Fiscal Policy and Real Interest Rates

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Fiscal policy and real interest rates

- We study the relation between fiscal policy and real interest rates
- We employ a model with partially unfunded government debt
  (Bianchi, Faccini, and Melosi, QJE 2023)
  1. At any given point in time, part of the outstanding government debt is unfunded
  2. Unfunded debt is not backed by future fiscal adjustments $\Rightarrow$ Inflationary pressure accommodated by the central bank
- Debt stability achieved with a mix of fiscal adjustments and inflation
- With nominal rigidities, unfunded fiscal shocks cause persistent movements in inflation and in real interest rates $\rightarrow$ A fiscal theory of persistent inflation
- With respect to other shocks, policymakers follow a typical Monetary-led policy $\Rightarrow$ other shocks propagate as in standard business cycle models

Empirical analysis

We augment a TANK model with partially unfunded debt:

1. Standard frictions and shocks, critical to explain business-cycle dynamics
2. Unfunded fiscal shocks with muted response of policymakers
3. Hand-to-mouth agents and distortionary taxation
4. Near-permanent cost-push shocks – effects of trade and geopolitical risk on inflation

Distinct implications of funded and unfunded shocks

1. Funded fiscal shocks: small **increase** in real interest rates
2. Unfunded fiscal shocks: large **decline** in real interest rates

US postwar real interest rate dynamics

Low-frequency movements in real interest rates driven by unfunded fiscal shocks

- **1960s-1970s**: Persistent spending thrust set off by the *Great Society* initiatives + loose monetary policy explain the *Great Inflation* and low real interest rates
- **1980s**: Volcker disinflation accelerated a pre-existing downward shift in the amount of unfunded debt $\Rightarrow$ Upward drift in real interest rates
- **1990s-2000s**: Fiscal real interest rates remain relatively stable
- **2010s-2020s**: Fiscal inflation counteracts deflationary pressure $\Rightarrow$ Drop in fiscal real interest rates

Pandemic and its aftermath

Pandemic: Two unprecedentedly large fiscal stimuli and a new monetary framework

- **March 2020**: Small fraction of the CARES stimulus considered unfunded
- **Summer 2020**: New monetary framework
  $\Rightarrow$ rise in fiscal inflation, boost in real activity, and **drop in real interest rates**
- **March 2021**: ARPA fiscal stimulus partially unfunded:
  Acceleration in fiscal inflation and **record low real interest rates**
- **Aftermath**: Fiscal real interest rates...
  1. ...back to the pre-pandemic level
  2. ...**lower than actual real interest rates**
  3. ...subject to significant uncertainty due to future fiscal policy

Related literature

- Monetary-fiscal policy interaction: Sargent and Wallace (1981); Leeper (1991); Sims (1994); Woodford (1994, 1995, 2001); Cochrane (1998, 2001); Schmitt-Grohe and Uribe (2000, 2002); Bassetto (2002); Reis (2016); Bassetto and Sargent (2021); Barro (1974); Aiyagari and Gertler (1985).
- Model with regime changes in policy: Bianchi (2013); Bianchi and Ilut (2017); Bianchi and Melosi (2017, 2022).
- Business cycle New Keynesian DSGE: Smets and Wouters (2007); Leeper, Traum, and Walker (2017).

Endowment economies

The Fisherian model

- The representative household solves:

$$\max \ \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t U(C_t),$$

  subject to the budget constraint $P_t C_t + Q_t B_t + P_t \tau_t = P_t Y + B_{t-1}$, where $Q_t = R_{n,t}^{-1}$.

- Government budget constraint: $Q_t B_t + P_t \tau_t = B_{t-1}$.
- Monetary rule: $R_{n,t}/R = (\Pi_t/\Pi)^{\phi}$.
- Fiscal rule: $\tau_t/\tau = (s_{b,t-1}/s_b)^{\gamma} e^{\zeta_t}$, where $s_{b,t} \equiv (Q_t B_t)/(P_t Y)$.
- Market clearing: $C_t = Y$.

Monetary and fiscal block

Linearize the model equations around the deterministic steady state:

$$\begin{aligned}
\hat{r}_{n,t} &= \mathbb{E}_t \hat{\pi}_{t+1}, && (1)\\
\hat{s}_{b,t} &= \beta^{-1}[\hat{s}_{b,t-1} + \hat{r}_{n,t-1} - \hat{\pi}_t - (1-\beta)\hat{\tau}_t], && (2)\\
\hat{r}_{n,t} &= \phi \hat{\pi}_t, && (3)\\
\hat{\tau}_t &= \gamma \hat{s}_{b,t-1} + \zeta_t. && (4)
\end{aligned}$$

Plugging the monetary rule into the Fisher equation leads to the monetary block:

$$\mathbb{E}_t \hat{\pi}_{t+1} = \phi \hat{\pi}_t. \quad (5)$$

Combining the law of motion for debt with the fiscal rule yields the fiscal block:

$$\hat{s}_{b,t} = \beta^{-1}[1-(1-\beta)\gamma]\hat{s}_{b,t-1} + \beta^{-1}\left[\hat{r}_{n,t-1} - \hat{\pi}_t - (1-\beta)\zeta_t\right]. \quad (6)$$

