\alpha} \tag{4}$$

$$\ln z_{t+1} = (1-\rho_z) \ln \bar{z} + \rho_z \ln z_t + \varepsilon_t^z, \quad \varepsilon_t^z \sim \mathcal{N}(0, \sigma_z^2) \tag{5}$$

Intuition

- Cobb–Douglas $\Rightarrow$ factor prices equal marginal products.
- Higher TFP raises the rental rate and the wage (through K_t/L).
- TFP follows log-AR(1) with persistence ρ_z, variance σ_z^2, mean $\bar{z}$.

Symbols: z_t TFP; K_t capital; L labor; α capital share; $r_{k,t}$ rental rate; w_t wage; $\rho_z, \bar{z}, \sigma_z$ TFP parameters.

Firms & SOE closure — user cost & capital demand (current)

Equations (using (4))

$$r_{k,t} = r_t^* + \delta \tag{6}$$

$$K_t = L\left(\frac{\alpha\, z_t}{r_t^* + \delta}\right)^{\frac{1}{1-\alpha}} \tag{7}$$

$$r_{t+1}^* = (1-\rho_r)\,\bar{r}^* + \rho_r\, r_t^* + \varepsilon_t^r, \quad \varepsilon_t^r \sim \mathcal{N}(0, \sigma_r^2) \tag{8}$$

Intuition

- Small open economy: perfect mobility equates the user cost $r_t^* + \delta$ with MPK (combine (4) and (6)).
- Given (z_t, r_t^*), (7) pins down K_t/L and thus factor prices.
- The world interest rate follows an *AR(1) in levels* with persistence ρ_r, variance σ_r^2, mean $\bar{r}^*$ ((8)).

Symbols: K_t capital; L labor; δ depreciation; r_t^* world rate; $\rho_r, \bar{r}^*, \sigma_r$ AR(1) parameters.

Firms & SOE closure — news & investment

Equations

$$K_{t+1} = L\left(\frac{\alpha\, z_{t+1}}{r^*_{t+1} + \delta}\right)^{\frac{1}{1-\alpha}} \tag{9}$$

$$I_t = K_{t+1} - (1-\delta)K_t \tag{10}$$

Intuition

- News at time t about (z_{t+1}, r^*_{t+1}) pins down desired next-period capital via (9).
- Investment adjusts according to (10); $\partial K_{t+1}/\partial z_{t+1} > 0$, $\partial K_{t+1}/\partial r^*_{t+1} < 0$.

Symbols: K_{t+1} next-period capital; I_t gross investment; δ depreciation; r^*_t world rate.

Government — budget & financing (I)

Equations

$$B_{t+1} = (1 + r_t^*)\, B_t \; + \; G_t \; + \; AC_t \; - \; T_t \tag{11}$$

$$T_t = \tau_{\ell,t}\, w_t L \; + \; \tau_a\, r_t^*\, A_t \tag{12}$$

Intuition

- (11): debt evolves with the borrowing rate, purchases, adjustment costs, and tax revenue.
- (12): revenue from labor taxes and asset–income taxation.

Symbols: B_t public debt; G_t purchases; AC_t adjustment cost for G; T_t taxes; $\tau_{\ell,t}$ labor-tax rate; τ_a asset-income tax; w_t wage; L labor; A_t private foreign assets; r_t^* world rate.

Government — constant-debt rule & implied taxes (II)

Equations (from (11))

$$B_{t+1} = B_t \;\equiv\; \bar{B} \tag{13}$$

$$T_t = G_t \;+\; AC_t \;+\; r_t^* \,\bar{B} \tag{14}$$

$$\tau_{\ell,t} = \frac{G_t + AC_t + r_t^* \,\bar{B} - \tau_a \, r_t^* \, A_t}{w_t \, L} \tag{15}$$

Intuition

- With (13), (11) implies (14): the primary surplus must cover interest $r_t^* \bar{B}$.
- Given prices and (G_t, AC_t), (15) gives the labor tax required to implement the constant-debt rule.

Symbols: $\bar{B}$ debt target.

