The Perils of Narrowing Fiscal Spaces

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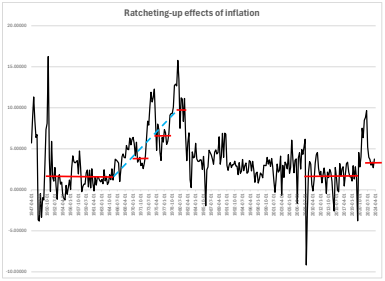
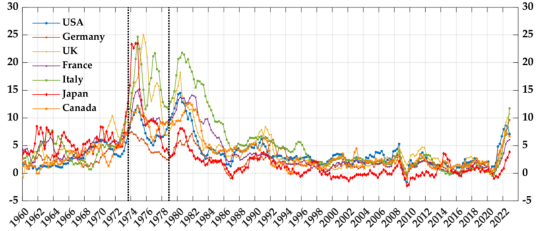
What We Still Do Not Understand About Inflation

Available explanations struggle to jointly explain:

- The ratcheting-up of inflation following the oil shocks of the 1970s
- The strong comovement of inflation across countries
- Why the "conquest of inflation" began in the early 1980s in most countries and took several years to be achieved





A Nonlinear Model of State-Dependent Fiscal Dominance

A nonlinear model in which large, fast-growing public debt may constrain monetary tightening

- A government may seek to expand deficits further without accepting higher debt.
- It does so by forcing the central bank to keep rates low $\rightarrow$ a state-dependent upper bound on nominal rates.

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Key Mechanism: Supply disruption risks $\times$ state-dependent fiscal constraints $\Rightarrow$ long-run inflation rises

What the Model Can Explain

1. **Ratcheting-up dynamics of inflation**

2. **Cross-country comovement**

3. **Why the "conquest of inflation" began in the early 1980s in most countries and took several years to be achieved**

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   $\Rightarrow$ A higher probability of hitting the fiscal limit persistently raises trend inflation. Standard cost-push shocks alone cannot account for the inflation ratcheting observed during the 1970s.

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   $\Rightarrow$ Oil, energy, and geopolitical tensions are global shocks that generate synchronized inflationary and deflationary pressures across countries.

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3. **Why the "conquest of inflation" began in the early 1980s in most countries and took several years to be achieved**

   $\Rightarrow$ As oil tensions gradually faded, the perceived risk of hitting the fiscal limit declined, allowing inflation to fall over time.

Literature

- Monetary-fiscal interactions and their implications for inflation dynamics
  - Sargent & Wallace (1981); Leeper (1991); Sims (1994); Woodford (1994, 1995, 2001); Cochrane (1998, 2001); Bianchi & Melosi (2017), Bianchi et al; (2023) ...
  - $\Rightarrow$ Fiscal inflation arises endogenously and in a state-dependent manner (not because debt is unbacked or fiscal policy turns active)
- Fiscal inflation outside canonical FTPL
  - Angeletos et al. (2024); Angeletos et al. (2025)
  - $\Rightarrow$ Fiscal limit generates inflationary pressure due to constraint on MP
- Fiscal limits and monetary policy space
  - Davig et al. (2010, 2011); Bi (2012); Bi et al. (2018); Wolf and Zessner-Spitzenberg (2022); Arellano et al. (2025)
  - $\Rightarrow$ Tractable nonlinear framework with an endogenous interest-rate ceiling

Roadmap

1. Simple model to explain the mechanism
2. Fiscal limit may bind after negative supply shocks
3. Supply disruptions risks and inflation ratcheting

The New Keynesian Model with the Fiscal Limit

- **Representative household** subject to preference shocks ζ_t

$$C_t^{-\sigma} = \beta R_t \, \mathbb{E}_t \left[\frac{\zeta_{t+1}}{\zeta_t} C_{t+1}^{-\sigma} \frac{1}{\Pi_{t+1}} \right]$$

- **Phillips curve** (Rotemberg pricing) with markup shocks μ_t

$$\varphi \left(\frac{\Pi_t}{\Pi} - 1 \right) \frac{\Pi_t}{\Pi} = (1 - \epsilon) + \epsilon MC_t + \varphi \mathbb{E}_t \left[\Lambda_{t,t+1} \left(\frac{\Pi_{t+1}}{\Pi} - 1 \right) \frac{\Pi_{t+1}}{\Pi} \frac{Y_{t+1}}{Y_t} \right] + \ln(\mu_t).$$

- **Monetary authority** sets nominal interest rate, responding to output and inflation

$$R_t^N = R \left(\frac{\Pi_t}{\Pi} \right)^{\phi_\Pi} \left(\frac{Y_t}{Y} \right)^{\phi_Y}$$