Solution

Two regions of the parameter space deliver a unique stationary solution (Leeper, 1991)

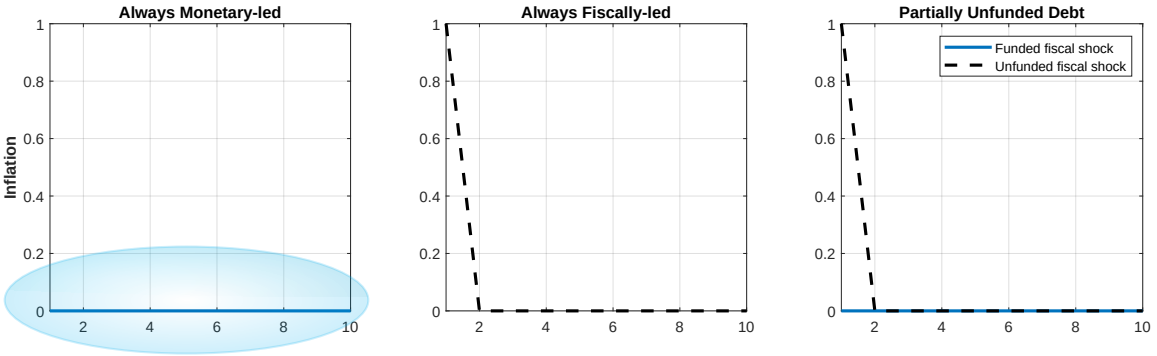
- Monetary-led policy mix: The fiscal authority is committed to implementing the necessary fiscal adjustments. Fiscal policy is passive ($\gamma > 1$) because it passively accommodates the behavior of the active monetary authority ($\phi > 1$).

  $\Rightarrow$ Inflation is insulated from the fiscal block.

- Fiscally-led policy mix: The fiscal authority is not committed to implementing the necessary fiscal adjustments. Monetary policy is passive ($\phi \leq 1$) because it passively accommodates the behavior of the active fiscal authority ($\gamma \leq 1$).

  $\Rightarrow$ Inflation is not insulated from the fiscal block.

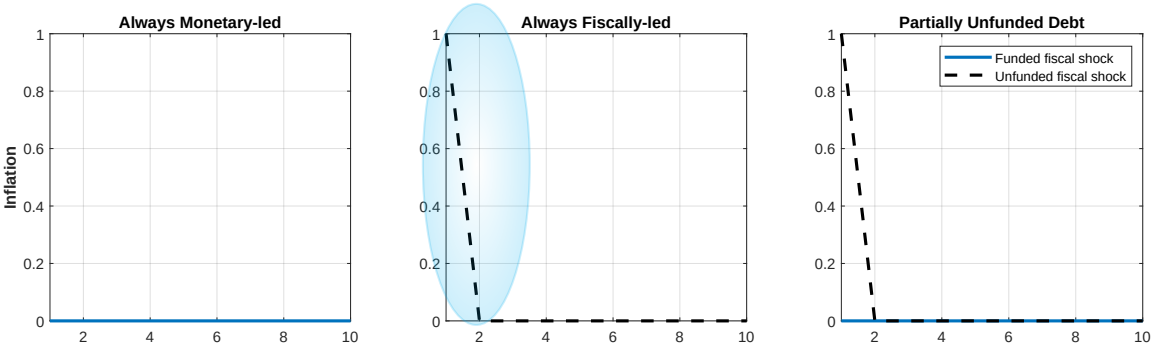
Inflation response to fiscal shocks



Impulse responses:

1. Inflation does not respond under the Monetary-led policy mix ($\phi = 2.0; \gamma = 0.2$)

Inflation response to fiscal shocks



Impulse responses:

2. Inflation responds under the Fiscally-led policy mix $(\phi = 0; \gamma = 0)$

Fisherian model with partially unfunded debt

We now introduce the notion of partially unfunded debt:

- We consider the following fiscal rule:

$$\hat{\tau}_t = \gamma^M \left(\hat{s}_{b,t-1} - \hat{s}^F_{b,t-1} \right) + \gamma^F \hat{s}^F_{b,t-1} + \zeta^M_t + \zeta^F_t . \tag{7}$$

  where ζ^M_t and ζ^F_t denote funded and unfunded fiscal shocks, respectively, and $\gamma^F < 1$, and $\gamma^M > 1$.

- The new monetary rule is:

$$\hat{r}_{n,t} = \phi^M \left(\hat{\pi}_t - \hat{\pi}^F_t \right) + \phi^F \hat{\pi}^F_t . \tag{8}$$

  where $\hat{\pi}^F_t$ denotes fiscal inflation, i.e., the amount of inflation that is tolerated by the central bank to stabilize the share of unfunded debt $\hat{s}^F_{b,t-1}$, $\phi^M > 1$ and $\phi^F \leq 1$.