Government — feasibility caps & adjustment costs (III)

Equations

$$AC_t = \frac{\Omega}{2}\left(G_{t+1} - G_t\right)^2, \qquad \Omega > 0 \tag{16}$$

$$G_{t+1} \le \bar{g}\, Y_{t+1}, \qquad \bar{g} \in (0,1) \tag{17}$$

$$Y_t = C_t \ + \ I_t \ + \ G_t \ + \ AC_t \ + \ TB_t \tag{18}$$

Intuition

- (16): adjustment cost is a resource use (not utility) and enters both the budget and goods market.
- (17): spending cap as a share of next-period output; with news on Y_{t+1}, it can bind at choice time.
- (18): open-economy resource constraint; TB_t is the trade balance (net exports).

Symbols: Ω adjustment-cost parameter; $\bar{g}$ spending cap; Y_t output; C_t consumption; I_t investment; G_t purchases; TB_t trade balance.

Market clearing — absorption & investment

Equations

$$Y_t = C_t + I_t + G_t + AC_t + TB_t \tag{19}$$

$$I_t = K_{t+1} - (1-\delta)\,K_t \tag{20}$$

Intuition

- Absorption identity: output goes to private absorption $(C_t + I_t)$, public purchases G_t, fiscal adjustment costs AC_t, and the trade balance TB_t.
- AC_t is a resource use (appears in the government budget and goods market), not a utility term.
- Given a choice of K_{t+1}, investment follows from capital accumulation (20).

Symbols: Y_t output; C_t consumption; I_t investment; G_t government purchases; AC_t adjustment cost of changing G; TB_t trade balance (exports minus imports); K_t capital; δ depreciation rate.

Markov-Perfect Equilibrium (MPE): components

Public consumption is chosen to maximize the contemporaneous utility of the household (both private consumption and public goods), **subject to adjustment costs on changes in G and tax-collapse constraints**.

Objects

- **State vector:** $\mathbf{s} = (A, G, r^*, z, \varepsilon_r, \varepsilon_z, \theta)$
- **Government policy function:** $G' = \Psi(\mathbf{s})$
- **Aggregate asset transition:** $A' = H(\mathbf{s}, G')$
- **Tax function (implements constant debt):** $\tau_\ell = \tau_\ell(\mathbf{s}; H)$
- **Value function:** $v(a, \mathbf{s}; \Psi, H)$
- **Best-response value:** $J(a, \mathbf{s}, G'; \Psi, H)$
- **Household asset rule:** $a' = h(a, \mathbf{s}, G'; \Psi, H)$

MPE — household best response & budget (I)

Household best response (given G' and (Ψ, H))

$$J(a, \mathbf{s}, G'; \Psi, H) = \max_{c,\, a' \geq \underline{a}} \left\{ \theta \log c + (1-\theta) \log G + \beta\, \mathbb{E}\big[v(a', \mathbf{s}'; \Psi, H) \big] \right\} \tag{21}$$

$$\text{s.t.} \quad c + a' = (1-\tau_\ell)\, w(r^*, z)\, L + \left[\, 1 + (1-\tau_A)\, r^* \,\right] a \tag{22}$$

Intuition

- (21): one-period utility plus discounted continuation value given policy rule Ψ and aggregator H.
- (22): disposable resources are after-tax labor income and after-tax world return on assets.

Symbols: J current-period objective with continuation; v value function; a private assets; $\mathbf{s}$ Markov state (see next slide); Ψ government policy rule; H aggregator for aggregates; $\underline{a}$ borrowing limit. $w(r^*, z)$ comes from firm pricing (see (4)); τ_A asset-income tax.

MPE — constraints, aggregation & transitions (II)

Restrictions & laws of motion

$$c \geq 0, \qquad a' \geq \underline{a} \tag{23}$$

$$A' = H(\mathbf{s}, G') \tag{24}$$

$$\tau_\ell = \tau_\ell(\mathbf{s}; H) \quad \text{(implements gov't financing, see (15))} \tag{25}$$

$$w = w(r^*, z) \quad \text{(factor pricing, see (4))} \tag{26}$$

$$\mathbf{s}' \sim \mathcal{P}(\cdot \,|\, \mathbf{s}, G', \varepsilon_r, \varepsilon_z) \quad \text{with } r^{*'} \text{ and } z' \text{ determined by news } (\varepsilon_r, \varepsilon_z) \tag{27}$$

State vector

A convenient choice is $\mathbf{s} = (a, A, r^*, z, \theta, G)$, where A are aggregate (external) assets and G is current public spending.