The model with fiscal limit (cont'd)

- Fiscal authority collects taxes τ_t and issues one-period bonds b_t

$$\frac{b_t}{R_t} = b_{t-1}\frac{Y_{t-1}}{\Pi_t Y_t} - \tau_t$$

- Fiscal rule responds to debt and output deviations

$$\tau_t = \tau + \delta(b_{t-1} - b) + \delta_Y(Y_t - Y)$$

- Parameter δ ensures debt stabilization through fiscal adjustment.
- Fiscal dominance manifests itself as a state-contingent limit on debt accumulation.

The model with fiscal limit (cont'd)

- **Fiscal limit is a constraint on debt-to-GDP ratio** $b_t < \bar{b}$
  - Fiscal space $(b_t - \bar{b})$ is state-dependent

$$b_t = R_t \left(b_{t-1} \frac{Y_{t-1}}{\Pi_t Y_t} - \tau_t \right) \leq \bar{b}$$

- Monetary policy affects fiscal space directly and indirectly
  - Direct effect through setting interest rates
  - Indirect effect via influencing output and inflation

An interpretation of the fiscal limit

The fiscal limit:

When public debt is high ($b_t = \bar{b}$), the debt-to-GDP ratio is bounded from above.

$$\frac{b_t}{b_{t-1}} = \underbrace{\frac{R_t}{\Pi_t g_t}}_{\text{r-g differential}} + \underbrace{\frac{d_t}{b_{t-1}}}_{\text{Fiscal stance}} \leq 0.$$

Interpretation:

A debt-ridden government seeks to expand deficits without taking responsibility for the resulting increase in debt.

A way to achieve this is by forcing the central bank to keep real interest rates low, thereby containing debt accumulation.

The model with fiscal limit (cont'd)

- **Fiscal limit translates directly into a constraint on monetary policy**

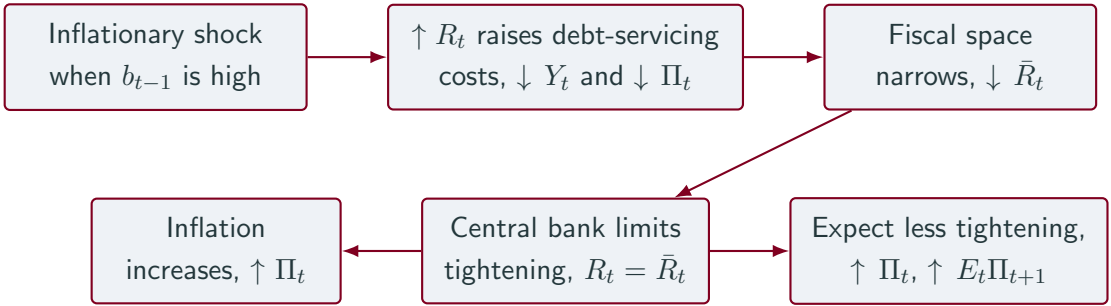
$$R_t \leq \bar{R}_t \equiv \bar{b} \cdot \underbrace{\left[b_{t-1} \frac{Y_{t-1}}{\Pi_t Y_t} - \tau_t \right]^{-1}}_{\Theta_t}$$

- **Upper bound depends on macro conditions** (Θ_t)

- Taken together, monetary authority sets interest rate as

$$R_t = \min \left[R_t^N, \bar{R}_t \right].$$

Overview of mechanism



$\Rightarrow$ **Fiscal inflation and inflationary bias due to upper bound on interest rates**

Inflationary bias and spiral of the fiscal limit

- A **simplified version to gain intuition about the link between risk of hitting the fiscal limit and trend inflation**
- Only markup shocks: two values: $\mu_t \in \left\{\mu_t^L, \mu_t^H\right\}$
- Simplified fiscal policy setting regime-specific debt-to-output ratios

$$\tau_t = \begin{cases} b_{t-1}\frac{1}{\Pi_t}\frac{Y_{t-1}}{Y_t} - \frac{b_t^L}{R_t} & \text{if } \mu_t^L \\ b_{t-1}\frac{1}{\Pi_t}\frac{Y_{t-1}}{Y_t} - \frac{b_t^H}{R_t} & \text{if } \mu_t^H \end{cases}$$

