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Fiscal R-Star: Fiscal-Monetary Tensions and Implications for Policy

RBA CONFERENCE

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Questions

1. How can we **measure** tensions between fiscal and monetary policy?

2. **How high** are fiscal-monetary tensions **today** relative to history?

3. What **macroeconomic outcomes** follow after periods of fiscal-monetary tensions?

Our argument in six points:

1. **Fiscal-monetary (FM) tensions** on the rise, but *few* direct measures of such tensions exist.
2. There is a real interest rate that stabilizes fiscal dynamics, which we call **fiscal r-star**.
3. Based on standard macro frameworks, show the difference between traditional monetary r-star and fiscal r-star—the "**fiscal-monetary gap"**—is a useful measure for FM tensions.
4. Based on 140 years of data for 16 advanced economies, fiscal-monetary tensions in AEs are currently at **highs not seen since WW2**.
5. Larger fiscal-monetary gaps are associated with **adverse macroeconomic outcomes**.
6. Policy implications: absent sustained **fiscal consolidation,** we could see challenges to **central bank independence** and temptations to employ **financial repression**.

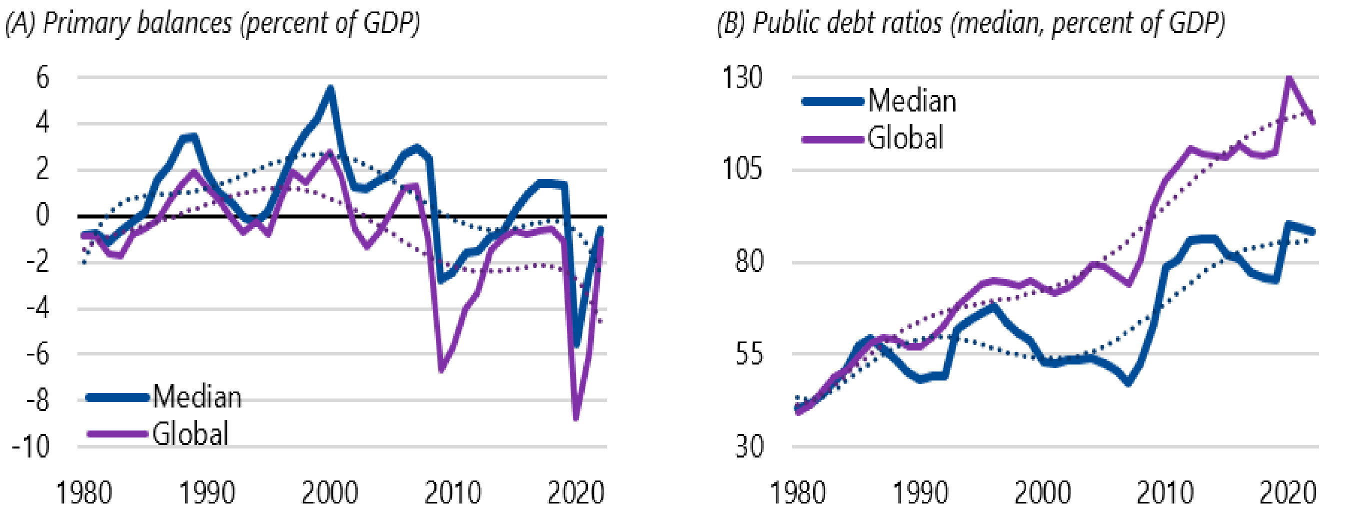
I. Motivation

The fault lines between monetary and fiscal policies have grown in recent years

- Major economies currently face **challenging fiscal outlooks**, with rising spending pressures and debt ratios
- …at a time of elevated interest rates, reigniting discussions on **fiscal-monetary tensions**

  (e.g., Blanchard / Gopinath / Summers / Wolf, 2023)

Debt and Primary Balance Dynamics in Advanced Economies[1]

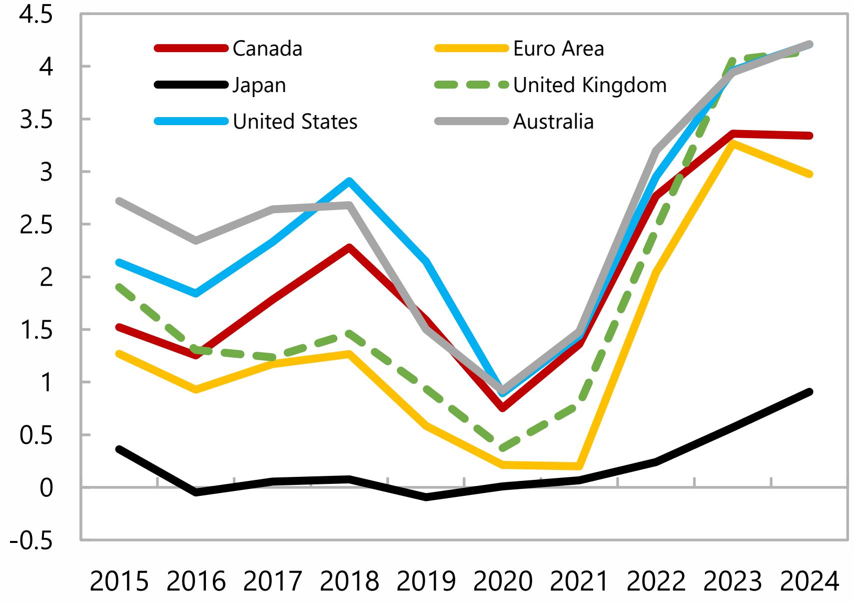


[1] Global variables are weighted by nominal GDP expressed in current USD. Trendlines are sixth-order polynomial.

Source: World Economic Outlook, Public Finances in Modern History, World Bank Development Indicators, and authors' calculations.

10-Year Government Bond Yields

(Percent)



Sources: National Banks; U.S. Treasury; and Haver Analytics.

Distinguish between passive and active fiscal policy

- When fiscal policy is "**passive**," the fiscal authority adjusts primary balances in response to higher debt levels to ensure fiscal sustainability (Leeper, 1991).
  - ➢ Therefore, the debt-raising effects of higher interest rates are offset by adjustments in primary balances over time.
  - ➢ Standard macro models (e.g., RANK models) usually assume "passive" fiscal policy.
- By contrast, under "**active**" fiscal policy, the fiscal authority does not adjust primary balances in response to higher debt levels to ensure fiscal sustainability.

Active fiscal policy can lead to tensions with monetary policy

Fiscal policy has become more active since the GFC

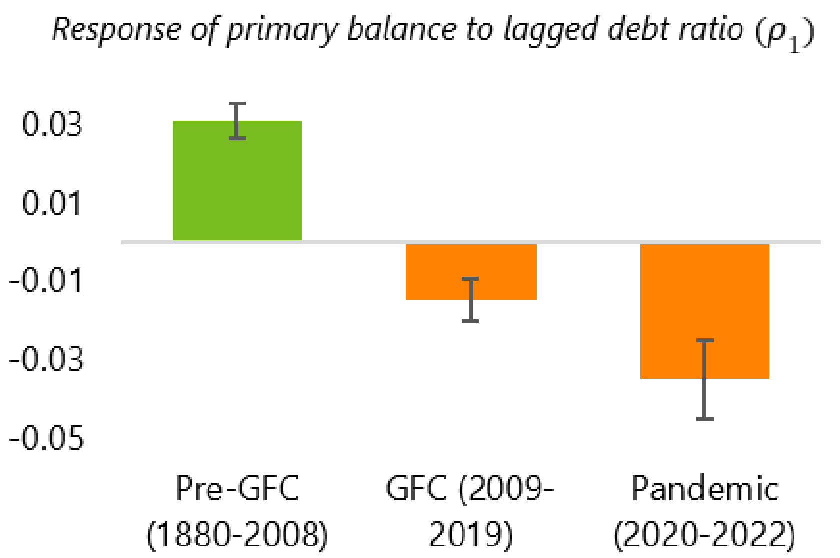
- Fiscal-monetary tensions are not necessarily high even under higher interest rates, if the fiscal authority **adjusts primary balance up in response to rising debt levels** (i.e., fiscal policy is "passive" (Leeper, 1991).

- **Bohn's test (1998):** Activeness of FP assessed through responsiveness of PB to lagged debt levels

$$pb_{i,t} = \rho_1 \cdot debt_{i,t-1} + \alpha_1 \cdot output\_gap_{i,t} + \delta_t + \beta_i + \epsilon_{i,t},$$

$$\rho_1 > 0 \Rightarrow passive\ FP, \rho_1 \leq 0 \Rightarrow active\ FP$$

- **Results:** fiscal policy was ***passive* prior to the pre-GFC**, but this is ***no longer* the case post-GFC.**



Fiscal policy has become more active since the GFC

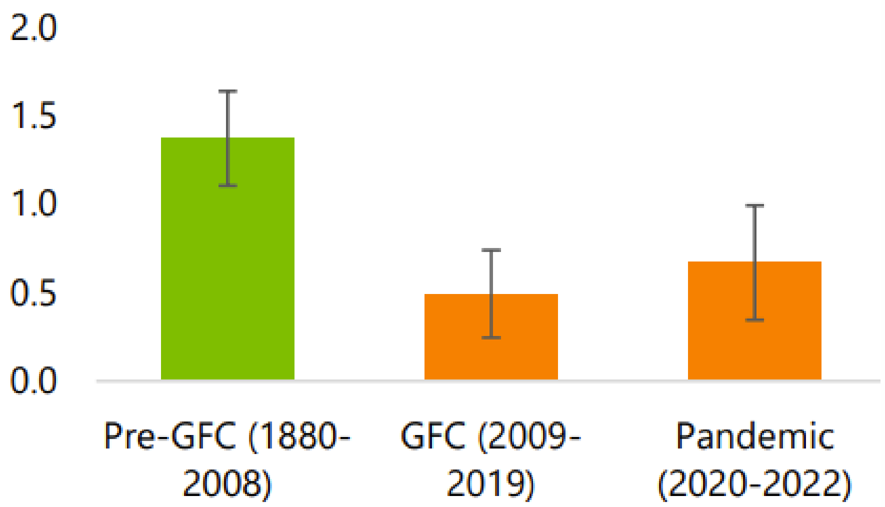
- Bohn's test assumes **stationarity in r-g**.
- Alternative test: Responsiveness of PB to *debt-stabilizing primary balance*

$$pb_{i,t} = \rho_2 \cdot pb^{DS}_{i,t-1} + \alpha_2 \cdot output\_gap_{i,t} + \delta_t + \beta_i + \epsilon_{i,t},$$

$$\rho_2 \geq 1 \Rightarrow passive\ FP, \rho_2 < 1 \Rightarrow active\ FP$$

- **Results:** fiscal policy was ***passive* prior to the pre-GFC**, but this is ***no longer* the case post-GFC.**