Notes: (24) aggregates private choices into next-period aggregates (e.g., A'). (25) ties the labor tax to the financing rule (e.g., constant-debt) via (15). (27) summarizes exogenous transitions with news that partially reveal $r^{*'}$ and z' at time t.

MPE — government policy & fixed point (III)

Government problem (limited commitment / Markov–perfect)

$$\Psi\big(A,\ r^*,\ z,\ \varepsilon_r,\ \varepsilon_z,\ \theta,\ G\big)\ =\ \arg\max_{G'}\Big\{\ J\big(a,\ \mathbf{s},\ G';\ \Psi,\ H\big)\Big\} \tag{28}$$

s.t. financing & caps: (13), (14), (16), (17); and goods market (19).

Markov–perfect equilibrium (definition)

A pair (Ψ, H) is an MPE if:
(i) Ψ solves (28) taking (Ψ, H) as given;
(ii) given Ψ, households' best responses solve (21)–(22) subject to (23)–(27);
(iii) H is consistent with aggregation of best responses (e.g., (24)).

Symbols: Ψ policy function (next-period spending $G' = \Psi(A, r^*, z, \varepsilon_r, \varepsilon_z, \theta, G)$); $\mathcal{P}$ transition kernel for $\mathbf{s}$; $(\varepsilon_r, \varepsilon_z)$ news shocks determining $r^{*'}$ and z'.

Calibration — moments: model vs. data (annual)

Business-cycle moments

Moment	Model	Data (ES)
Std (%)	7.2*	6.6
AR(1)	0.64	0.36
Corr(G, Y)	0.37	0.31
Corr(G, Y_{t-1})	0.32†	0.17
Corr(G, Y_{t-2})	0.20†	0.28

Notes: Std = standard deviation of cyclical G (percent). AR(1) is first-order autocorrelation. Corr = contemporaneous or lagged correlation with output. * model baseline simulation; † lagged-output correlation.

Calibration — baseline parameters (annual)

Parameter	Symbol	Value	Source / Target
Preferences & Technology			
Discount factor	β	0.96	Standard annual ($\approx$4% real rate)
Capital share	α	0.33	Standard in growth/RBC
Depreciation	δ	0.10	Annual depreciation (10% p.a.)
Private-good weight	$\bar{\theta}$	0.75	Utility aggregator weight
International Finance			
World real rate	r^*	0.04	Long-run external rate (4% annual)
Domestic bonds (constant)	B_{dom}	0.50	Stationarity device (no DEIR)
Asset-income tax	τ_a	0.15	Effective capital/bond tax (15%)
Exogenous Processes (annual)			
TFP AR(1)	(ρ_z, σ_z)	(0.90, 0.03)	$n_z = 3$ states (Rouwenhorst)
World rate AR(1)	(ρ_r, σ_r)	(0.85, 0.008)	$n_r = 2$ states (Rouwenhorst)
Preference shock	ρ_θ	0.90	Two-state preference process
Preference states	$(\theta_{\text{low}}, \theta_{\text{high}})$	(0.60, 0.90)	Low vs. high weight on C

Results & Discussion

Results — policy function coefficients by exogenous state

	Mean	Std. dev.	Min	Max
Panel A. Household asset rule ($\log A_{t+1} = \alpha_0 + \alpha_1 \log A_t + \alpha_2 \log^2 A_t + \alpha_3 \log G_t + \alpha_4 \log^2 G_t$)				
Persistence α_1	0.882	0.201	0.656	1.266
Curvature α_2	−0.028	0.141	−0.294	0.100
Government response α_3	−0.467	0.336	−1.122	−0.162
Government curvature α_4	−0.032	0.024	−0.078	−0.011
Panel B. Government spending rule ($\log G_{t+1} = \beta_0 + \beta_1 \log G_t + \beta_2 \log^2 G_t + \beta_3 \log A_t + \beta_4 \log^2 A_t$)				
Intercept β_0	0.039	0.054	−0.061	0.111
Own persistence β_1	0.047	0.013	0.025	0.065
Curvature β_2	0.008	0.021	−0.020	0.034
Asset response β_3	−0.012	0.022	−0.056	0.009
Asset curvature β_4	−0.001	0.002	−0.004	0.001

Average elasticities: $\partial \ln A_{t+1}/\partial \ln G_t \approx -0.350$, $\partial \ln G_{t+1}/\partial \ln A_t \approx 0.015$.