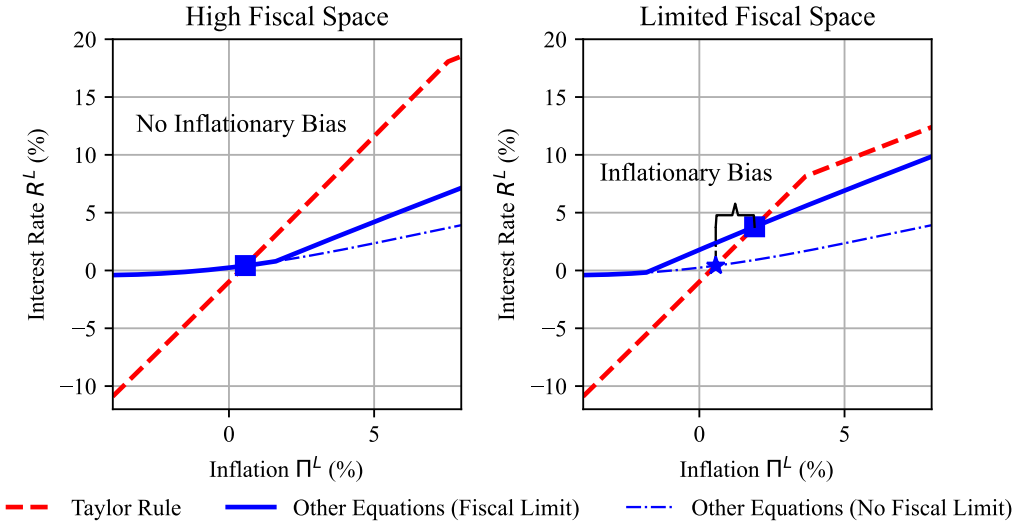
- Fiscal limit abstracting from period-by-period growth:

$$\bar{R}_t = \frac{\bar{b}E_t\Pi_{t+1}}{b_t}$$

Equilibrium characterization

- Equilibria can be characterized by solving a set of nonlinear equations
  - Partition of equilibrium conditions in blocks for low and high markup regime
  - Blocks are connected as agents are rational and forward looking
  - Even before constraint binds, risk of future binding can lift inflation

Inflationary bias: A graphical characterization

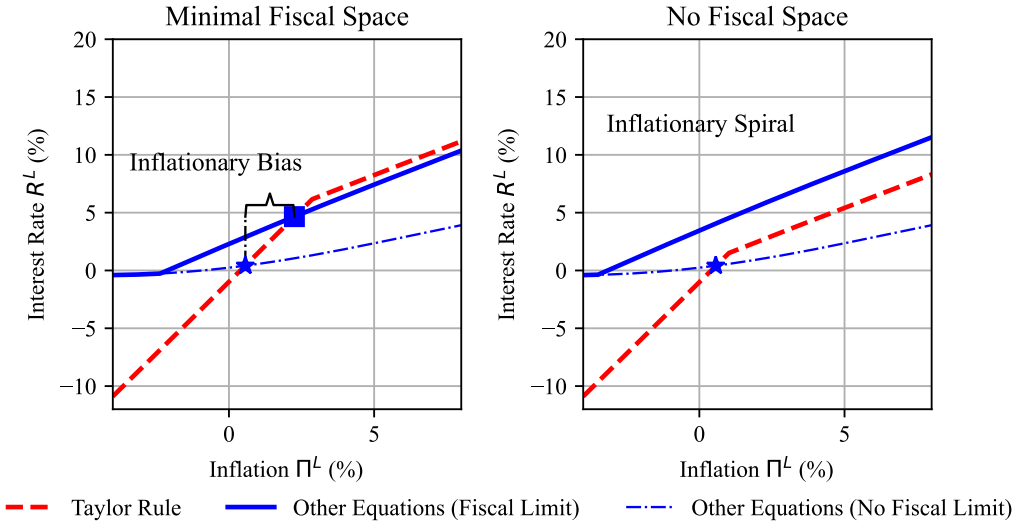


Inflationary bias and expectations

- Fiscal limit does not bind in the low markup state, but in the high markup state
- Agents understand that it may bind in the future, affecting their current behavior
- Fiscal limit increases inflation in high markup state, affecting inflation expectations
- Inflation is higher in low markup state, despite fiscal limit not being binding

$\Rightarrow$ Inflationary bias due to fiscal constraint

Inflationary spiral: A graphical characterization



Inflationary Spirals

- Under a sufficiently tight fiscal constraint, monetary accommodation can become substantial.
- The accommodation required to preserve fiscal sustainability raises inflation expectations and current inflation.
- Stabilizing inflation would require higher real interest rates, but this would violate the fiscal limit.