(B) Response of primary balance to debt-stabilizing PB (ρ_2)



II. Introducing Fiscal R-star & Fiscal-Monetary Gap

Fiscal r-star and debt-stabilizing primary balance

- The standard debt accumulation framework for measuring debt sustainability backs out a **debt-stabilizing primary balance** (pb_t^{DS}) for a given interest-growth differential:

$$(1)\ \Delta d_t = \frac{r_t - g_t}{1 + \pi_t + g_t} d_{t-1} - pb_t$$

$$(2)\ pb_t^{DS} = \frac{r_t^* - \bar{g}_t}{1 + \bar{\pi} + \bar{g}_t} d_{t-1}$$

- But if fiscal policy is active, we can no longer be assured that the primary balance adjusts

- This makes fiscal r-star a more useful measure of fiscal sustainability when assessing fiscal-monetary tensions

Introducing Fiscal R-star

Debt accumulation equation:

$$(1)\ \Delta d_t = \frac{\boldsymbol{r_t} - g_t}{1 + \pi_t + g_t} d_{t-1} - pb_t$$

- **Fiscal r-star** is the *unobserved real interest rate that would achieve a stable ratio of public debt to GDP ($\bar{d}$) for a given inflation target ($\bar{\pi}$), primary balance ($\overline{pb}$), and potential growth ($\bar{g}$) at a given time.*
- **Higher fiscal r-star** corresponds to **greater fiscal sustainability:**

$$r_f^* = \bar{g} + (1 + \bar{\pi} + \bar{g}) \frac{\overline{pb}}{\bar{d}}$$

- Intuitively, increasing in inflation target, real growth rate, and primary balance, and decreasing in terminal debt level.

Fiscal r-star and monetary r-star

- Unlike the debt-stabilizing primary balance, fiscal r-star is **defined in the real interest rate space.**

- This makes quantitative comparisons between the two r-star concepts possible.

- By framing fiscal and monetary policy based on similar **price-based measures**, it is feasible to have a **quantitative measure of potential tensions** between the two policies.

Fiscal monetary gap = monetary r-star – fiscal r-star

- A higher fiscal-monetary gap corresponds to greater tensions between fiscal and monetary policy

Fiscal-monetary gap and debt/inflation dynamics

Start from three equations embedded in standard macro frameworks (IS and Phillips curves and debt accumulation)

1. **Debt accumulation equation**:

$$\Delta d_t = \frac{r_t - g_t}{1 + \pi_t + g_t} d_{t-1} - pb_t.$$

2. **Phillips curve**:

$$\pi_t = \beta E \pi_{t+1} + \kappa x_t$$

3. **IS curve**:

$$x_t = \frac{1}{\sigma}(r_t^P - r_{mt}^*)$$

Fiscal-monetary gap and debt/inflation dynamics

- Combining and using definition of fiscal r-star gives predictions:

$$\boldsymbol{r}^*_{\boldsymbol{m}_t} - \boldsymbol{r}^*_{\boldsymbol{f}_t} = \frac{\Delta d_t}{\bar{d}}(1 + \bar{\pi} + \bar{g}) + \frac{1}{\phi}(\Delta\pi_t - \Phi_t) + \frac{pb_t - \overline{pb}}{\bar{d}}(1 + \bar{\pi} + \bar{g}) - \tau^*_t$$

Fiscal-monetary gap and debt/inflation dynamics

- From standard macro frameworks (IS and Philips curves and debt accumulation)

$$\boldsymbol{r^*_{m_t} - r^*_{f_t}} = \frac{\Delta d_t}{\bar{d}}(1 + \bar{\pi} + \bar{g}) + \frac{1}{\phi}(\Delta\pi_t - \Phi_t) + \frac{pb_t - \overline{pb}}{\bar{d}}(1 + \bar{\pi} + \bar{g}) - \tau^*_t$$

When the **fiscal-monetary gap** increases,

1. If policy actions unchanged, **debt will grow**

Fiscal-monetary gap and debt/inflation dynamics

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$$\boldsymbol{r^*_{m_t}} - \boldsymbol{r^*_{f_t}} = \frac{\Delta d_t}{\bar{d}}(1+\bar{\pi}+\bar{g}) + \frac{1}{\phi}(\Delta\pi_t - \Phi_t) + \frac{pb_t - \overline{pb}}{\bar{d}}(1+\bar{\pi}+\bar{g}) - \tau^*_t$$

When the **fiscal-monetary gap** increases,

1. If policy actions are not taken, **debt will grow**
2. If the monetary authority accommodates fiscal policy (passive MP) by lowering the real interest rate, **inflation will rise.** (how fast will depend on expectation formation)

Fiscal-monetary gap and debt/inflation dynamics

- From standard macro frameworks (IS and Philips curves and debt accumulation)

$$\boldsymbol{r}^{*}_{\boldsymbol{m}_t} - \boldsymbol{r}^{*}_{\boldsymbol{f}_t} = \frac{\Delta d_t}{\bar{d}}(1 + \bar{\pi} + \bar{g}) + \frac{1}{\phi}(\Delta \pi_t - \Phi_t) + \frac{pb_t - \overline{pb}}{\bar{d}}(1 + \bar{\pi} + \bar{g}) - \tau^{*}_{t}$$

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3. Or, the gap can also be accommodated by **fiscal consolidation**, i.e., when the primary balance is adjusted upwards (leading to passive FP)

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$$\boldsymbol{r^*_{m_t} - r^*_{f_t}} = \frac{\Delta d_t}{\bar{d}}(1 + \bar{\pi} + \bar{g}) + \frac{1}{\phi}(\Delta\pi_t - \Phi_t) + \frac{pb_t - \overline{pb}}{\bar{d}}(1 + \bar{\pi} + \bar{g}) + \tau^*_t$$

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4. Finally, compression of "term premia" (difference effective interest rate and policy rate) can be achieved through **financial repression** and **shortening the debt-maturity profile**. (may require capital controls)

Fiscal-monetary gap and debt/inflation dynamics

- From standard macro frameworks (IS and Philips curves and debt accumulation)

$$\boldsymbol{r^*_{m_t}} - \boldsymbol{r^*_{f_t}} = \frac{\Delta d_t}{\bar{d}}(1+\bar{\pi}+\bar{g}) + \frac{1}{\phi}(\Delta\pi_t - \Phi_t) + \frac{pb_t - \overline{pb}}{\bar{d}}(1+\bar{\pi}+\bar{g}) - \tau^*_t$$

When the **fiscal-monetary gap** increases,

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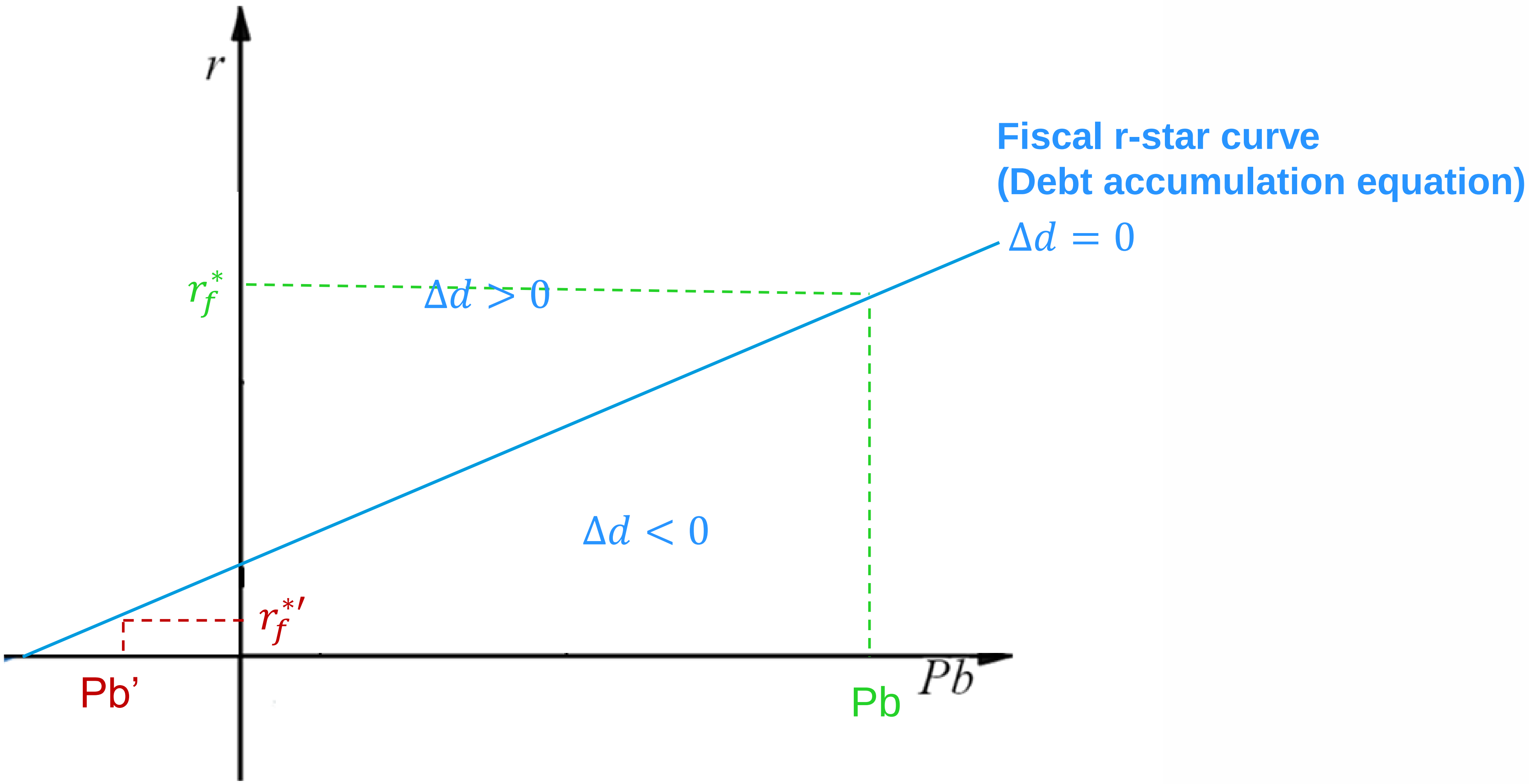
4. Finally, compression of “term premia” (difference effective interest rate and policy rate) can be achieved through financial repression and shortening the debt-maturity profile. (may require capital controls)

These are empirically testable predictions.