Notes. Coefficients averaged over 12 exogenous states $(z, r, \theta) = (3 \times 2 \times 2)$ on the publication grid (36 assets $\times$ 31 spending $\Rightarrow$ 2,232 states). Log-quadratic basis with ridge $\lambda = 0.01$; converged at iter 320 ($\Delta H = 4.67 \times 10^{-3} \approx 0.93 \cdot$tol, $\Delta\Psi = 1.43 \times 10^{-5} \approx 0.003 \cdot$tol).

Policy rules — main messages from the estimates

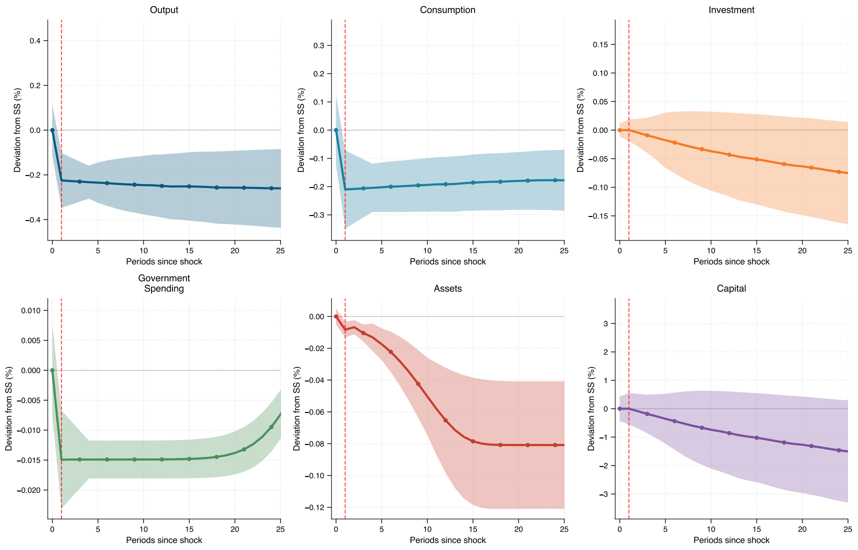
- **How savings evolve.** Households tend to carry today's balance into tomorrow; current assets are a strong predictor of next period's assets (average persistence **0.88**).
- **Adjustment varies with conditions.** The "curvature" terms are small on average but differ across macro environments, so some situations push households to adjust savings more sharply than others.
- **Reaction to public spending.** When government spends more this period, households typically save less next period (average response **0.47** per 1% higher G), a negative effect in all environments—consistent with crowding out.
- **How policy adjusts.** The government mainly *shifts the overall level of spending up or down as conditions change*; it leans only mildly on last period's level (persistence **0.05**) and responds little to households' wealth (asset sensitivity **0.01**).
- **Bottom line.** In a time-consistent EM setting, spending moves with the cycle and with expected conditions; households partly offset it (average saving elasticity **0.35**), and feedback from private wealth back to policy is limited.

Figures summarise coefficient means across 12 macro environments (z, r, θ).