Linearized model

- The monetary block:

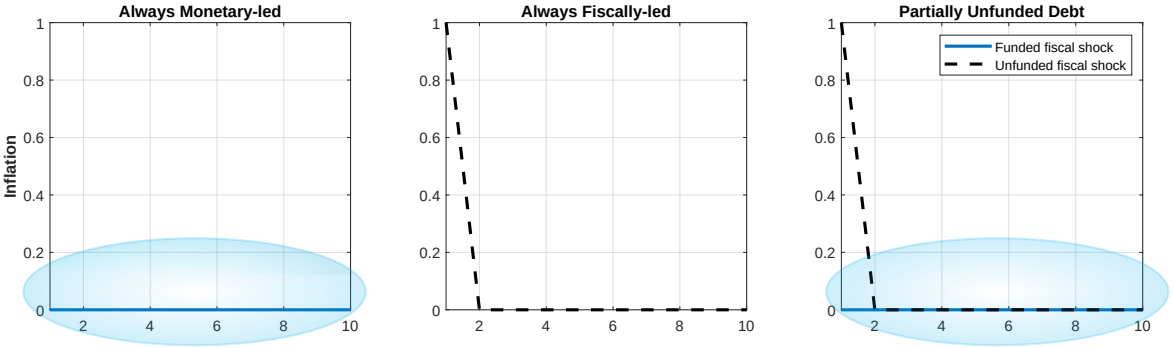
$$\mathbb{E}_t \hat{\pi}_{t+1} = \phi^M \left(\hat{\pi}_t - \hat{\pi}_t^F \right) + \phi^F \hat{\pi}_t^F .$$

- The fiscal block ($\gamma_F = 0$)

$$\hat{s}_{b,t} = \beta^{-1}[1 - (1-\beta)\gamma^M]\hat{s}_{b,t-1} + \beta^{-1}[(1-\beta)\hat{s}^F_{b,t-1} + \hat{r}_{n,t-1} - \hat{\pi}_t - (1-\beta)(\zeta_t^M + \zeta_t^F)]$$

- To close the model, we need to characterize the dynamics of fiscal inflation, $\hat{\pi}_t^F$, and of the associated amount of unfunded debt, $\hat{b}_t^F$.
- We construct a shadow economy in which the Fiscally-led policy mix is always in place and only shocks to unfunded spending ζ_t^F occur.

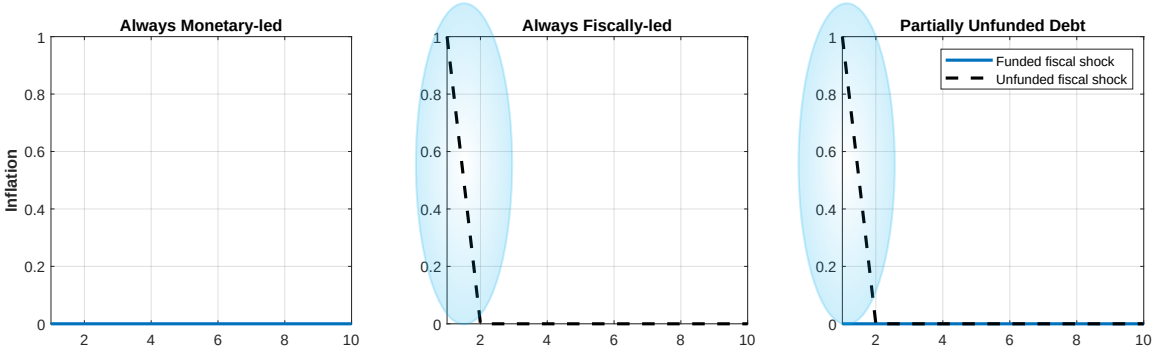
Inflation response to funded and unfunded fiscal shocks



Impulse responses $(\phi^M = 2.0; \gamma^M = 0.2)$; $(\phi^F = 0; \gamma^F = 0)$:

1. Inflation does not respond to a funded fiscal shock $(\phi = 2.0; \gamma = 0.2)$

Inflation response to funded and unfunded fiscal shocks



Impulse responses $(\phi^M = 2.0; \gamma^M = 0.2)$; $(\phi^F = 0; \gamma^F = 0)$:

2. Inflation responds to an unfunded fiscal shock $(\phi = 0; \gamma = 0)$

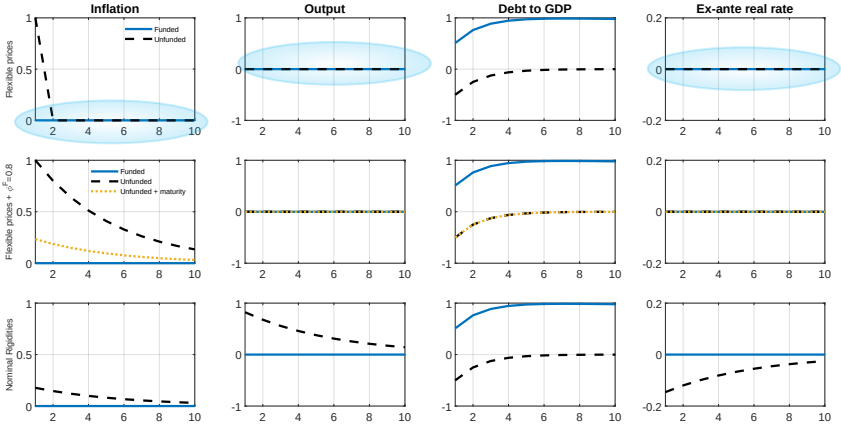
Production economies

Production economies

We now extend the analysis to a production economy.