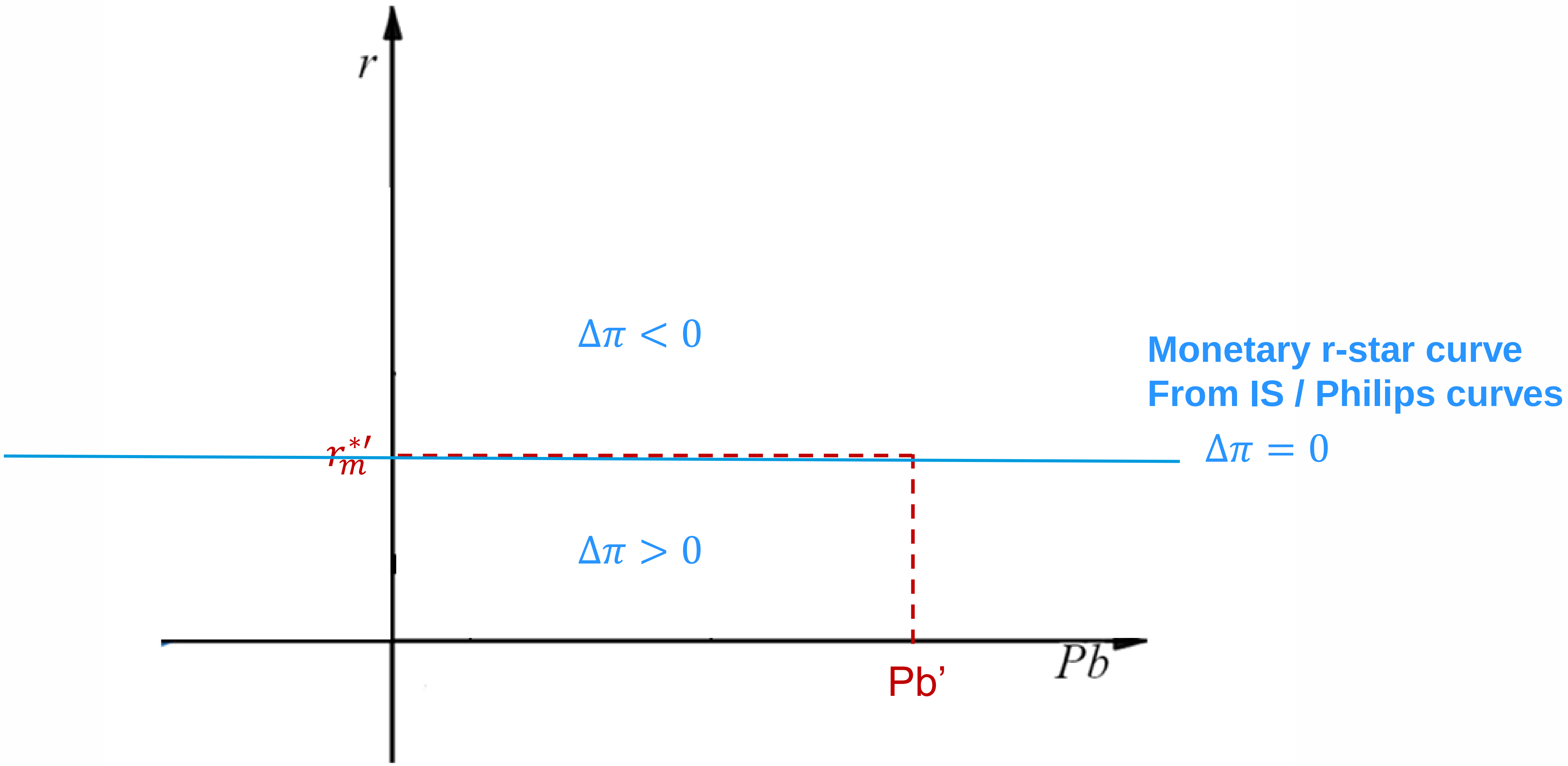
Fiscal-Monetary Gap: Diagram

Dynamics **summarized in a r-pb diagram**



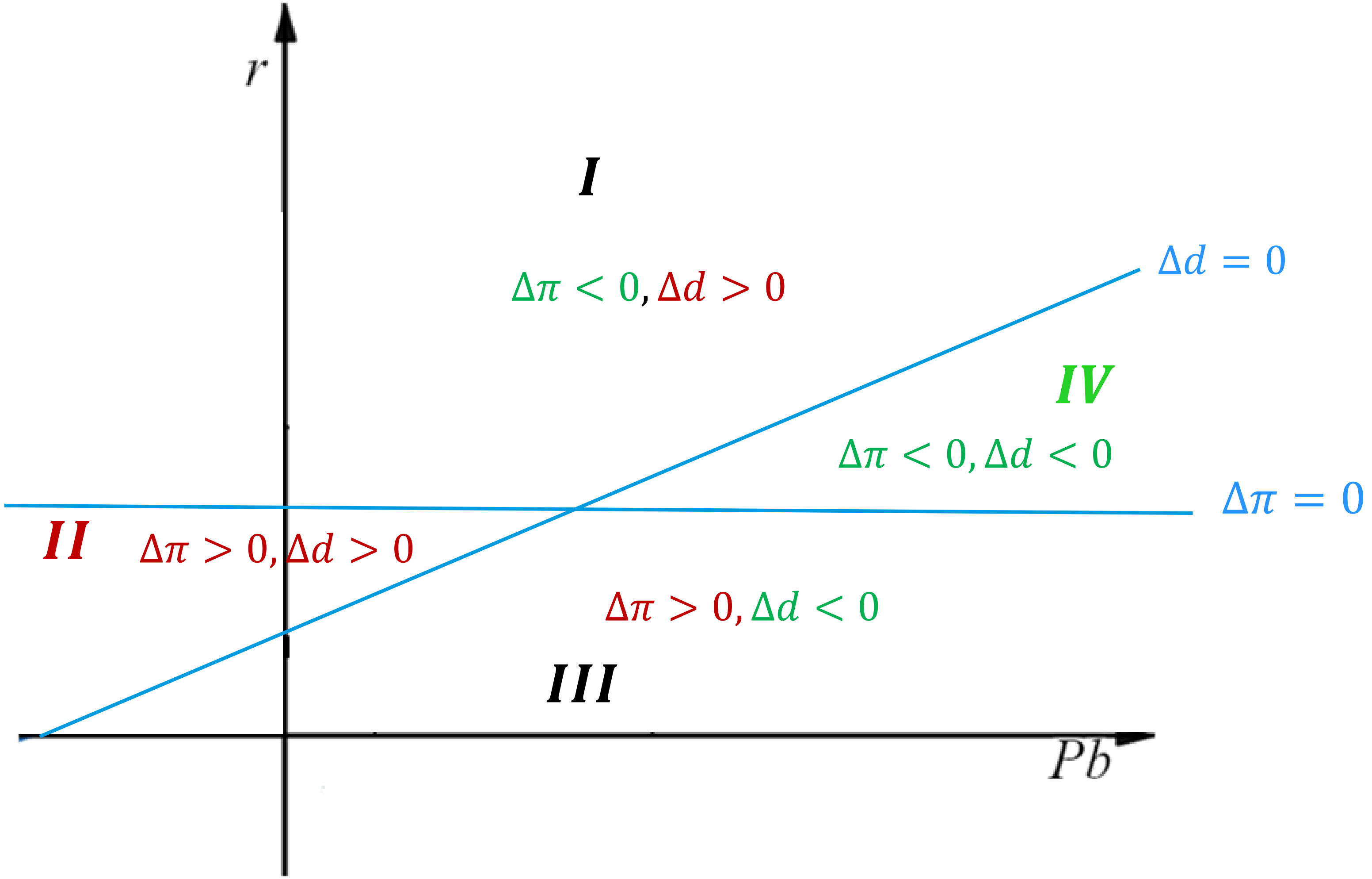
Fiscal-Monetary Gap: Diagram

Dynamics **summarized in a r-pb diagram**



Fiscal-Monetary Gap: Diagram

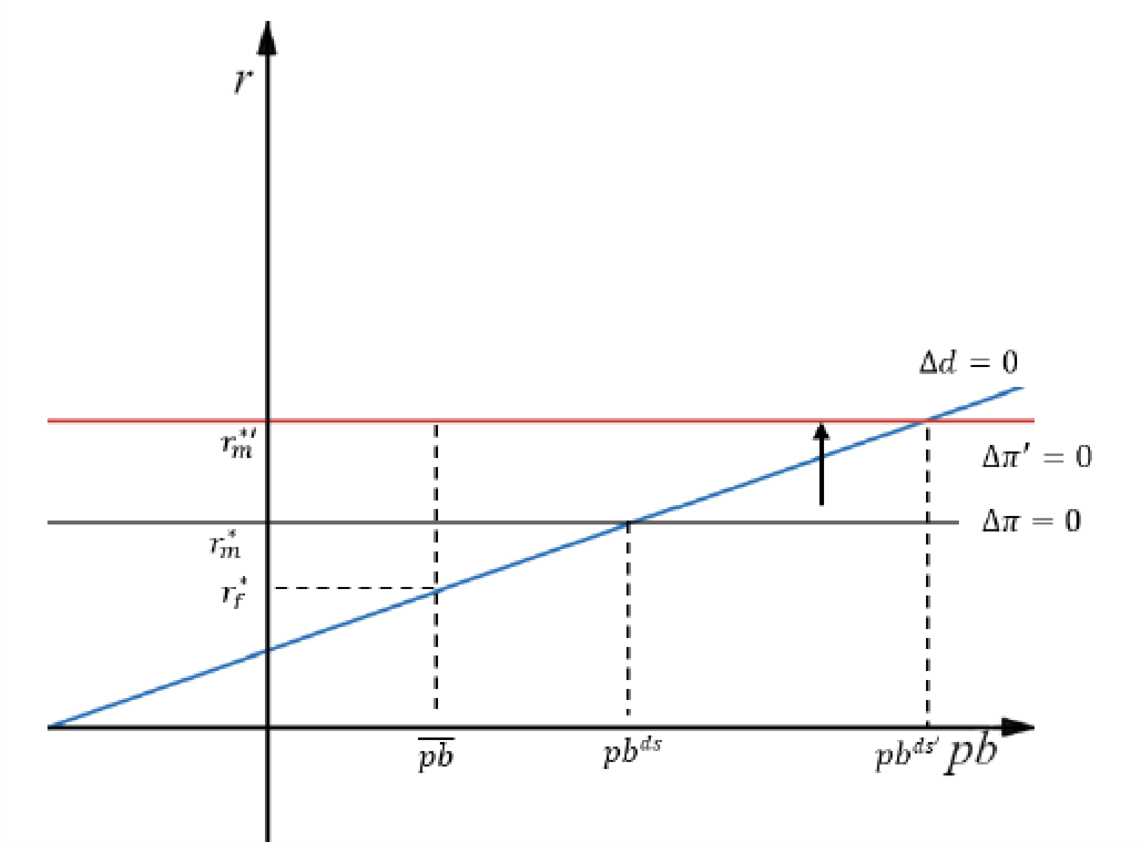
Dynamics summarized in a r-pb diagram



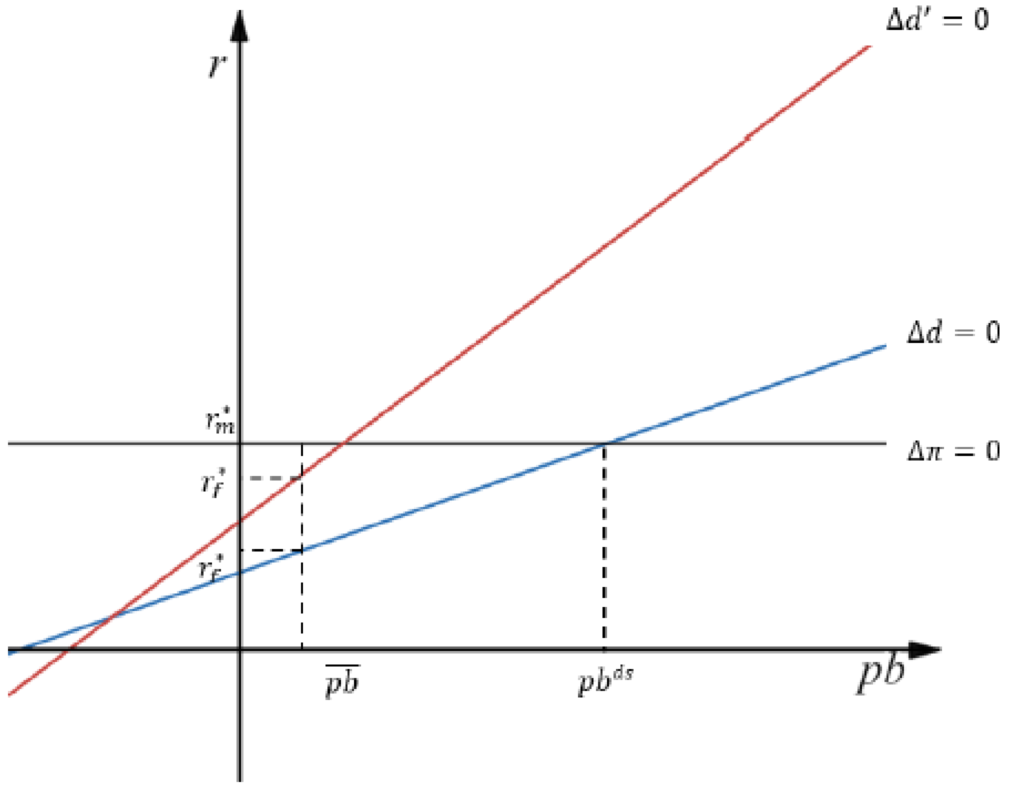
Fiscal-Monetary Gap: Diagram

Comparative Statics (examples)

(A) Exogenous ***increase monetary r-star*** *increases gap and tensions…*



(B) …while ***increase in potential growth*** *reduces gap and tensions.*



Relationship to literature

- **Fiscal r-star** is the real discount rate required for the private sector to absorb the current stock of government debt at stable inflation

    e.g., Brunnermeier et al. (2020), Cochrane (2023), Jiang et al. (2023)