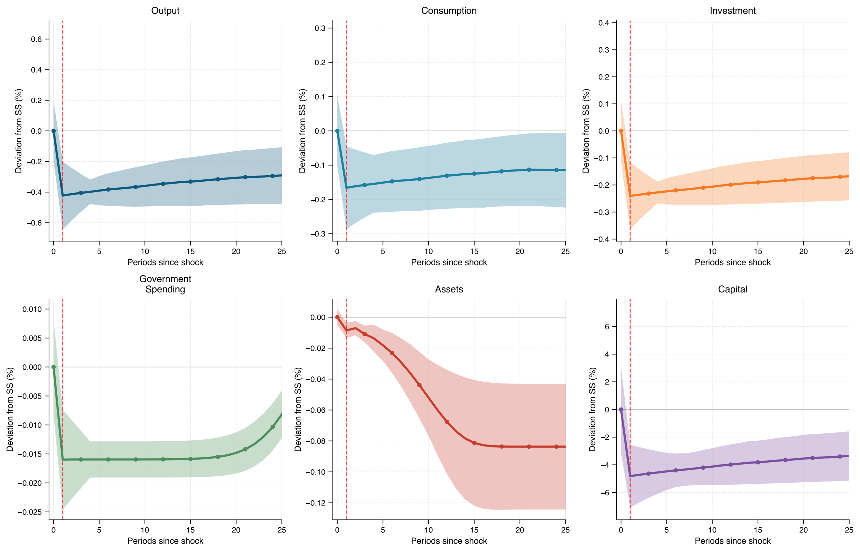
IRFs — what to remember

- **Supply vs. demand.** Output reacts *more sharply and persistently* to supply-side shocks (productivity $z \downarrow$, world rate $r^* \uparrow$) than to preference shocks—consistent with SOE arbitrage constraining demand responses; investment moves via the user cost, G remains modestly procyclical.
- **Preference shocks.** Immediate *reallocation* from public to private consumption; capital and asset accumulation adjust gradually, reflecting government–household strategic interaction in MPE.
- **State dependence.** Responses vary meaningfully across current (z, r, θ): policy functions shift mainly via *state-contingent intercepts*, implying heterogeneous IRFs and design implications for fiscal rules and debt management.

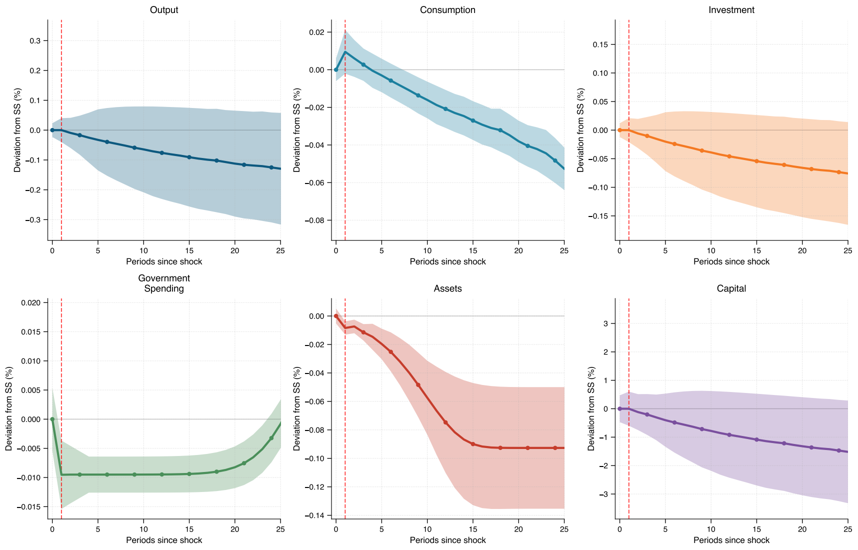
Impulse response — productivity ($z\downarrow$)



Impulse response — world interest rate ($r^* \uparrow$)



Impulse response — world interest rate ($\theta \uparrow$)



Conclusion

Conclusion — time-consistent fiscal policy in EM cycles

- **What it implies.** With limited commitment, a constant-debt anchor, simple caps, and costs of changing policy, the time-consistent rule keeps public spending *procyclical* and *forward-looking*: government mainly *raises or lowers the overall level of G as conditions change*, rather than reacting to household balances.
- **Consequences for cycles.** Because G tracks expected fundamentals and adjusts gradually, public services rise in booms and ease in downturns, tending to **reinforce** rather than offset business-cycle fluctuations; the direct response to household wealth is **small**.
- **Policy design.** To temper amplification, **smooth** G **over the cycle** (e.g., medium-term expenditure ceilings, structural-balance rules, stabilization funds). Expect a **trade-off**: steadier G typically implies more adjustment via taxes or debt; the net gain depends on how much **internal smoothing** (from adjustment costs) is already at work.