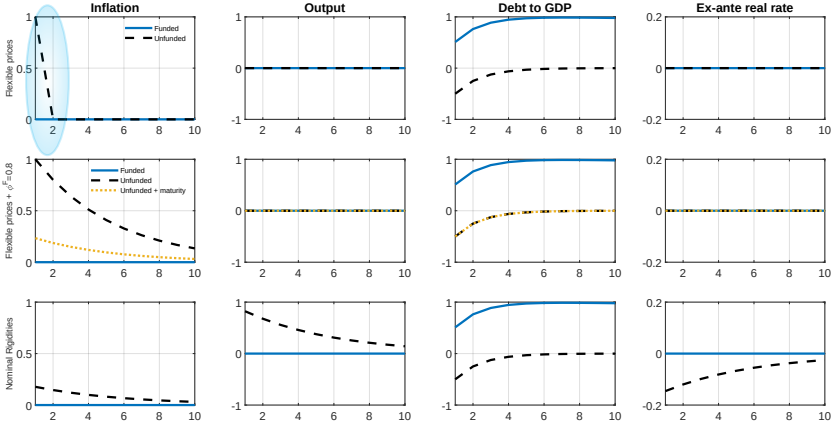
- Simple environment with no capital, but endogenous labor supply and production
- Two alternatives:
  1. Flexible prices
  2. Nominal rigidities
- Nominal rigidities and unfunded shocks deliver a a fiscal theory of persistent inflation:
  1. Persistent movements in inflation
  2. Persistent movements in real interest rates
  3. Persistent movements in output (real effects)

Persistent Fiscal Inflation and Real Interest Rates



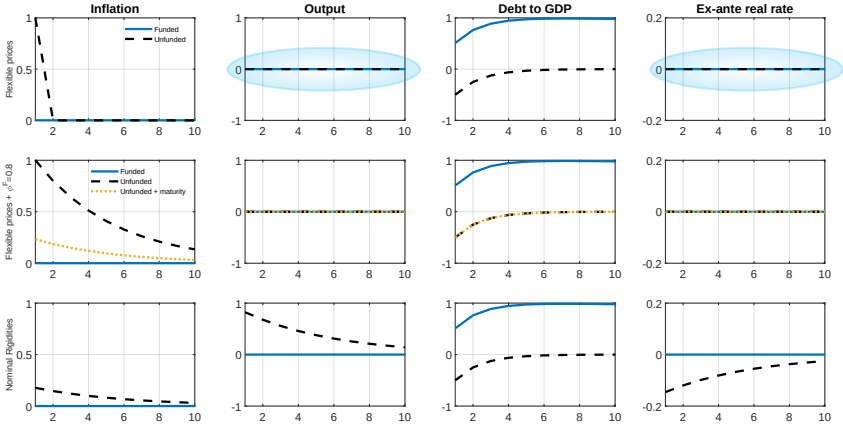
1. **Absent nominal rigidities**, macro-fiscal dichotomy holds for funded shocks

Persistent Fiscal Inflation and Real Interest Rates



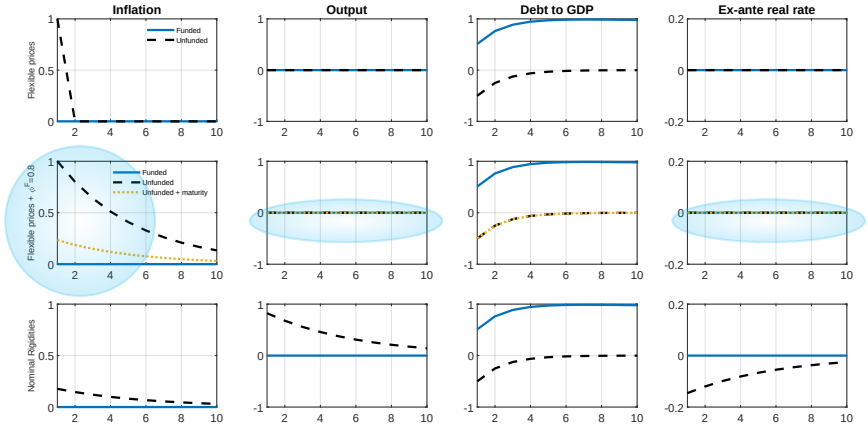
2. **Absent nominal rigidities**, price level increases after unfunded shocks as in the Fisherian model

