Inflation-Indexed Debt and the Risks of Fiscal Dominance

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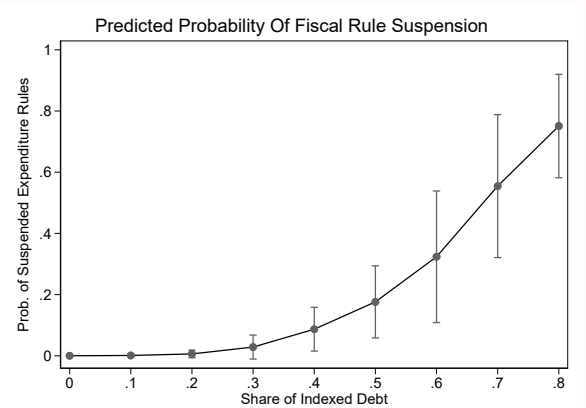
New Challenges for Monetary-Fiscal Policy Interactions, *Sveriges Riksbank*, *October 2025*

Introduction

- US inflation 2021-23 coincided with large debt-financed fiscal expansion
- Theoretical and empirical papers emphasise fiscal-monetary interactions
  - Angeletos et al. (2024), Ascari et al. (2023), Bianchi et al. (2023), Cochrane (2022)
  - Barro and Bianchi (2023), Hazell and Hobler (2024), Hilscher et al. (2022)
- Unfunded fiscal expansion $\rightarrow$ inflation needed to devalue market value of government debt and ensure the government budget constraint continues to be satisfied
- *Fiscal dominance* (Leeper (1991)) or *Fiscally-led policy mix* (Bianchi et al. (2023))

Today's motivation

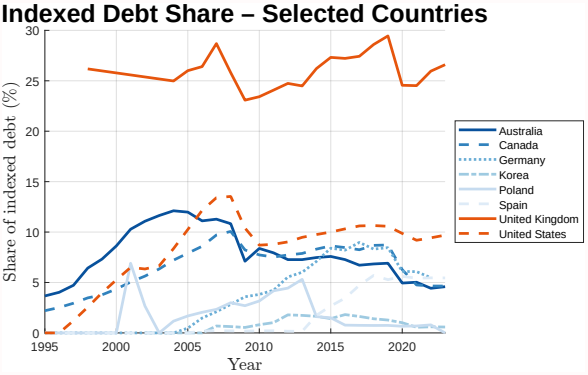
- Davoodi et al. (2022) *Fiscal Rules Dataset* for 106 economies 1985-2021



- We interpret suspension as government willing to run fiscal policies that would normally be considered unsustainable

Today's talk

- Cross-country heterogeneity in π-indexation and fiscal-monetary interactions



- How does π-indexation affect fiscally-led inflation and risk of fiscal dominance?

Ricardian model with partially-indexed debt

- Only savings device is government bond that is partially indexed to inflation
- Household maximises utility s.t. budget constraint

$$\max_{\{c_t, b_t\}_{t=0}^{\infty}} E_0 \sum_{t=0}^{\infty} \beta^t u(c_t)$$

$$s.t.$$

$$P_t c_t + q_t b_t = (1 - \tau_t) P_t Y + \pi_t^{\theta} b_{t-1}$$

- In equilibrium $c_t = Y$ so bond pricing equation

$$q_t = \beta E_t \pi_{t+1}^{\theta - 1}$$

Policy rules and log-linearisation

- Government budget constraint

$$\pi_t^{\theta} b_{t-1} = \tau_t P_t Y + q_t b_t$$

- Monetary and fiscal policy

$$R_t = \frac{1}{q_t} = \frac{1}{\beta}\pi_t^{\phi} \qquad s_t = \frac{q_t b_t}{P_t Y} \qquad \frac{\tau_t}{\tau} = \left(\frac{s_{t-1}}{s}\right)^{\gamma} e^{\varphi_t}$$

- Log-linearisation $\rightarrow 2 \times 2$ first-difference system

$$(1-\theta)E_t\hat{\pi}_{t+1} = \phi\hat{\pi}_t$$
$$(1-\beta)E_t\varphi_{t+1} + E_t\beta\hat{s}_{t+1} = (1-(1-\beta)\gamma)\hat{s}_t$$