$\Rightarrow$ A very tight fiscal constraint or heightened risk of supply disruptions can generate inflationary spirals and equilibrium instability.

Calibration

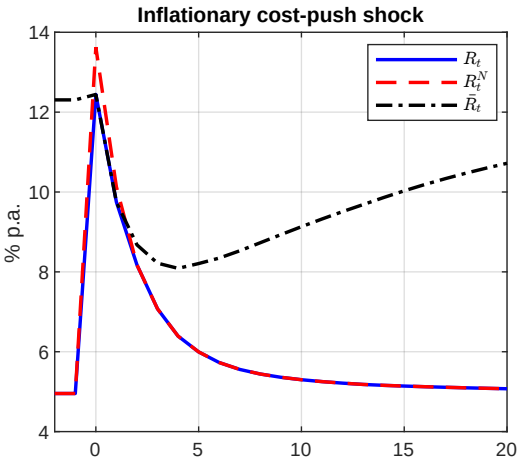
- Calibration matches broad postwar U.S. moments for:
  - inflation volatility,
  - output-growth volatility,
  - and their near-zero correlation.

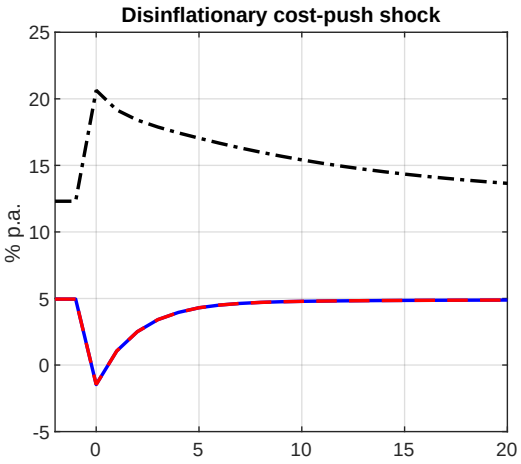
Parameters	Sign	Value	Parameters	Sign	Value
Discount factor	β	0.993	Relative risk aversion	σ	1
Inverse Frisch elasticity	η	1.33	Disutility of labor	ψ	0.87
Price elasticity of demand	ϵ	7.67	Rotemberg pricing	φ	78.36
Fiscal response to debt	δ	0.1	Fiscal response to output	δ_Y	0.5
Monetary response to inflation	ϕ_Π	1.5	Monetary response to output	ϕ_Y	0.1
Persistence Pref. Shock	ρ_ζ	0.6	Std. Dev. Pref. Shock	σ_ζ	0.012
Persistence Markup Shock	ρ_μ	0.6	Std. Dev. Markup Shock	σ_μ	0.18
Inflation target	(Π-1)*4	2%	Steady-state debt-to-output	b	2.4
Fiscal limit (p.p. above SS debt)	$\bar{b} - b$	0.05			

Model Solution

- The model is solved globally in its nonlinear specification using time iteration.
  - Expectations are computed using Gauss–Hermite quadrature.
  - The solution method follows Richter et al. (2014), as in Bianchi et al. (2021).
- Future versions will rely on our neural-network-based solution method.
  - The approach scales to larger models, estimation, larger shocks, and non-Gaussian shock distributions.
  - See Kase, Melosi, and Rottner (2025) for details.
  - A simpler, though less accurate, alternative is Generative Economic Modeling (Kase, Rottner, and Stohler 2025).

Cost-push shock and the fiscal limit



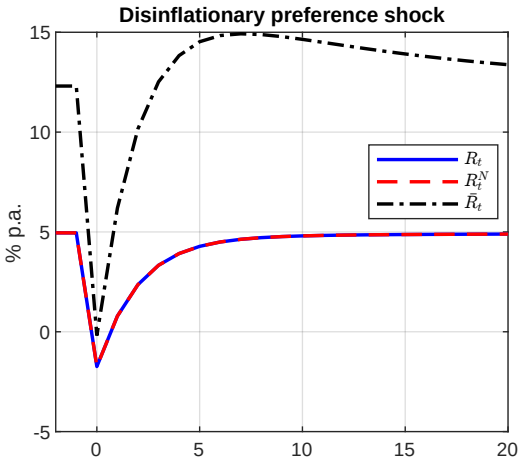


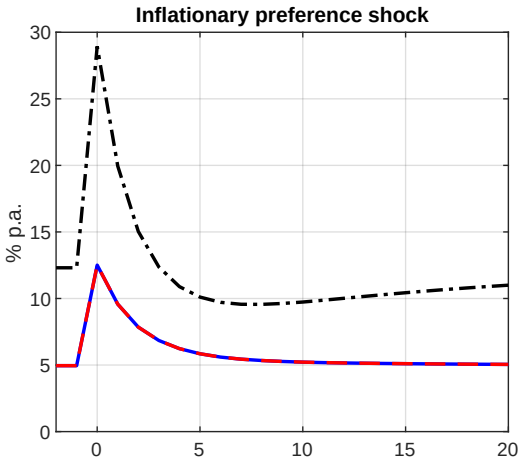
Supply Shocks and the Fiscal Limit (cont'd)