Persistent Fiscal Inflation and Real Interest Rates



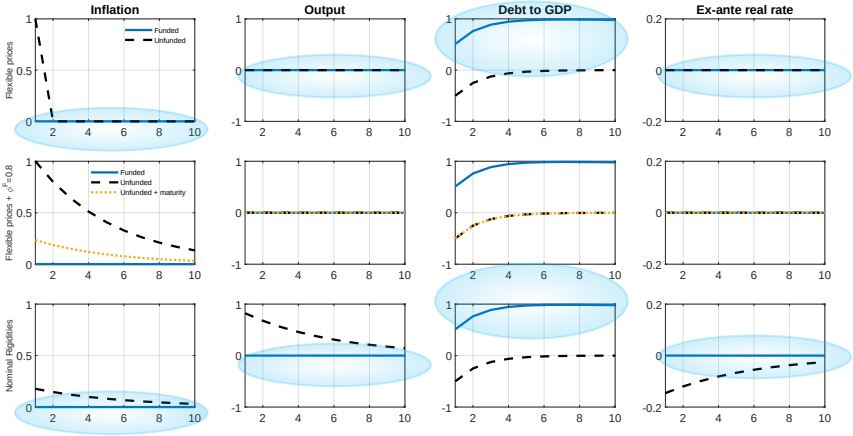
3. **Absent nominal rigidities**, real economy unaffected by unfunded shocks

Persistent Fiscal Inflation and Real Interest Rates



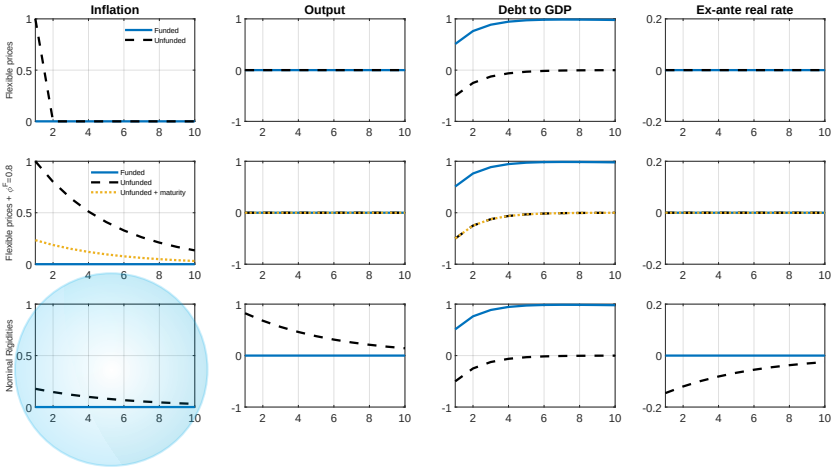
4. **With flexible prices and** $\phi_\pi^F > 0$, persistent inflation but no real effects in response to unfunded shocks

Persistent Fiscal Inflation and Real Interest Rates



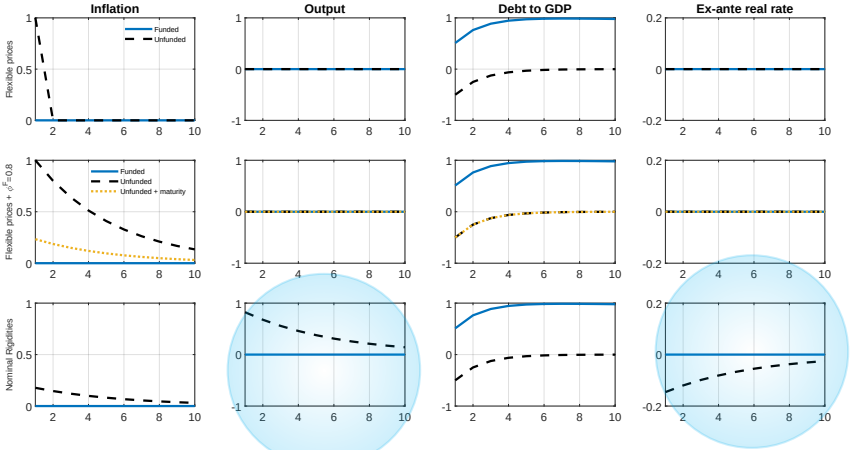
5 **Nominal rigidities:** No macro effects of funded shocks as in flex prices
→ macro-fiscal dichotomy

Persistent Fiscal Inflation and Real Interest Rates



6 **Nominal rigidities:** persistent and moderate inflation response to unfunded shocks

Persistent Fiscal Inflation and Real Interest Rates



- **Nominal rigidities: persistent decline in the real interest rate** and real effects of unfunded shocks

A Quantitative General Equilibrium Model

The Model

State-of-the-art TANK model

- Distortionary taxation on labor and capital income
- Price and wage rigidities
- Hand-to-mouth households
- Long-term government bonds
- **Typical set of business cycle shocks** plus **fiscal shocks** and a **shifter of the Phillips curve** capturing market and non policy forces such as globalization