Appendix

Computation — solver workflow

Model solve (Markov-perfect equilibrium)

- *Setup:* build grids (center-heavy $\mathcal{G}$; dense $\mathcal{A}$ near 0); discretize shocks (Rouwenhorst, 1995; Tauchen, 1986); precompute transitions.
- *Scale & steady state:* pin $(Y_{ss}, G_{ss}, \tau_{\ell,ss})$ and normalize value/policy scales.
- *Warm start:* initialize $G' \equiv G$, rough off-path (A', C), flat values.
- *Fixed-point loop (each iteration):* household EGM update $\rightarrow$ government Bellman best reply g^{+} (feasibility projection).
- **Convergence test:** stop if $\|a^{k+1} - a^{k}\|_{\infty} < \varepsilon$ and $\|g^{k+1} - g^{k}\|_{\infty} < \varepsilon$; otherwise go back to the EGM step and continue.
- *Diagnostics:* check Euler digits, Bellman residuals, and feasibility.

Computation — algorithm & parametric projection

Parametric projection

$$
\begin{aligned}
\log A_{t+1} &= \alpha_0 + \alpha_1 \log A_t + \alpha_2 (\log A_t)^2 + \alpha_3 \log G_t + \alpha_4 (\log G_t)^2, \\
\log G_{t+1} &= \beta_0 + \beta_1 \log A_t + \beta_2 (\log A_t)^2 + \beta_3 \log G_t + \beta_4 (\log G_t)^2.
\end{aligned}
$$

References

- Bachmann, R., & Bai, J. H. (2013a).**Politico-economic inequality and the comovement of government purchases.** *Review of Economic Dynamics*, *16*(4), 565–580.
- Bachmann, R., & Bai, J. H. (2013b).**Public consumption over the business cycle.** *Quantitative Economics*, *4*(3), 417–451.
- Corsetti, G., & Müller, G. J. (2013). **Multilateral economic cooperation and the international transmission of fiscal policy.** In *Globalization in an age of crisis: Multilateral economic cooperation in the twenty-first century* (pp. 257–297). University of Chicago Press.
- Fernández-Villaverde, J., Guerrón-Quintana, P., Kuester, K., & Rubio-Ramírez, J. (2015).**Fiscal volatility shocks and economic activity.** *American Economic Review*, *105*(11), 3352–3384.
- Ilzetzki, E., & Végh, C. A. (2008). ***Procyclical fiscal policy in developing countries: Truth or fiction?* (Tech. rep.).** National Bureau of Economic Research.

Klein, P., Krusell, P., & Rios-Rull, J.-V. (2008). **Time-consistent public policy.** *The Review of Economic Studies*, *75*(3), 789–808.

Lane, P. R. (2003). **The cyclical behaviour of fiscal policy: Evidence from the oecd.** *Journal of Public economics*, *87*(12), 2661–2675.

Marioli, F. A., Fatas, A., & Vasishtha, G. (2024). **Fiscal policy volatility and growth in emerging markets and developing economies.** *International Review of Economics & Finance*, *92*, 758–777.

Mendoza, E. G. (1991). **Real business cycles in a small open economy.** *The American Economic Review*, *81*(4), 797–818.

Obstfeld, M., & Rogoff, K. S. (1996). ***Foundations of international macroeconomics.*** MIT Press.

Pallage, S., & Robe, M. A. (2003). **On the welfare cost of economic fluctuations in developing countries.** *International Economic Review*, *44*(2), 677–698.

Riascos, A., & Vegh, C. A. (2003).**Procyclical government spending in developing countries: The role of capital market imperfections.** *unpublished (Washington: International Monetary Fund)*.

Rouwenhorst, K. G. (1995).**Asset pricing implications of equilibrium business cycle models.** *Frontiers of business cycle research*, *1*, 294–330.

Tauchen, G. (1986).**Finite state markov-chain approximations to univariate and vector autoregressions.** *Economics letters*, *20*(2), 177–181.