- **Inflationary supply shock**
  - Inflation rises while output contracts.
  - Monetary tightening aimed at curbing inflation deepens the recession and increases debt burdens, pushing the debt-to-GDP ratio closer to the fiscal limit.
  - Fiscal pressures on the central bank intensify to keep interest rates low.
  - The central bank raises rates, but tightening is constrained by the fiscal limit.
    - Large shocks or high initial debt levels limit monetary tightening.

- **Disinflationary supply shock**
  - Inflation falls while output strengthens.
  - Lower interest rates expand fiscal space.
    - The shock does not give rise to fiscal pressures.

Demand shock and the fiscal limit





Demand Shocks and the Fiscal Limit

- **Inflationary demand shock**
  - Higher inflation and output relax the fiscal constraint.
  - Countercyclical fiscal policy further expands the fiscal limit on monetary policy
    - more room for rate hikes.

- **Disinflationary demand shock**
  - Lower inflation and output tighten the fiscal constraint.
  - Although the central bank cuts rates, policy space shrinks more rapidly.
  - Monetary policy space contracts during recessions.
    - The fiscal limit may even imply an upper bound below the ZLB.

Fiscal Limits and the Zero Lower Bound

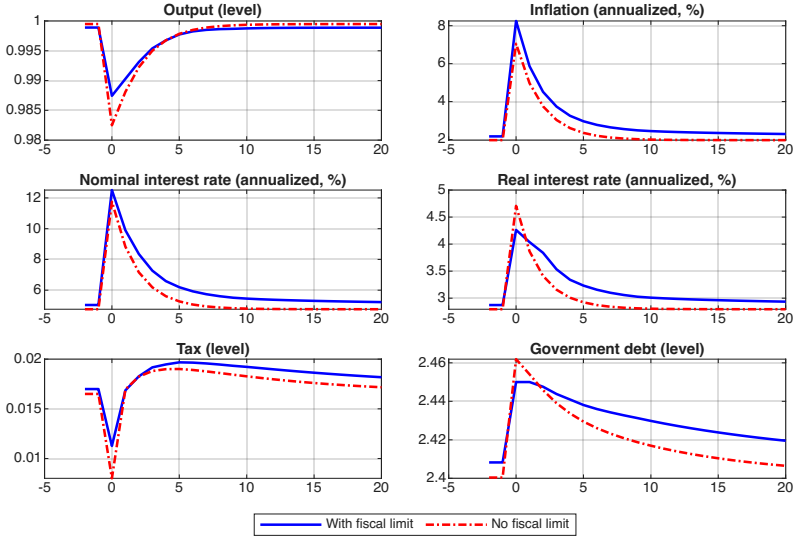
- A large negative demand shock can push the fiscal limit below zero.
- Once the ZLB binds, the policy rate cannot be reduced further.
  - This deepens the recession and worsens fiscal stress.
- The interest rate consistent with the fiscal limit falls even further.
- Fiscal limit below the ZLB: Monetary policy space is fully exhausted.
- The central bank then faces the exit strategy:
  1. Monetize the portion of public debt exceeding the borrowing limit.
  2. Higher inflation expectations may help the economy escape the ZLB, but at the risk of excessive inflation.

Importance of shock type

- Supply shocks are the main source of binding episodes
  - Coming from large inflationary markup shocks
- Demand shocks can also trigger the upper bound
  - Policy space gets curtailed in a recession, but implying a more loose policy

Scenario	Bind frequency
All shocks active	8%
Only supply shocks	7%
Only demand shocks	1%

Economic impact of an inflationary markup shock



Economic Effects of an Inflationary Markup Shock

- Inflation rises while output contracts.
- Higher debt-to-GDP ratios induce fiscal pressure for a weaker monetary response.
  - The central bank still tightens, but less than implied by the notional rule.
  - Real interest rates rise by less.
- Relative to the unconstrained case, the economy experiences:
  - higher inflation,
  - stronger output growth.