Unfunded debt and monetary and fiscal coordination

- Changes in transfers $\zeta_{z,t}^{M}$ and $\zeta_{z,t}^{F}$ determine the share of funded and unfunded debt
- Funded debt $\tilde{b}_t^M$ is stabilized by fiscal instruments
- Unfunded debt $\tilde{b}_t^F$ is stabilized by fiscal inflation $\hat{\pi}_t^F$, which the monetary authority accommodates
- No fiscal response to unfunded debt ($\gamma^F = 0$)
- No monetary response to fiscal inflation ($\phi^F = 0$) $\rightarrow$ endogenous inflation target

Formalization

Monetary Rule

$$\hat{R}_t = \max(-\ln R_*, \rho_r \hat{R}_{t-1} + (1-\rho_r)\left[\phi_\pi(\hat{\pi}_t - \hat{\pi}_t^F) + \phi_y \hat{y}_t\right]) + \epsilon_{R,t}$$

Fiscal Rules

$$\hat{\tau}_t^L = \rho_L \hat{\tau}_{t-1}^L + (1-\rho_L)\,\gamma_L \left(\tilde{b}_{t-1} - \tilde{b}_{t-1}^F\right) + \zeta_{\tau_L,t}$$

$$\hat{\tau}_t^K = \rho_K \hat{\tau}_{t-1}^K + (1-\rho_K)\,\gamma_K \left(\tilde{b}_{t-1} - \tilde{b}_{t-1}^F\right) + \zeta_{\tau_K,t}$$

$$\hat{g}_t = \rho_G \hat{g}_{t-1} - (1-\rho_G)\,\gamma_G \left(\tilde{b}_{t-1} - \tilde{b}_{t-1}^F\right) + \zeta_{g,t}$$

$$\hat{z}_t = \hat{z}_t^* + \zeta_{z,t}^M + \zeta_{z,t}^F$$

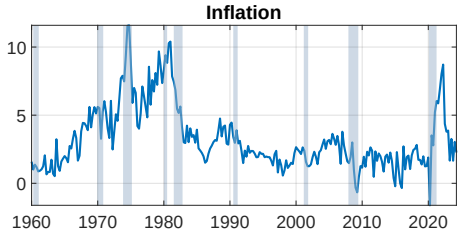
$$\hat{z}_t^* = \rho_Z \hat{z}_{t-1}^* - (1-\rho_Z)\,\gamma_Z \left(\tilde{b}_{t-1} - \tilde{b}_{t-1}^F\right) + \phi_{zy}\hat{y}_t + \zeta_{z^*,t}$$

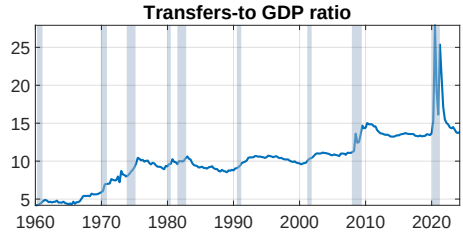
Empirical Analysis

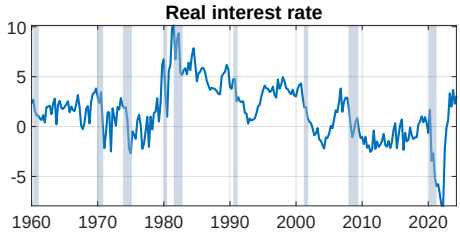
Estimation

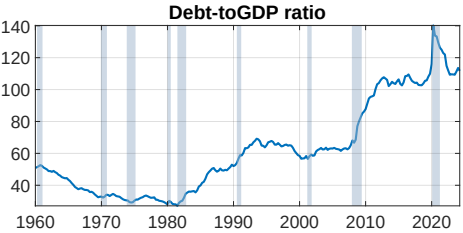
- The model is estimated using a data set of 21 macro and fiscal variables
  1. Real GDP growth
  2. Real consumption growth
  3. Real investment growth
  4. Hours worked
  5. Inflation (GDP deflator)
  6. Growth rate of real average weekly earnings
  7. Real transfers payments growth rate
  8. Real government consumption and investment growth rate
  9. Debt to GDP ratio
  10. Federal funds rate (FFR)
  11-20. 1Q-10Q ahead expected market path of the FFR (OIS data)
  21. 5-YR breakeven inflation expectations
- Sample periods: 1960q1-2007q4 and 2008q1-**2024q2**
- Second sample includes all the 21 observables; re-estimation of standard deviations and the factor model governing the forward guidance shocks (Campbell et al. 2012)