- For standard fiscal policy rule, the **fiscal-monetary gap** is proportional to the degree of fiscal backing

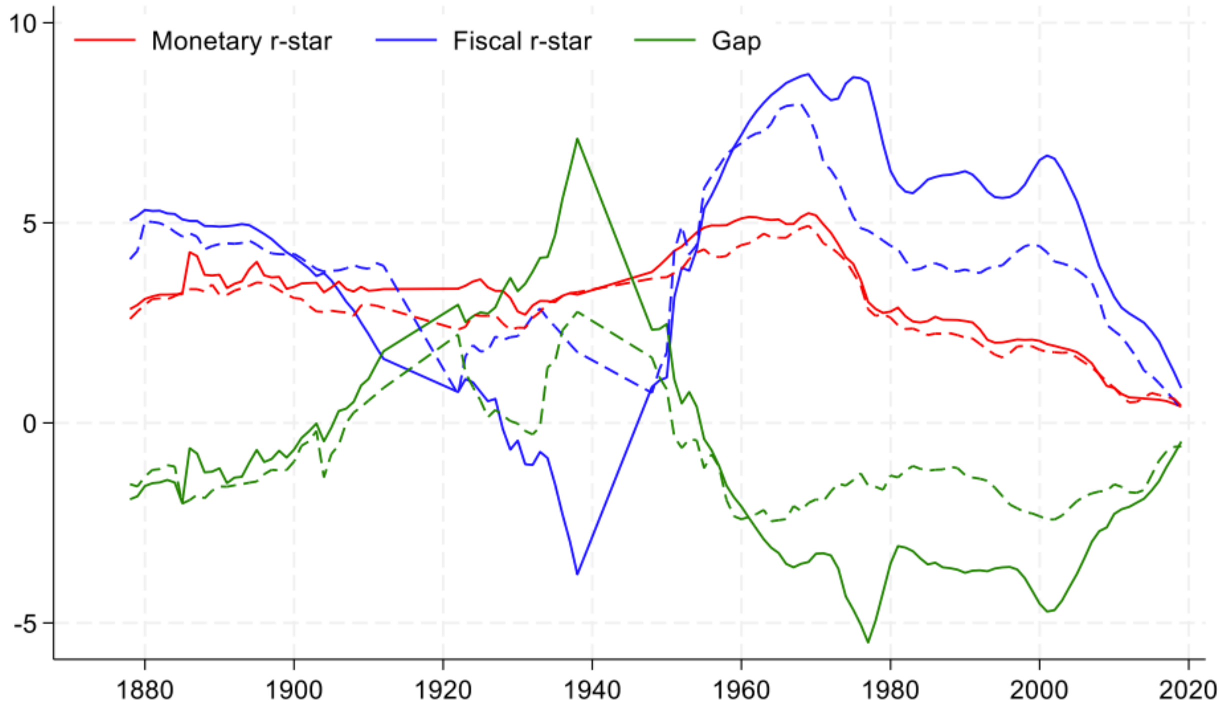
    - e.g., Bianchi et al. (2023), Smets and Wouters (2024)

III. Empirics

Estimates of Fiscal R-Star and the Fiscal-Monetary Gap

- 16 advanced economies based on a 140 years of data (**Jordà et al database**)
- **Filtering and moving averages** of underlying variables (debt, PB) to extract trend component
- Monetary r-star and potential output growth from Platzer et al. (2023)

Figure 5. Historical Estimates of Fiscal R-Star and the Fiscal-Monetary Gap[1]



Key results

- **FM gap peaked during WWII** amid war-era fiscal strains and low growth
- **Historic low in the mid-1970s** following post-war boom and demobilization
- Gap remained **low and stable during 1980s-2000s**, supported by the declining monetary r-star
- **Upward trajectory** since mid 2000s, reaching **historic highs** currently