Long-Term Debt and the Fiscal Constraint

- With long-term debt, fiscal constraints place an upper bound on bond yields.
- Higher expected inflation lowers the real return on nominal bonds.
- **Why are households still willing to hold these bonds?**
  - The fiscal limit on monetary policy lowers the expected path of future real rates.
  - Households shift consumption toward the present, making future consumption relatively scarcer.
  - The higher SDF increases the discounted value of future bond payoffs.
  - Despite low real returns, households continue to hold bonds because they provide a vehicle for intertemporal consumption smoothing.

Long-Run Inflation Risks and Bias

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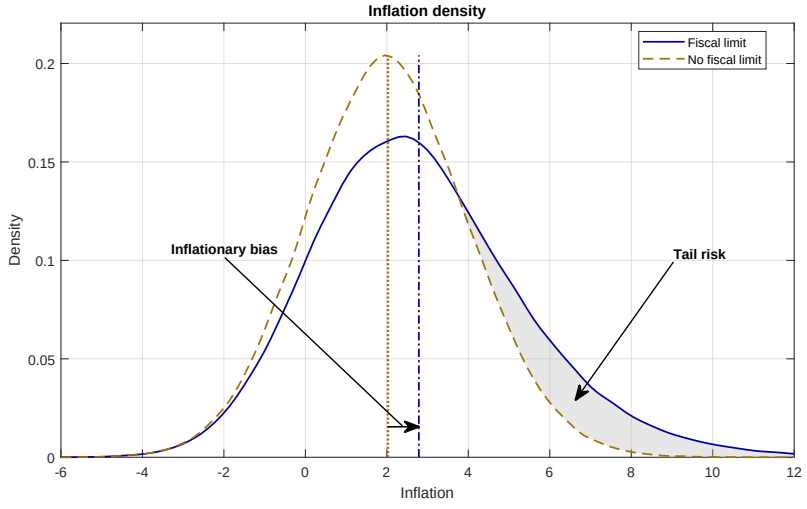

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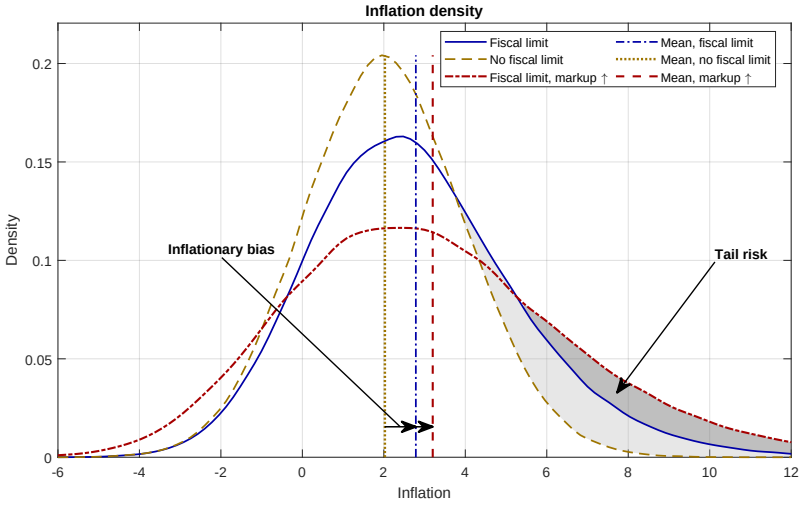

Supply Disruption Risks and Inflation Ratcheting

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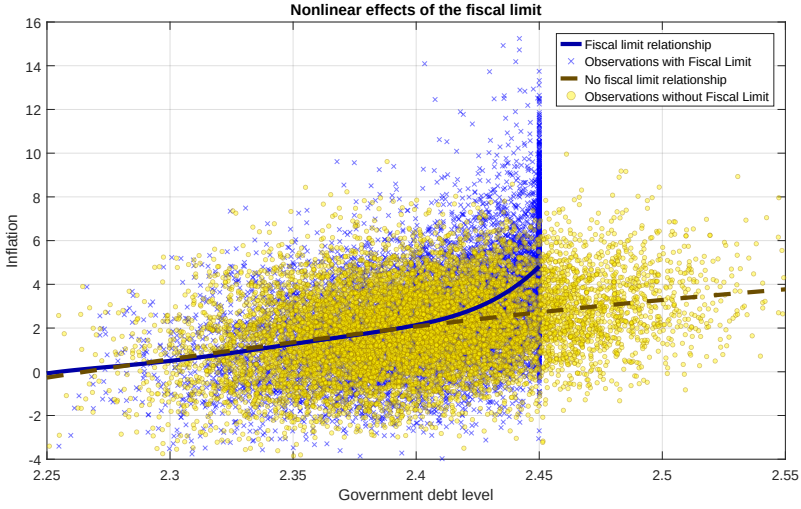