Determinacy in Ricardian model

- φ_t is AR(1) fiscal disturbance with persistence ρ
- State space form

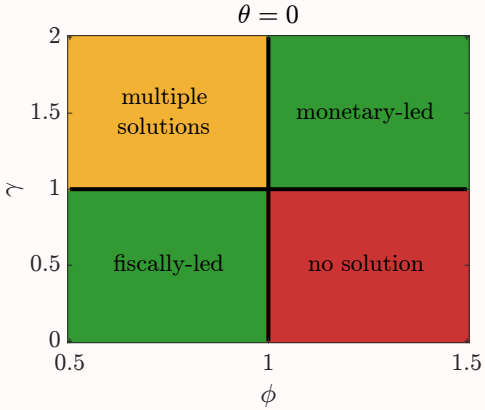
$$E_t \begin{pmatrix} \hat{\pi}_{t+1} \\ \hat{s}_{t+1} \end{pmatrix} = \begin{pmatrix} \frac{\phi}{1-\theta} & 0 \\ 0 & \frac{1-\gamma(1-\beta)}{\beta} \end{pmatrix} \begin{pmatrix} \hat{\pi}_t \\ \hat{s}_t \end{pmatrix} + \begin{pmatrix} 0 \\ \frac{1-\beta}{\beta} \end{pmatrix} E_t \varphi_{t+1}$$

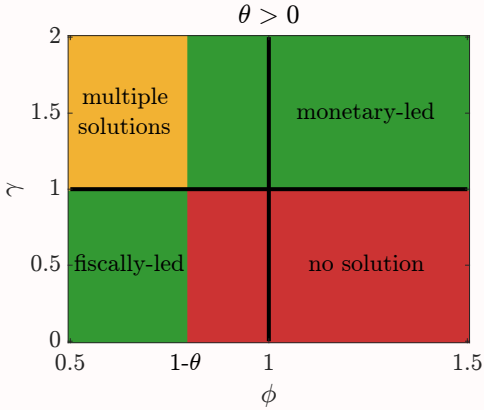
- Eigenvalues of system

$$\frac{\phi}{1-\theta}, \quad \frac{1-\gamma(1-\beta)}{\beta}$$

- Determinacy requires one eigenvalue outside unit circle and one inside
- *Monetary-led* policy mix if $\phi > 1-\theta$ and $\gamma > 1$, *Fiscally-led* if $\phi < 1-\theta$ and $\gamma < 1$.

Determinacy in Ricardian model





Intuition of Ricardian model

- π-indexation raises interest rate in Euler equation when $\pi \uparrow$
  - Monetary-led equilibrium more likely
  - Fiscally-led equilibrium less likely
  - Multiple solutions less likely
  - No solution more likely
- π-indexation acts as automatic stabiliser

Dynamics in Ricardian model

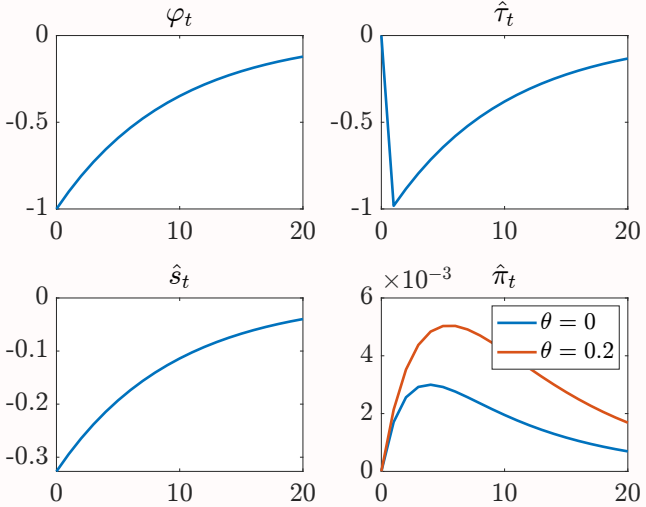
- Monetary-led equilibrium

$$\hat{\pi}_t = 0$$
$$\hat{s}_t = \frac{1-(1-\beta)\gamma}{\beta}\hat{s}_{t-1} - \varphi_t$$