Macroeconomic Implications of Larger Fiscal-Monetary Gap

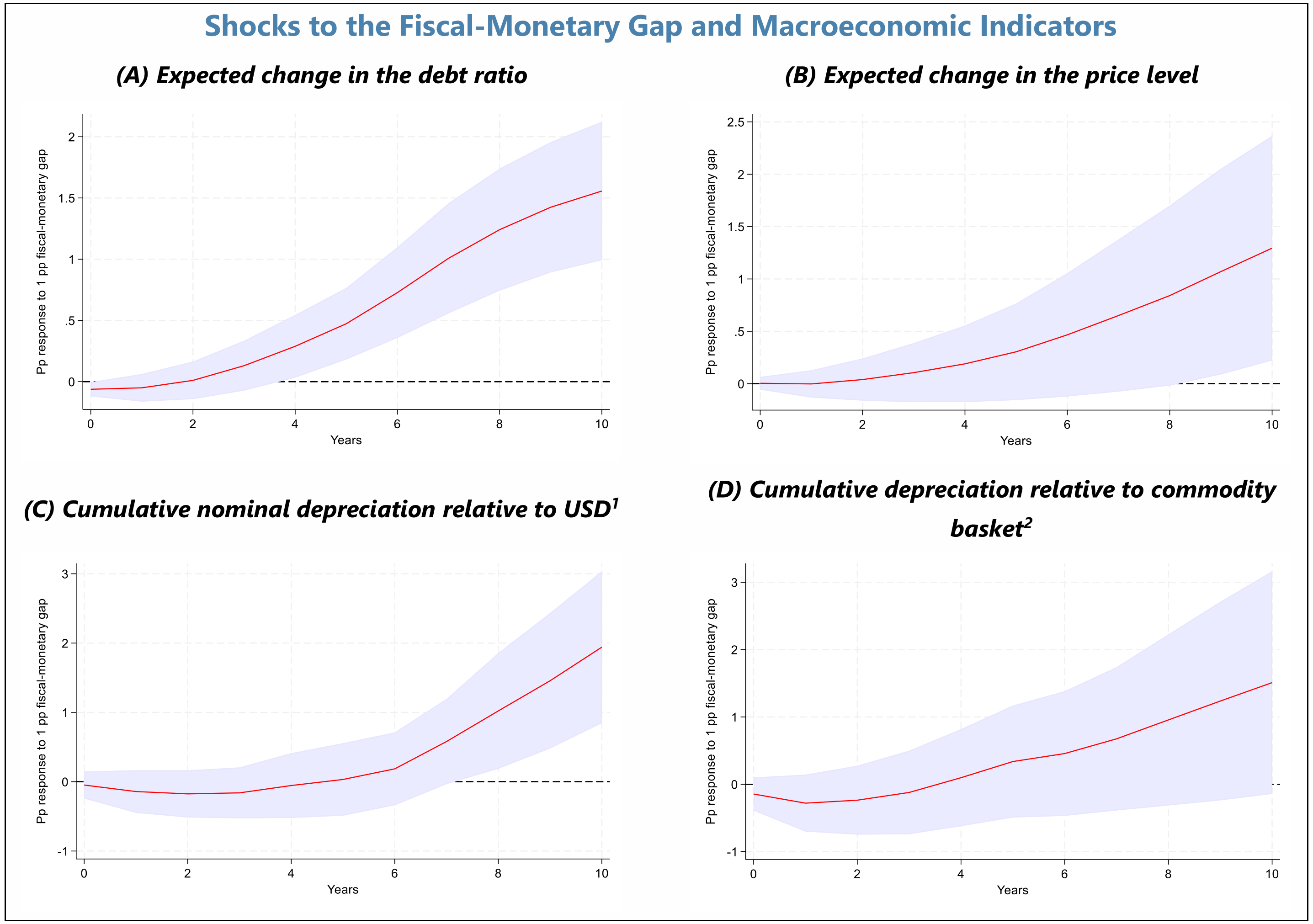
Local projections* to compute *dynamic impulse responses* to *variation in FM gaps

- **Dependent variables**
  - Macroeconomic variables
  - Real asset returns
  - Probability of crisis
- **Control variables**
  - Lags of the outcome variable to capture persistence
  - Lags of the debt level, business cycle variables (i.e., output growth and inflation), policy variables (the primary balance and real policy rate) and monetary r-star
  - Country fixed effects

$$y_{i,t+h} - y_{i,t-1} = \beta^h gap_{i,t} + \alpha_i^h + \sum_{k=1}^{3} \delta_k^h y_{i,t-k} + \boldsymbol{\Gamma^h X_{i,t}} + u_{i,t+h} \quad , \qquad h = 0, \dots, H \quad .$$

Interpretation: 1 p.p. larger fiscal-monetary gap predicts β^h p.p. higher outcome variable

Higher gaps predict higher debt, higher prices, and FX depreciation…

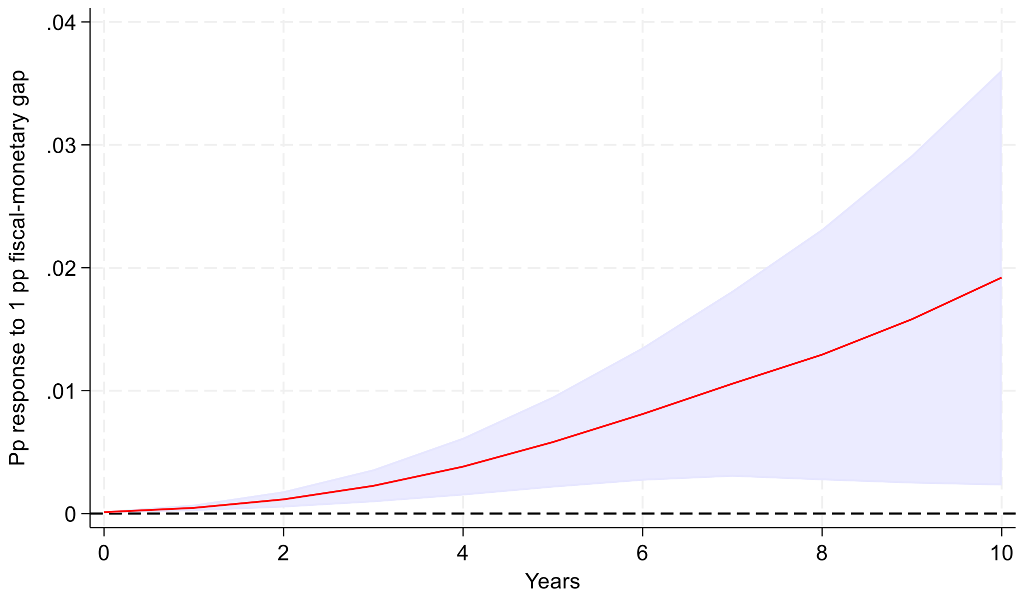


[1] USA not included in sample. Units expressed in foreign currency units per 1 unit USD; hence increases imply nominal in the local currency.
[2] Units expressed in foreign currency unit per 1 unit of basket, equal weighed 27 commodities, including beef, hides, lamb, pork, coal, petroleum, barley, corn, rice, rye, wheat, copper, lead, nickel, steel, tin, zin, gold, silver, cocoa, coffee, cotton, palm oil, sugar, tea, tobacco, wool.

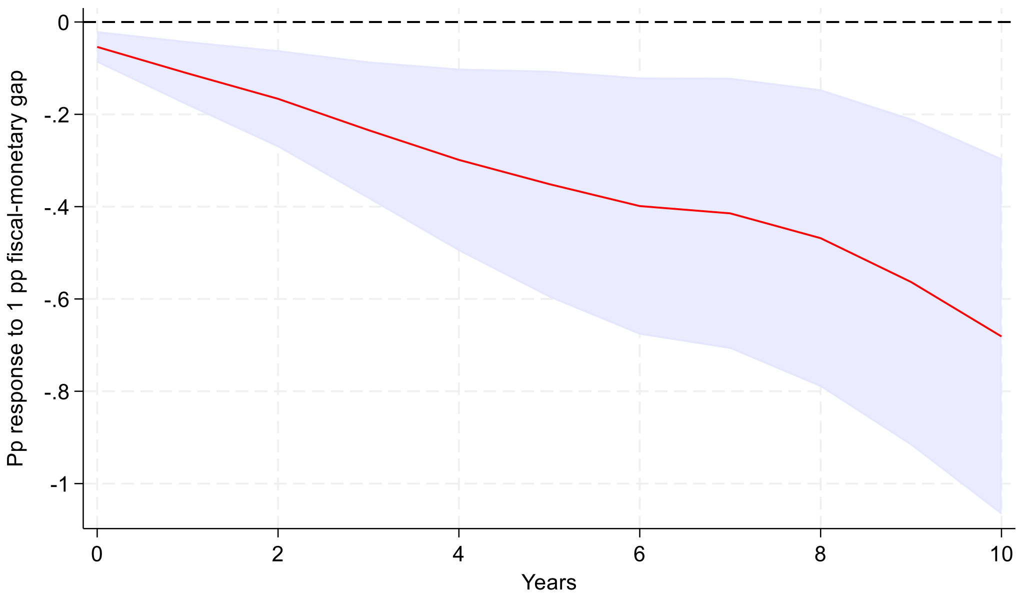
...fiscal consolidation and debt liquidation (sign of financial repression)

Shocks to the Fiscal-Monetary Gap and Macroeconomic Indicators

(E) Cumulative fiscal consolidation[3]



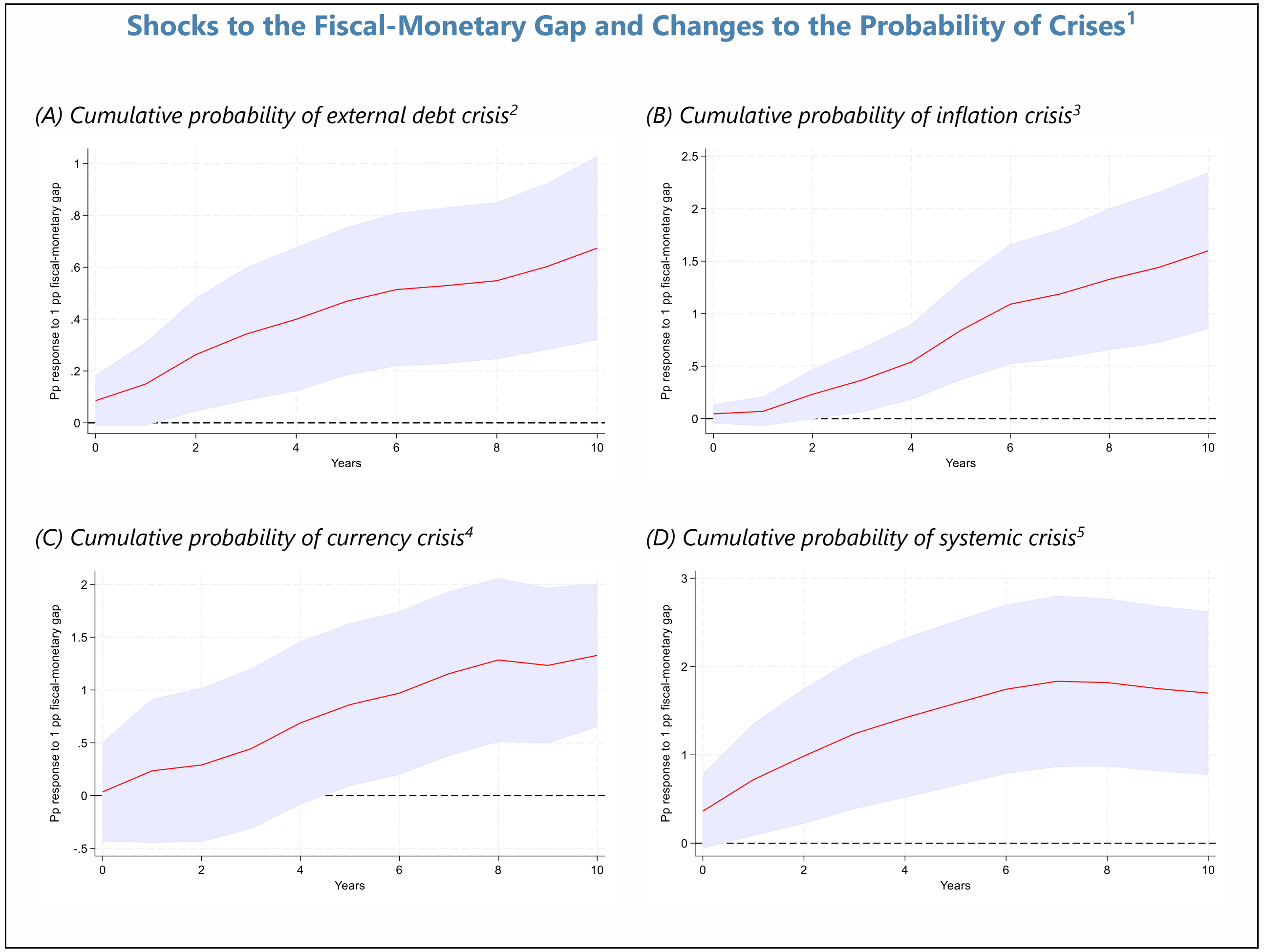
(F) Cumulative debt liquidation[4]