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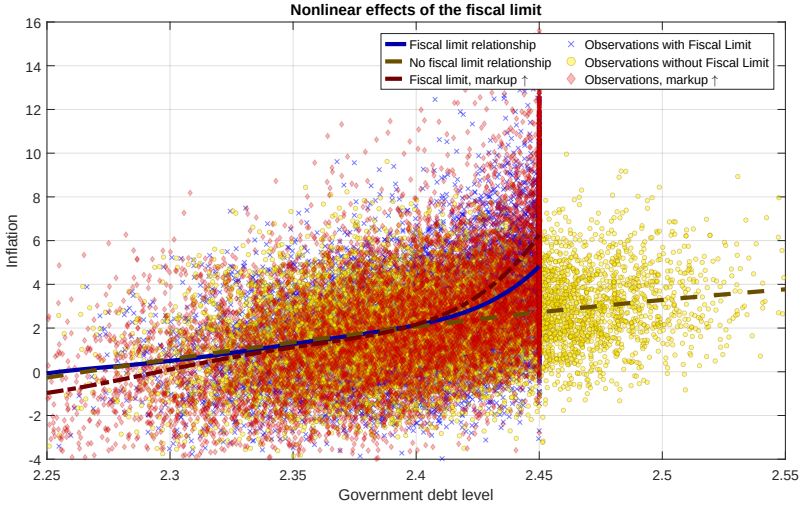
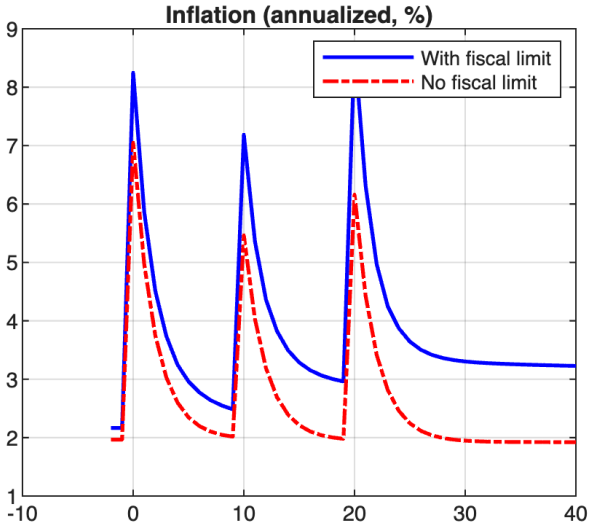
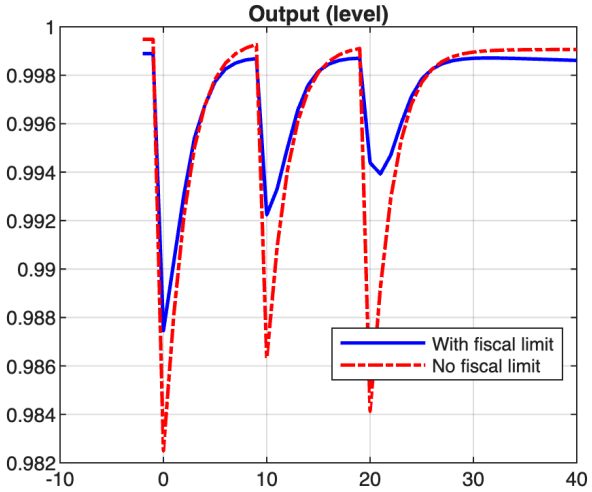


