Government Funding Costs Under Financial Repression

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Motivation

- How does financial repression affect bond yields, inflation, risk premia?:
- Financial repression: policies that ↑ gov't bond prices given cash flows
- History: governments use financial repression to manage debt burdens.
  - WW2: interest rate caps, capital controls, reserve requirements
  - Recent: QE, regulatory pressure to hold government bonds
- Unlike explicit taxation or inflation, repression operates through portfolio distortions that reduce government funding costs.

- This paper: Model financial repression as a **third policy instrument**
  - (alongside monetary and fiscal policy)
  - Affects bond pricing, inflation dynamics, equilibrium determinacy

Analytical Model of Repression and its Effects

- Two-agent endowment model w/ fiscal-monetary-repression interactions
  - *a*. **agents**: asset holders and hand-to-mouth
  - *b*. **policy stance**: Taylor rule, tax rule, and financial repression rule
    - **Repression Rule**: Repression ↑ in a fiscal expansion
  - *d*. **gov't budget**: long-term nominal debt, lump-sum taxes + transfers
  - *c*. **one shock**: gov't spending ⟶ potentially unfunded fiscal expansions

- **Three microfoundations** of financial repression:
  1. Forced holdings (portfolio restrictions)
  2. Financial regulation (capital requirements, liquidity rules)
  3. Quantitative easing (central bank purchases)

Main Results: Financial Repression ...

1. Directly increases bond values and reduces government funding costs (by lowering interest on govt liabilities).
2. Restores equilibrium determinacy when fiscal backing of spending insufficient, monetary policy won't accommodate
    * e.g. Leeper (1991) "active/active" regime
3. Reduces inflation response to fiscal expansions
    * Less inflation needed to satisfy government budget constraint
4. Reduces government bond risk premia and term premia
    * Further pushes down gov't financing costs
5. Neutral for bondholder utility unless repression increases taxes
    * Fiscal expansions still redistribute from bondholders, shift to lower future returns instead of current inflation
6. Repression effectiveness depends on its expected persistence:
    * Effectiveness reduced if agents expect repression won't persist
    * When repression ends: inflation increases, bond prices fall

Model: Households

- A continuum of agents with limited asset market participation (LAMP).
  - *a*. fraction ζ **asset holders** ("bondholders") w/ Epstein-Zin preferences

$$U_{At} = \left\{(1-\beta)C_{At}^{\frac{1-\gamma}{\theta}} + \beta\left(\mathbb{E}_t\left[U_{At+1}^{1-\gamma}\right]\right)^{\frac{1}{\theta}}\right\}^{\frac{\theta}{1-\gamma}}$$

    with $\theta \equiv (1-\gamma)/(1-1/\psi)$ decoupling risk aversion γ from IES ψ

  - *b*. remaining fraction $1-\zeta$ are **hand-to-mouth** ("taxpayers")

- Household real endowment $\overline{Y} > 0$, net gov't lump-sum transfers $G_t - \tau_t$
- For analytical tractability, $\psi \to \infty$ limit $\longrightarrow$ "**CAPM**" pricing kernel.

$$m_{t+1} = (1-\gamma)\log(\beta) - \gamma\, r_{At+1}$$

where r_{At+1} is the log real return on asset holders' consumption claim

Model: Monetary & Fiscal Policy

- The CB follows a nominal interest rate rule: $i_t = i^\star + \rho_\pi(\pi_t - \pi^\star)$
- The gov't follows a real tax rule: $\tau_t = \tau^\star + \delta_b(b_{t-1} - b^\star)$
  - Levied uniformly and in lump sum across all agents
  - Assume $\delta_b \in (\delta_b^*, \infty)$ e.g. taxes don't fall too much in debt
- Real gov't spending ⟨**only shock** in the analytical model⟩

$$g_t = g^\star + x_t, \quad x_t = \rho_g x_{t-1} + \sigma\epsilon_t$$

  distributed uniformly as transfers across all agents

- Gov't issues **long-term nominal bonds** w/ geometric amortization rate δ

$$B_{t-1} = P_t s_t + Q_t B_t$$

  where $s_t \equiv \tau_t - g_t$ is the real primary surplus

Financial Repression Policy

- Financial repression manifests as a **wedge** in the bond pricing equation:

$$Q_t = \mathbb{E}_t \left[M_{t+1} \cdot \frac{\delta + (1-\delta) Q_{t+1}}{\Pi_{t+1}} \right] \cdot \Omega_t$$

  where M_{t+1} is the asset holder's real SDF

- If asset holder faces constraint (forced holdings, financial regulation) Ω_t depends on lagrange multiplier on constraint