A look at the data

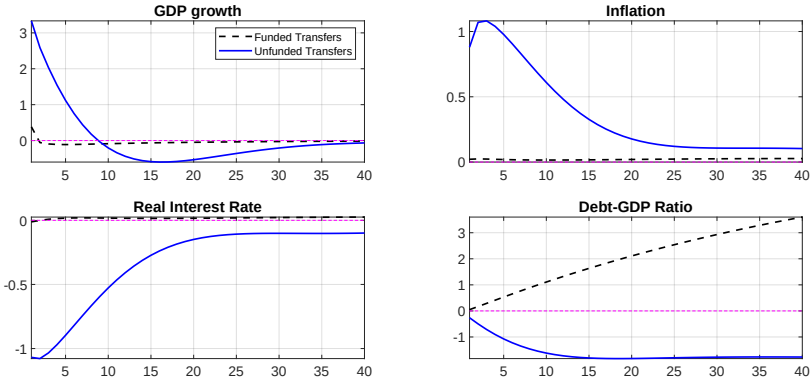








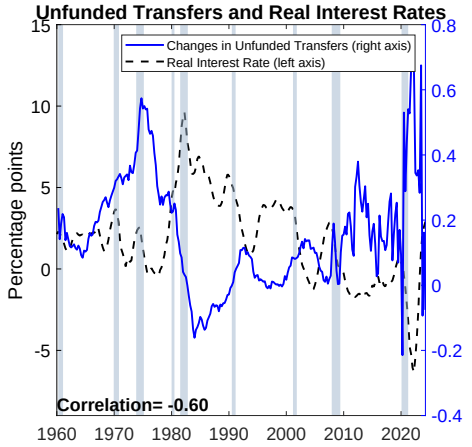
Funded and unfunded transfers shocks

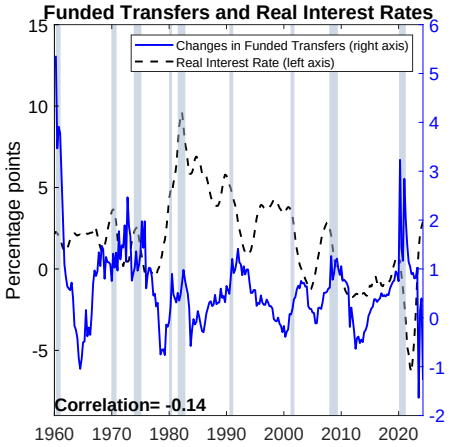


- **Funded transfers**: Modest macro impact, real rate and debt **increase**
- **Unfunded transfers**: Persistent inflation increase, real rate and debt **decline**

Fiscal shocks and real interest rates

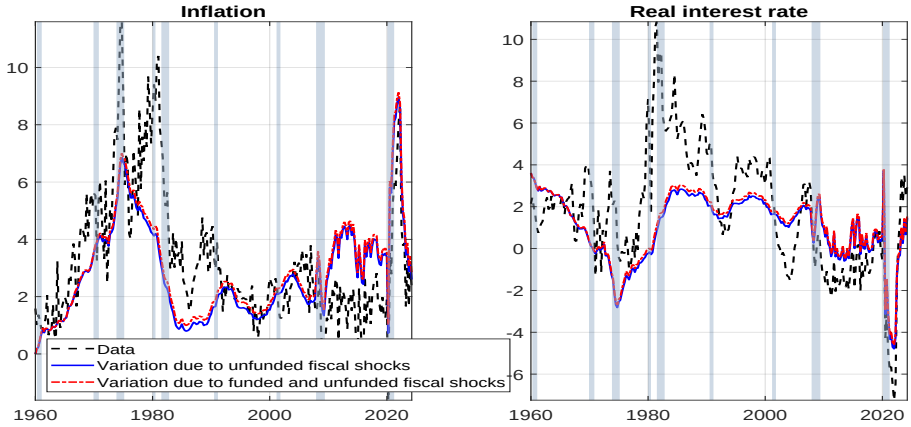
Strong negative commovement between real rate and changes in unfunded spending





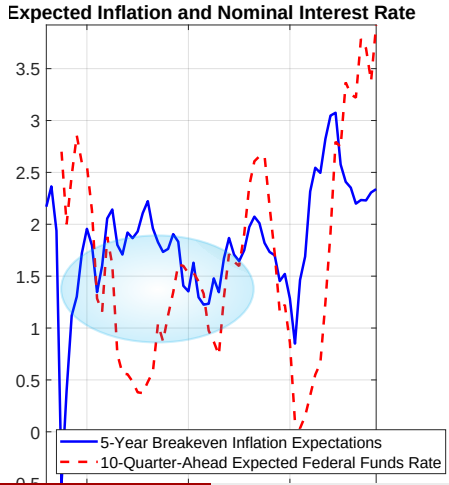
Fiscal inflation and real interest rates

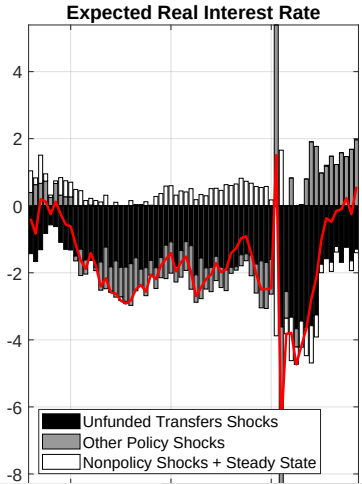
Fiscal real rates account for large share of low-frequency changes in real interest rates



Post-pandemic outlook for real interest rate

Post-pandemic: Real rates have increased, but still downward pressure from fiscal policy