- Fiscally-led equilibrium

$$\hat{s}_t = \left(\frac{\beta\rho}{1-(1-\beta)\gamma-\beta\rho}\right)\left(\frac{1-\beta}{1-(1-\beta)\gamma}\right)\varphi_t$$
$$\hat{\pi}_t = \frac{\phi}{1-\theta}\hat{\pi}_{t-1} - \frac{\beta}{1-\theta}\hat{s}_t + \frac{1-(1-\beta)\gamma}{1-\theta}\hat{s}_{t-1} - \frac{1-\beta}{1-\theta}\varphi_t$$

Dynamics of fiscally-led equilibrium in Ricardian model



Intuition of fiscally-led equilibrium in Ricardian model

- Dynamics of debt-to-GDP ratio independent of π-indexation
- Unexpected drop in taxes $\varphi_t \downarrow, \tau_t \downarrow \rightarrow$ fall in debt-to-GDP ratio $s_t \downarrow$

$$s_t = \frac{q_t b_t}{P_t Y} \qquad q_t b_t = \beta \pi_t^{\theta} b_{t-1} - \tau_t P_t Y$$

- For $s_t \downarrow$ need $q_t b_t \downarrow$ or $P_t \uparrow$
  - If $\theta = 0$ then for $q_t b_t \downarrow$ need $P_t \uparrow$
  - If $\theta > 0$ then π-indexation pushes $q_t b_t$ higher $\rightarrow$ need $P_t \uparrow\uparrow$ to rise even more
- Higher π in response to unfunded fiscal expansion when debt π-indexed

Non-Ricardian model with partially indexed debt

- Angeletos, Lian and Wolf (2024) *Deficits and Inflation: HANK meets FTPL*
- Monetary-fiscal interactions in NK model with finite planning horizons where monetary and fiscal policies are described by interest rate and deficit rules
- What happens when debt is partially indexed to inflation?

Aggregate demand and supply

- Aggregate demand depends on financial wealth and permanent income
  Second term captures substitution and wealth effects of real interest rates

$$c_t = (1-\beta\omega)\left(a_t + E_t\sum_{s=0}^{\infty}(\beta\omega)^s(y_{t+s}-t_{t+s})\right) - \beta\left(\sigma\omega - (1-\beta\omega)\frac{A^{SS}}{Y^{SS}}\right)E_t\left[\sum_{s=0}^{\infty}(\beta\omega)^s(r_{t+s}+\theta\pi_{t+1+s})\right]$$

- Aggregate supply is standard NKPC

$$\pi_t = \kappa\sum_{k=0}^{\infty}\beta^k E_t[y_{t+k}].$$

Fiscal and monetary policy

- Log-linearised government budget constraint

$$d_{t+1} = \frac{1}{\beta}(d_t - t_t) + \frac{D^{SS}}{Y^{SS}} r_t - \frac{D^{SS}}{Y^{SS}} \left((1 - \theta)\pi_{t+1} - \mathbb{E}_t \pi_{t+1} \right).$$