[3] Measured as the cumulative sum of the primary balance.

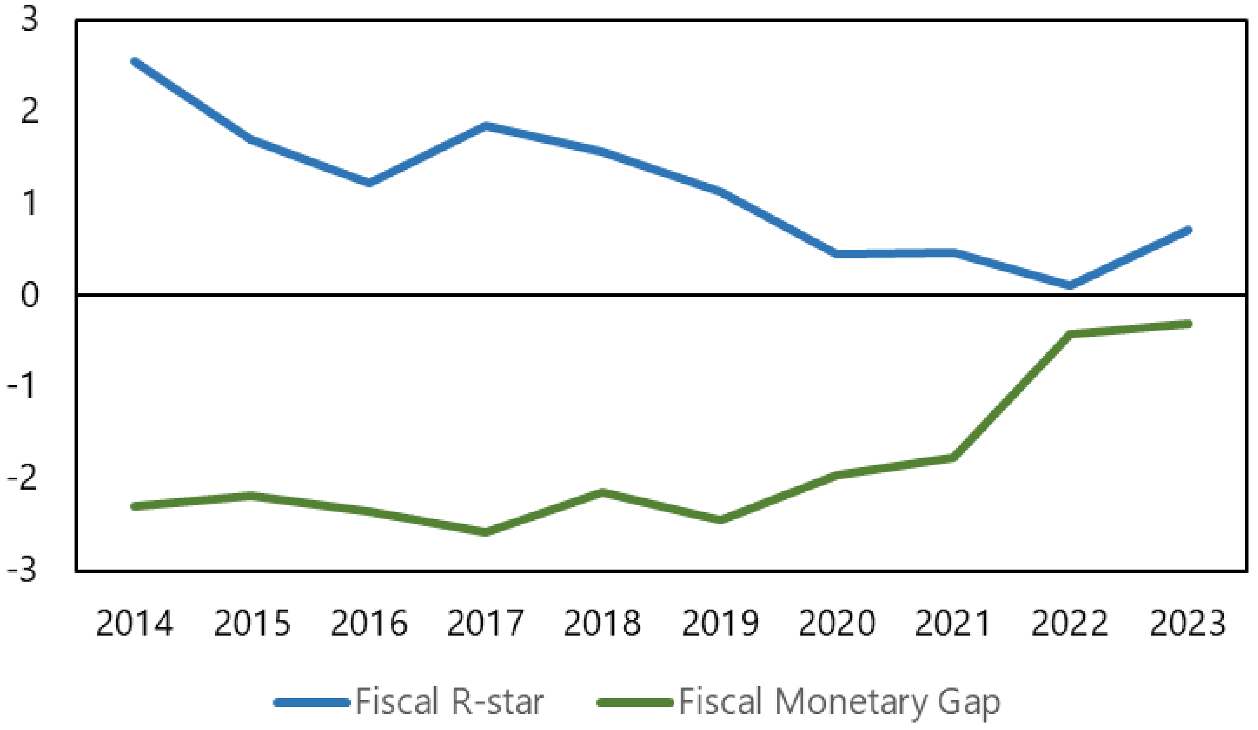
[4] Debt liquidation is the change in the debt level that results form the real interest rate being below monetary r-star and inflation being above target. In the paper, we compute the cumulative liquidation effect over the 10-year horizon to show that a 1 percentage point higher fiscal-monetary gap is associated with a cumulative debt liquidation of about 1.5 percent.

...and with a higher probability of debt, inflation, currency, and systemic crises.



[1] Expected difference in cumulative probability of crisis within time window due to a 1 p.p. increase in the fiscal-monetary gap.
[2] Debt crisis if either in domestic or external default according to data by Carmen Reinhart.
[3,4,5] Definitions from same dataset. A systemic crisis is defined following Caprio et al. (2005), who characterize modern systemic crises as "those episodes where there are bank runs, a significant share of non-performing assets, bank liquidations, and large-scale policy intervention to support banks" (Reinhart and Rogoff, 2014).

Recent estimates indicate fiscal r-star has declined, while the fiscal-monetary gap increased.



- The Jorda database cuts off at 2020.
- To assess how the fiscal-monetary gap has evolved since the pandemic, we constructed a more contemporary and forward-looking measure of the fiscal-monetary gap using WEO projections (+5 years).
- The results show that **fiscal r-star has declined over time** and that **the fiscal-monetary gap has increased**.

IV. Policy implications

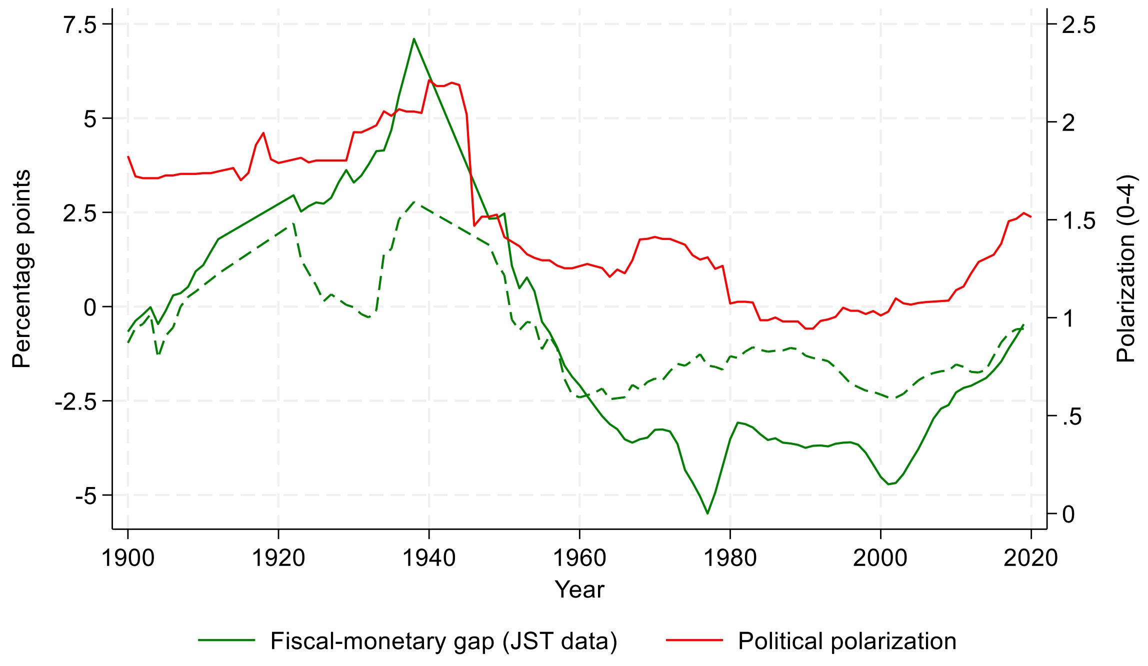
Policy implications (summary)

- Given rising tensions, **policy adjustments will be needed**
- But **growth will likely remain tepid**, with **social cohesion lacking**. So, **achieving durable fiscal consolidations will be challenging**.
- Historically, **financial repression** worked to lower borrowing costs, but similar implementation could be difficult today (unless we go back to a world with capital controls?).
- **Central bank independence** may come under threat as fiscal-monetary gaps persist.
- A **return to "low-for-long" inflation and interest rate dynamics** could reduce fiscal-monetary tensions, but prudent risk-management indicates that policymakers should not bet on this outcome.