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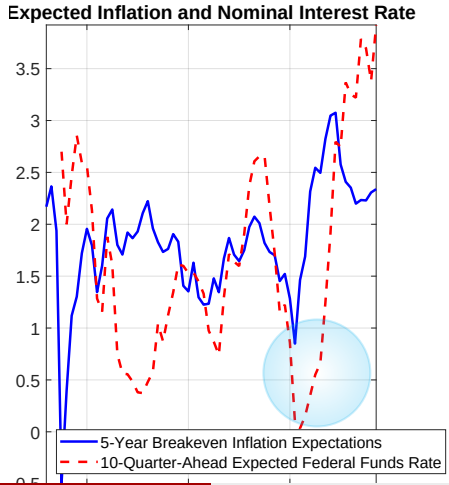

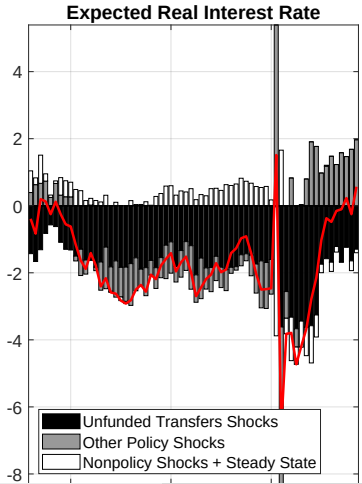

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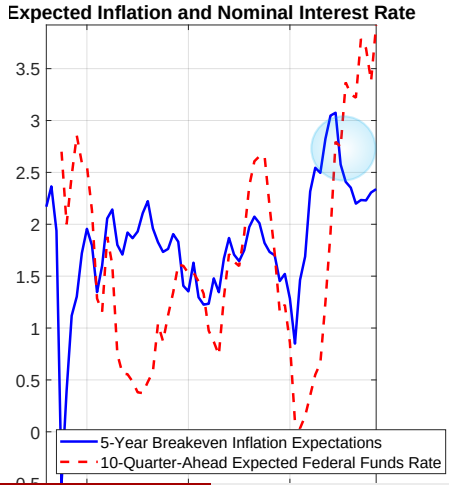

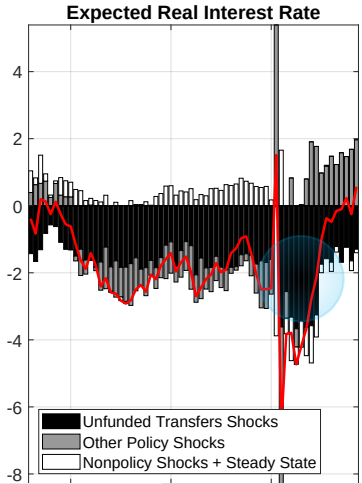

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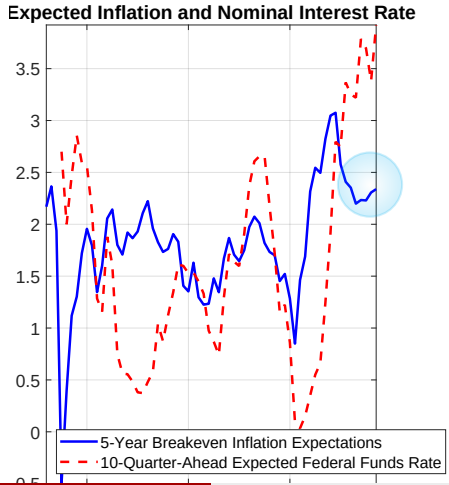

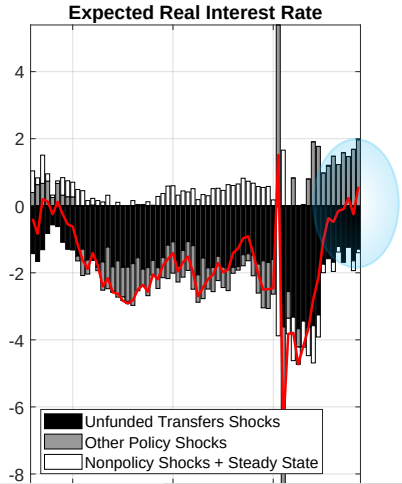

Conclusions

- Low frequency movements in real interest rates related to fiscal policy:
  1. Unfunded spending critically affects inflation dynamics and real interest rates
  2. Funded spending has a small impact on real interest rates
- **Pandemic**: Fiscal real interest rates dropped significantly following two large fiscal stimuli **and** the change in monetary policy strategy
- **Post pandemic**: Fiscal real interest rates back to pre-pandemic level, but lower than actual real interest rates $\Rightarrow$ **downward pressure**
- Spending and debt at an historical maximum
  - $\rightarrow$ Small revisions to beliefs $\Rightarrow$ large swings in inflation and real interest rates
  - $\rightarrow$ A credible fiscal plan is needed for long-run inflation stability
  - $\rightarrow$ Rising geopolitical risks might require a more ambitious fiscal plan