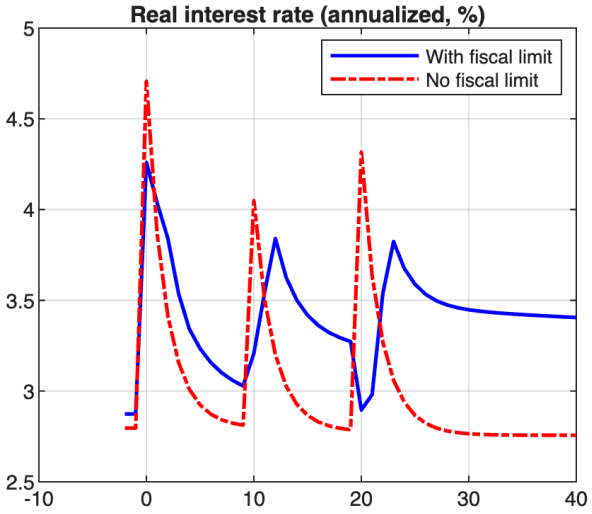
Ratcheting-up Inflation



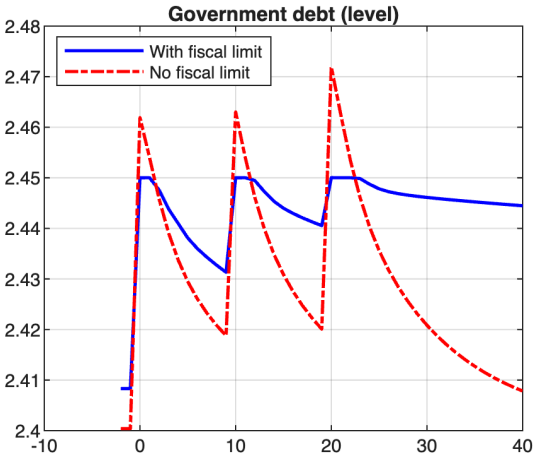
Output


Output (level)
1
0.998
0.996
0.994
0.992
0.99
0.988
0.986
0.984
0.982
-10
0
10
20
30
40
With fiscal limit
No fiscal limit

Real Interest Rate



Debt


Government debt (level)
With fiscal limit
No fiscal limit
2.48
2.47
2.46
2.45
2.44
2.43
2.42
2.41
2.4
-10
0
10
20
30
40

Concluding Remarks

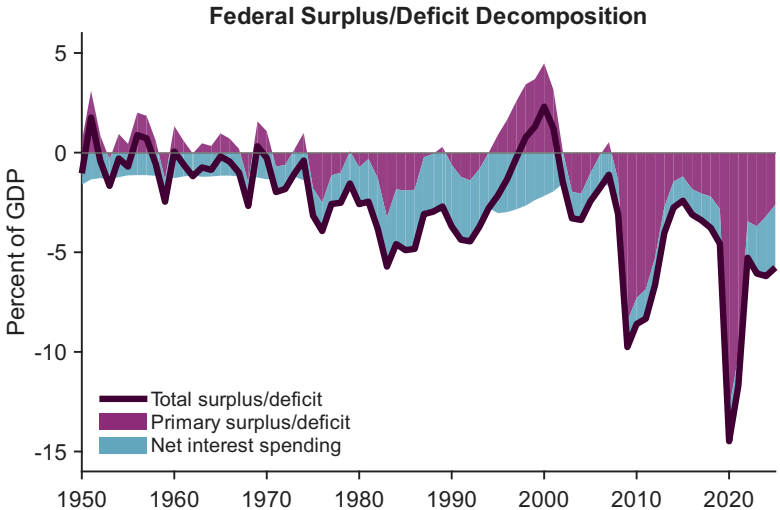
- **Supply Disruption Risks, High Debt, and Inflation Ratcheting**
  - Persistent global supply disruptions call for monetary tightening.
  - Yet high public debt makes tightening more fiscally costly by compressing fiscal space and raising debt-servicing pressures.
  - When debt is high, constrained policy responses can amplify the macroeconomic effects of geopolitical risks and supply disruptions, leading to inflation ratcheting.

$\Rightarrow$ **Macroeconomic stability is a global public good.**

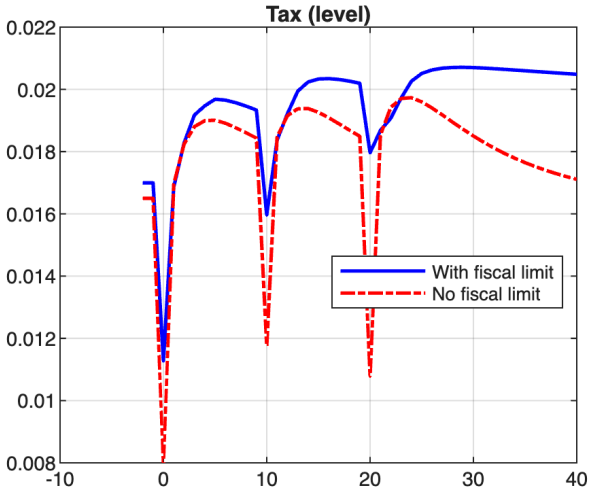
- Limiting geopolitical fragmentation is crucial in a world with high public debt.

Appendix

Fiscal situation



Taxes


Tax (level)
0.022
0.02
0.018
0.016
0.014
0.012
0.01
0.008
-10
0
10
20
30
40
With fiscal limit
No fiscal limit