- Deficit rule

$$t_t = -\varepsilon_t + \tau_d (d_t + \varepsilon_t) + \tau_y y_t,$$

- Real interest rate rule

$$r_t = \phi y_t$$

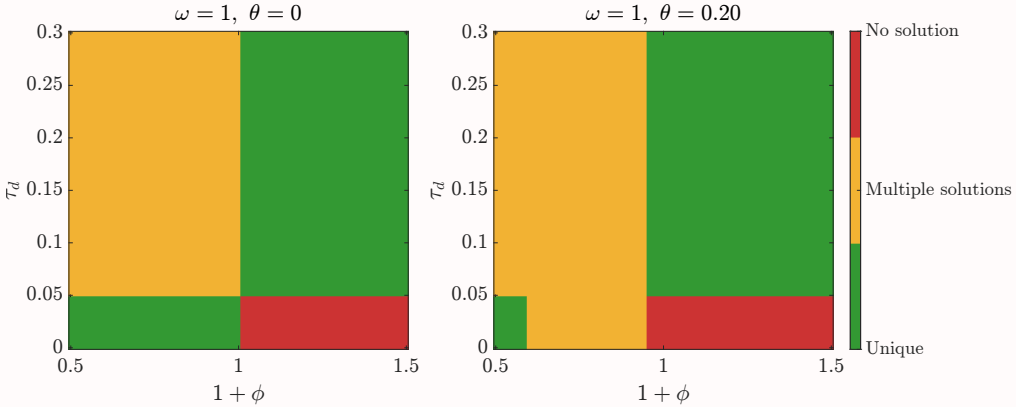
Dynamics when $\omega = 1$

- 3×3 system in output, inflation and debt
- Output-inflation block decoupled from debt block as in Ricardian case
- π-indexed debt tightens restriction for fiscally-led equilibrium

$$r_t = \phi y_t \qquad \phi < -\frac{\frac{D^{SS}}{Y^{SS}}\kappa\theta}{1-\beta}$$

- Inflation indexation does not overturn Kaplan (2025) and Rachel and Ravn (2025) results that debt block-exogenous with respect to output and inflation in RANK models

Determinacy when $\omega = 1$

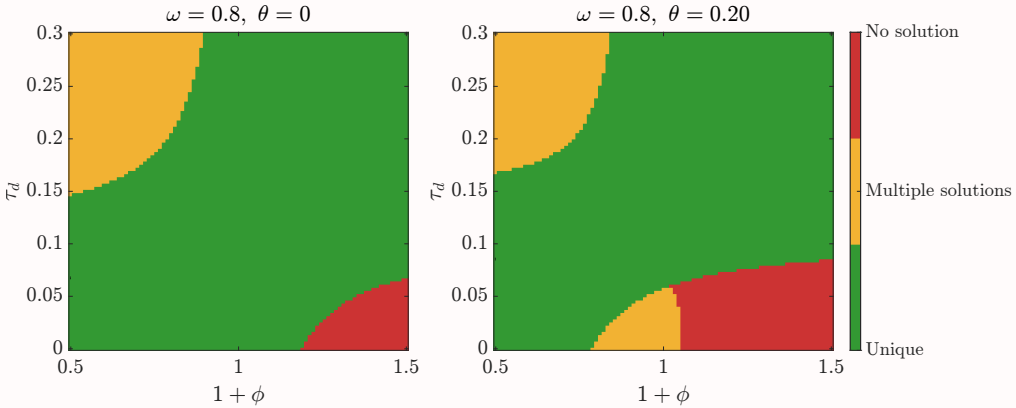


Dynamics when $\omega < 1$

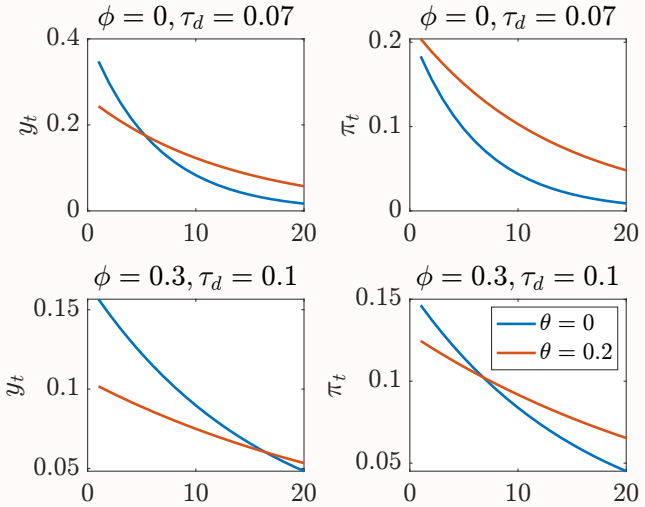
Proposition

The feasible region for a unique saddle path-stable equilibrium is constrained by a band $\phi^-(\tau_d;\theta) < \phi < \phi^+(\tau_d;\theta)$ *when* $\tau_d^0 > \tau_d > \tau_d^*$. *The band shifts with* θ, *with higher levels of* θ *making it less likely that a unique saddlepath equilibrium exists.*