Achieving durable fiscal consolidations may be constrained by political economy considerations

Political polarization correlates with the rise in fiscal-monetary tensions:

Figure 13. Political Polarization and the Fiscal-Monetary Gap[1]



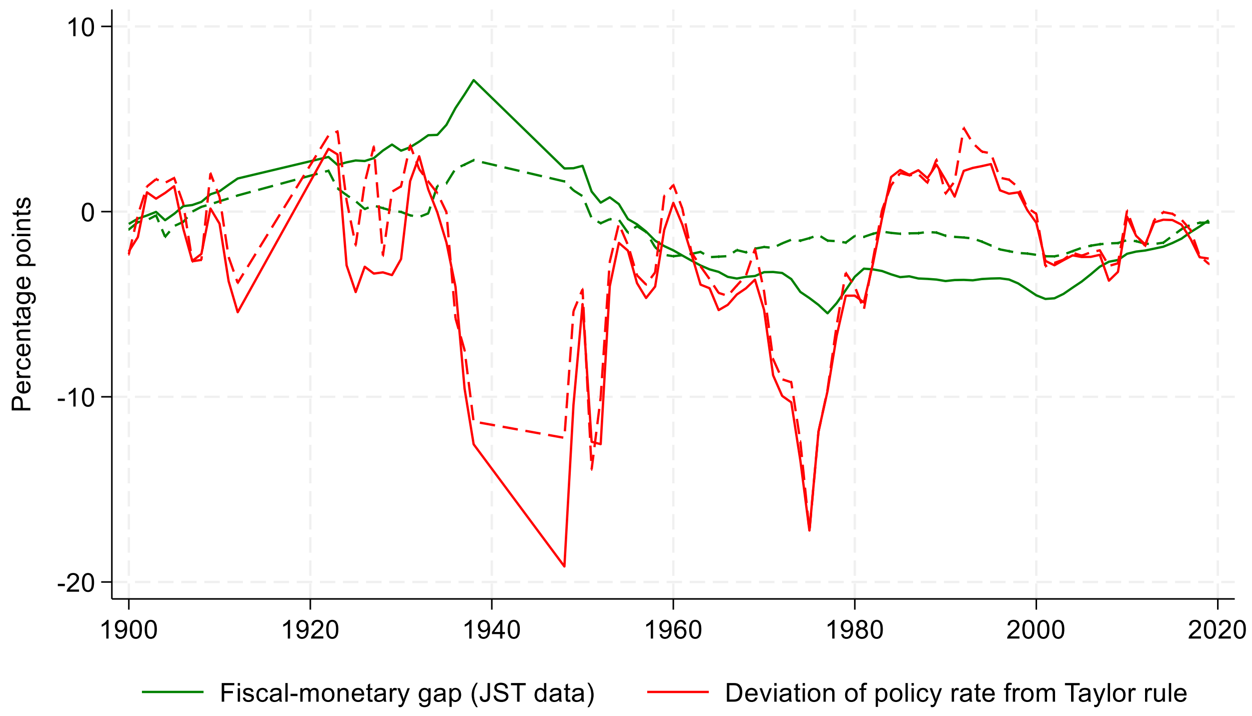
[1] Sample includes Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom, and United States

Source: Varieties of Democracy Dataset (version 13) and authors' calculations. Political polarization is measured via a survey-based approach, whereby survey respondents in each country are asked questions to elicit the degree to which society has separated into distinct, antagonistic political camps based on the likelihood of disparate groups to engage in friendly interactions with non-likeminded parties.

Central bank independence may come under threat as fiscal-monetary gaps grow

Historically, larger fiscal-monetary gaps coincide with periods where monetary policy rate deviated from interest rates given by Taylor rules.

Figure 14. The Fiscal-Monetary Gap and Deviations of Policy Rates from Equilibrium Rates



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Source: Jorda-Schularick-Taylor database.

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Additional Slides (reference)

We use two tests to show the "activeness" of fiscal policy.

1. "Activeness" of fiscal policy can be assessed through **responsiveness of the primary balance to lagged debt** levels (Bohn, 1998)

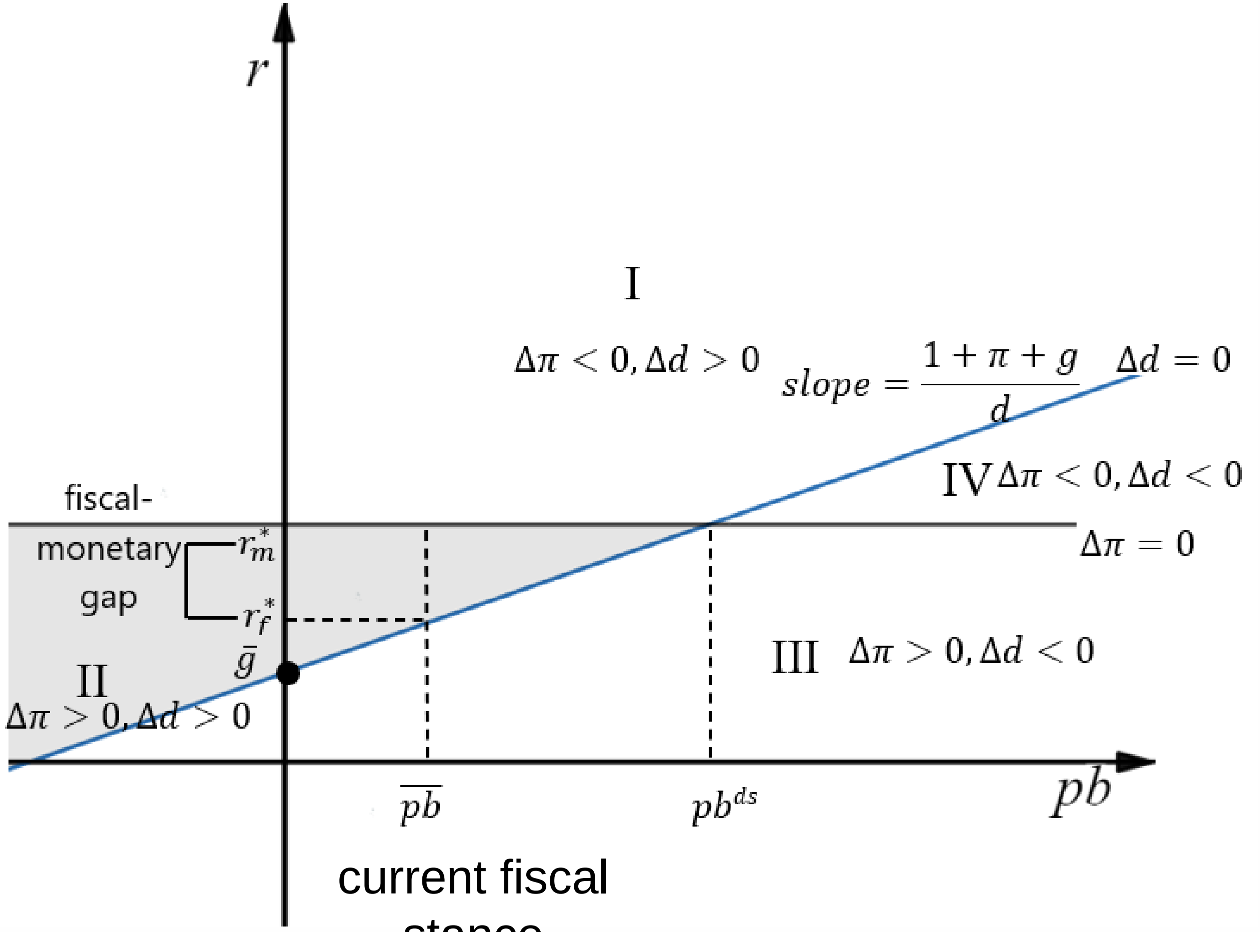
$$pb_{i,t} = \rho_1 \cdot debt_{i,t-1} + \alpha_1 \cdot output\_gap_{i,t} + \delta_t + \beta_i + \epsilon_{i,t},$$
$$\rho_1 > 0 \Rightarrow passive\ FP, \rho_1 \leq 0 \Rightarrow active\ FP$$

2. "Activeness" can also be assessed by the **degree to which the primary balance "catches up"** to the debt-stabilizing primary balance (Mauro et al., 2015):

$$pb_{i,t} = \rho_2 \cdot pb_{i,t}^{DS} + \alpha_2 \cdot output\_gap_{i,t} + \delta_t + \beta_i + \epsilon_{i,t},$$
$$\rho_2 \geq 1 \Rightarrow passive\ FP, \rho_2 < 1 \Rightarrow active\ FP$$

Dynamics can be summarized in a r-pb space

- **2 main curves**: fiscal r-star and monetary r-star
- **4 areas** with **different inflation and debt dynamics** based on location relative to the 2 curves
- Different monetary and fiscal r-star combinations **affect fiscal-monetary tensions.**



current fiscal stance

stable debt
(**fiscal r-star curve**)

stable inflation
(**monetary r-star curve**)

Local projections allow us to assess the macroeconomic implications of rising tensions.

- We conducted local projections to compute the cumulative associations with **variations in fiscal-monetary gaps:**

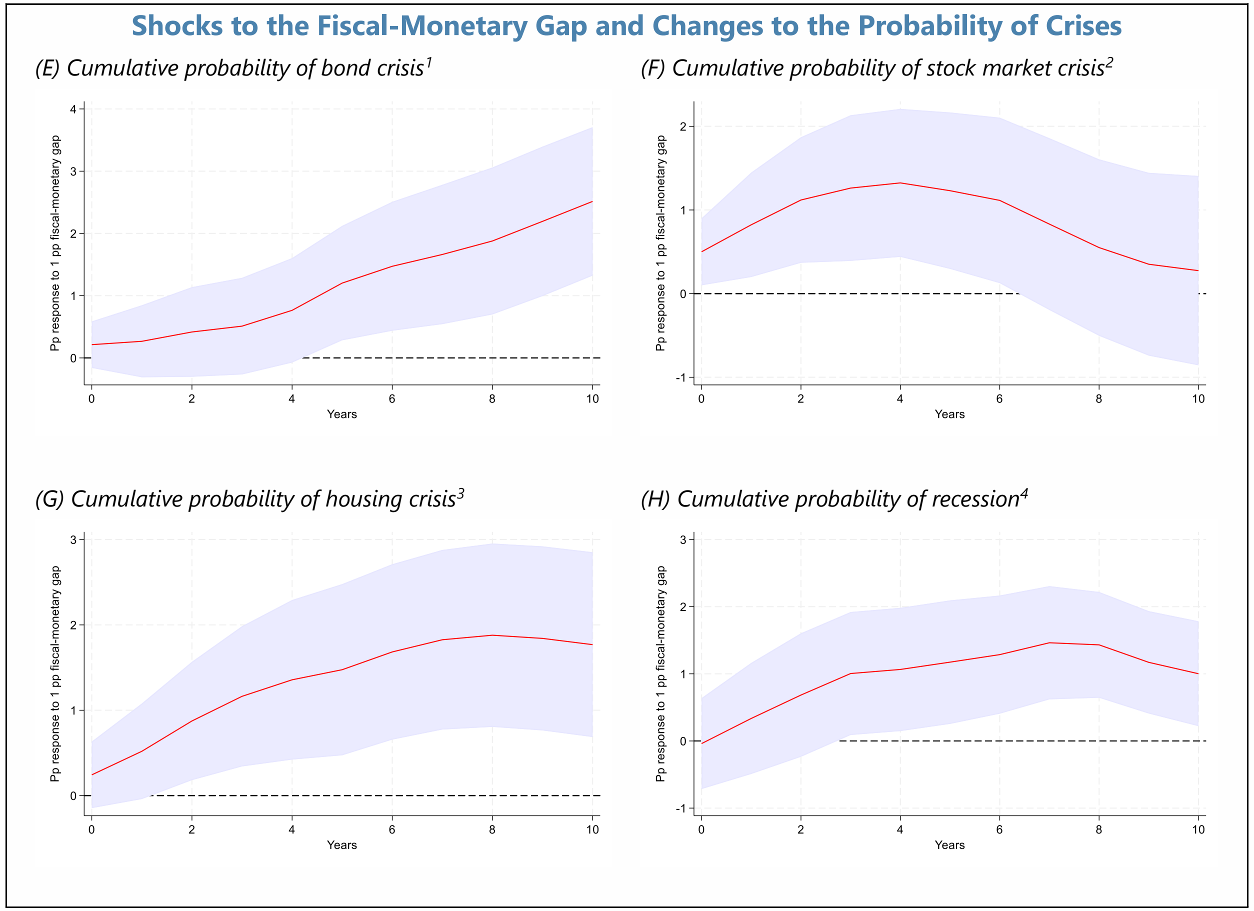
$$y_{i,t+h} - y_{i,t-1} = \beta^h gap_{i,t} + \alpha_i^h + \sum_{k=1}^{3} \delta_k^h y_{i,t-k} + \boldsymbol{\Gamma^h X_{i,t}} + u_{i,t+h} \quad , \qquad h = 0, \dots, H \quad .$$