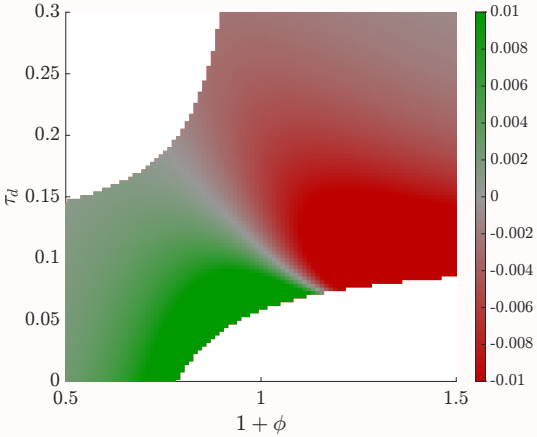
Determinacy when $\omega < 1$



Dynamics when $\omega < 1$



Dynamics when $\omega < 1$



- Difference in impact inflation in fiscally-led regime when debt is partially π-indexed

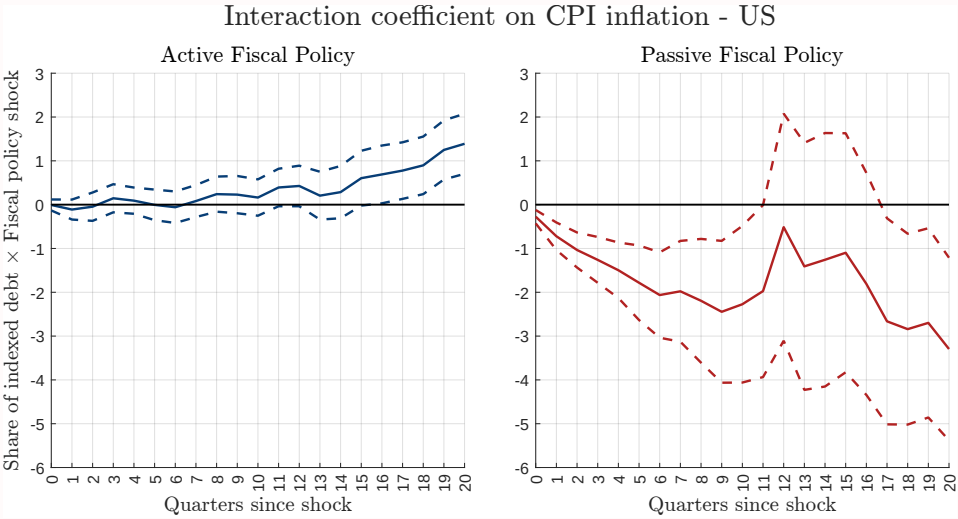
Empirical evidence

- Deciding whether policy is monetary-led or fiscally-led is difficult
- Chen, Leeper and Leith (2022) *Strategic interactions in U.S. monetary and fiscal policies*
  - Model-based identification of policy regime U.S. 1955q1-2008q3 $\rightarrow$ updated
  - Fiscally-led 91-94, 00-04, (09-12), and (16-17); otherwise Monetary-led
- Mierzwa (2024) *Spillovers from tax shocks to the Euro Area*
  - ε_t^F from narrative identification of U.S. tax shocks 1980q1-2018q4
- Separate local projection in each policy regime

$$\log P_{t+h} - \log P_t = \alpha_h + \beta_h \omega_t \varepsilon_t^F + \delta_{2h} \varepsilon_t^F + \Gamma_h Z_{t-1} + e_{t+h}$$

- $\{\beta_h\}$ is dependency of reaction at $t+h$ on share of indexed debt ω_t at t

Empirical evidence from the U.S.



Conclusions

- Non-causal evidence links π-indexed debt and suspension of Fiscal Rules
- Fiscally-led equilibrium less likely in Ricardian model but inflation reacts more to unfunded fiscal shocks if equilibrium is fiscally-led and debt is π-indexed
- Non-Ricardian model broadly agrees but conclusions more nuanced
- π-indexed debt *causes* greater reaction of π when U.S. in fiscally-led regime
- Little evidence that π-indexed debt has an effect when U.S. in monetary-led regime