- Dependent variables: debt, inflation, fiscal consolidation, FX, real asset returns, and financial repression, and probability of crisis

- Control variables: Lags of the outcome variable to capture persistence, lags of the debt level, business cycle variables (i.e., output growth and inflation), policy variables (the primary balance and real policy rate), and monetary r-star; country fixed effects

- $\boldsymbol{\beta^h}$ is the coefficient of interest, which captures the elasticity between fiscal-monetary gaps and subsequent outcomes.

Higher fiscal-monetary gaps are associated with a higher probability of bond, stock market, and housing crises, as well as recessions.



[1, 2, 3] Crisis if real asset returns are less than negative 10 percent in a given year within the time window.
[4] Recession if real GDP falls in a given year.

The pace and urgency of adjustment will depend on the trajectory for fiscal and monetary r-star.

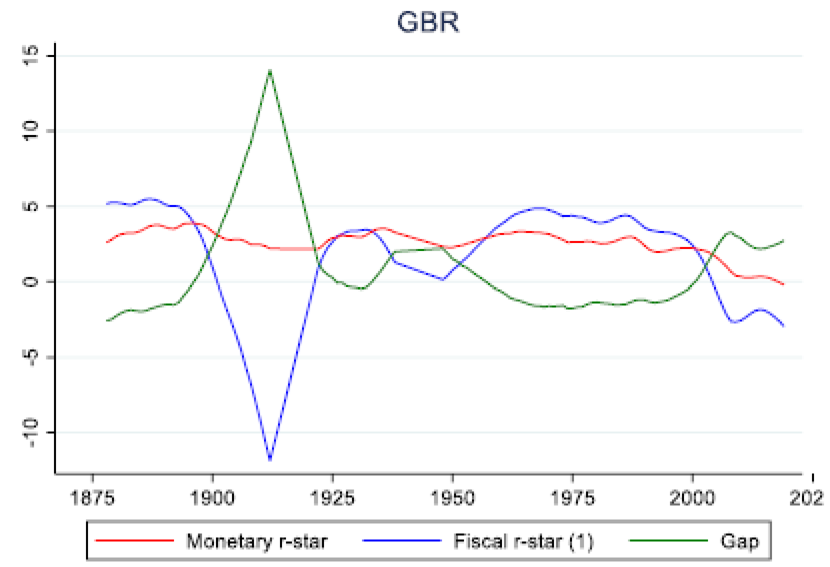
Figure 12. Managing Policy Given Potential Fiscal and Monetary R-Star Dynamics[1]

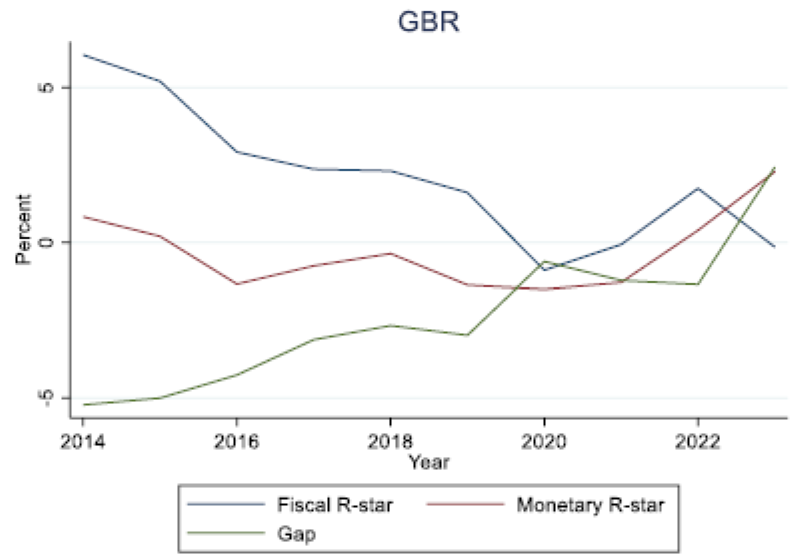
Monetary r-star

Fiscal r-star		*Lower-for-longer*	*Higher-for-longer*
	Low	**I.** Weak fiscal adjustment; backloaded	**II.** Strong fiscal adjustment; front-loaded[1]
	High	**III.** No adjustment needed	**IV.** Potential fiscal adjustment needed

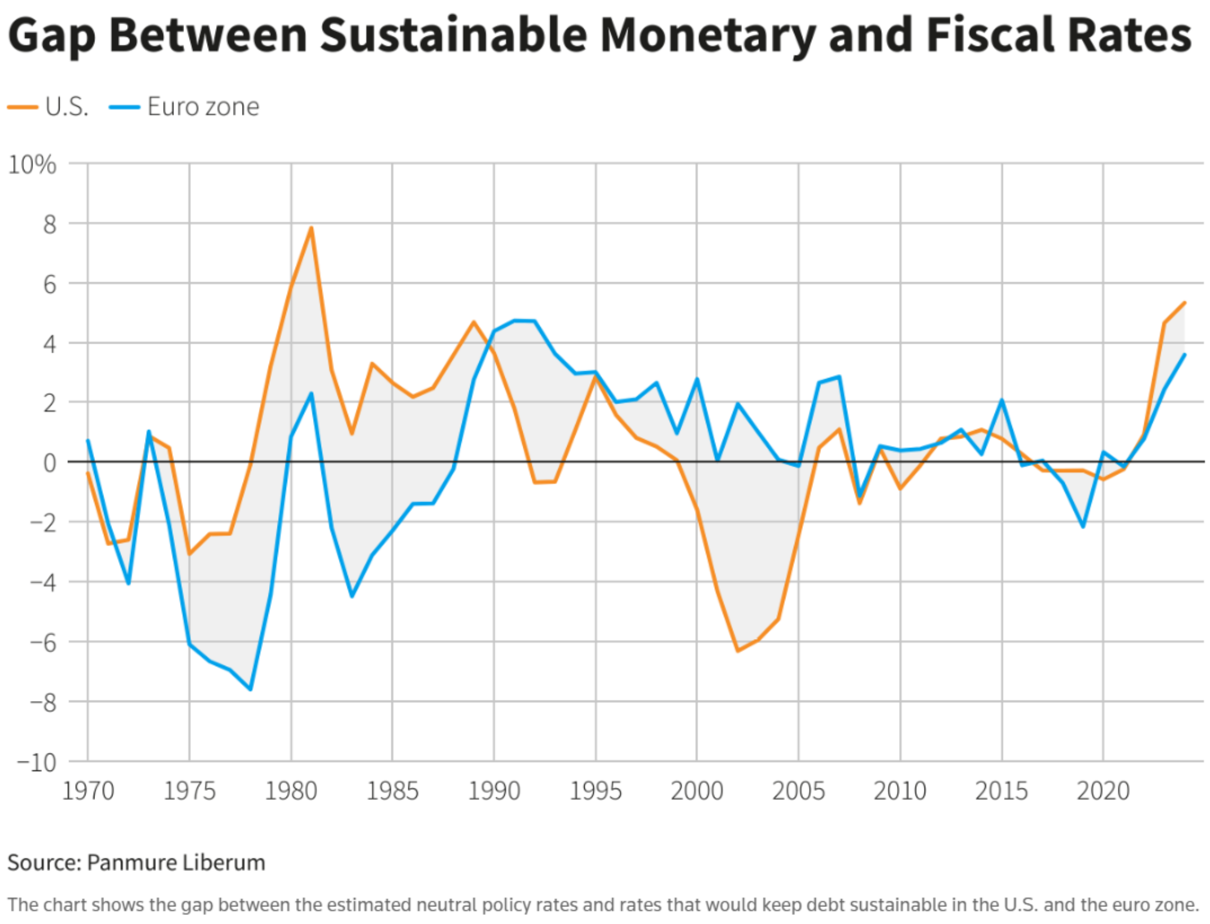
[1] In quadrant II, there could be a temptation to resort to financial repression to engineer a reduction in the fiscal-monetary gap without a concomitant fiscal adjustment. Indeed, as explained in Section VI, historically large fiscal-monetary gaps were accompanied by combination of rising debt levels, higher inflation, financial repression, and lower real asset returns, with elevated risks of future debt, currency, and housing crises.

Source: Authors.


GBR
15
10
5
0
-5
-10
1875
1900
1925
1950
1975
2000
202
Monetary r-star
Fiscal r-star (1)
Gap


GBR
Percent
5
0
-5
2014
2016
2018
2020
2022
Year
Fiscal R-star
Monetary R-star
Gap

Estimates for US / EA (from an external source) / UK



Estimates for UK from WEO data