- Repression rule:

$$\log(\Omega_t) = \omega_* + \omega_b (b_t - b^\star)$$

- The coefficients ρ_π, δ_b, and ω_b jointly determine the **policy stance**.
- Later: repression policy that affects portfolio composition but not wedge

Microfoundations of Financial Repression

- **Three alternative microfoundations** for the repression wedge Ω_t:

1. **Forced holdings**: Gov't imposes portfolio restrictions Details
   - Minimum holdings requirements (e.g., pension funds, insurance co.)
   - Creates captive demand $\longrightarrow$ suppresses yields

2. **Financial regulation**: Capital requirements, liquidity rules
   - Favorable risk weights for government bonds in Basel framework
   - Liquidity coverage ratio requirements favor government securities

3. **Quantitative easing**: Central bank purchases
   - CB buys government bonds, reducing private sector holdings
   - Effectively creates demand wedge in equilibrium pricing

- All three generate qualitatively similar effects on bond pricing

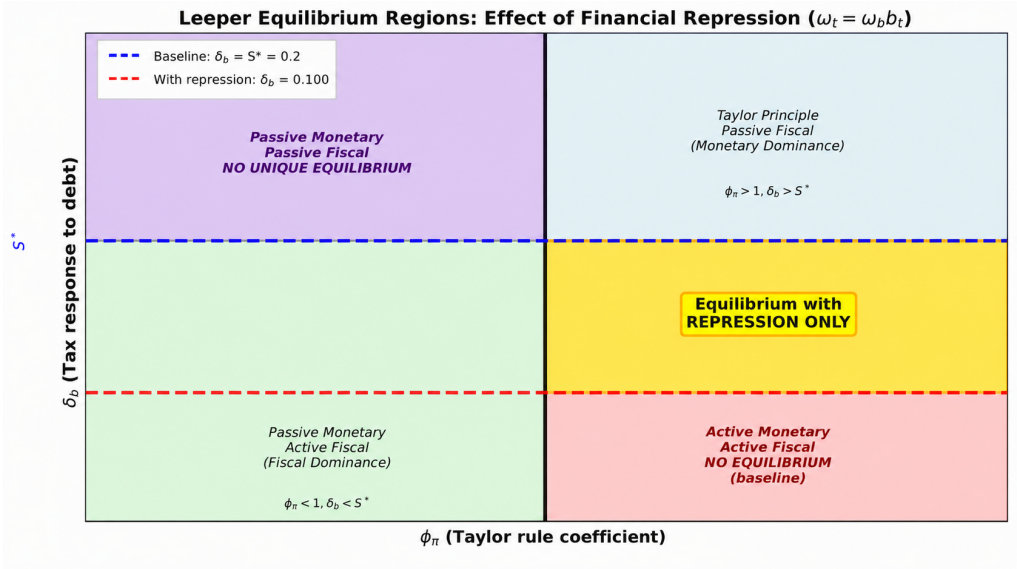
Bondholder Wealth and Redistribution

- Bondholders hold all gov. bonds: $\zeta \mathcal{B}_{At} = \mathcal{B}_t$
- Consumption good clearing: $\overline{Y} = \zeta C_{At} + (1-\zeta) C_{Ht}$.
  - Hand-to-mouth HH's consumption: $C_{Ht} = \overline{Y} - s_t$.
  - Bondholders HH's consumption: $C_{At} = \overline{Y} + \frac{1-\zeta}{\zeta} s_t$.
- Fiscal expansion $\longrightarrow$ consumption redistribution from bondholder to HTM
- Redistributive impact of (unfunded) fiscal shocks key for fiscal risk premia
  - See our paper *Fiscal Redistribution Risk in Treasury Markets*
- Total value of bondholder consumption stream:

$$P_{At} = \frac{\overline{Y}}{R^\star - 1} + \frac{1-\zeta}{\zeta} \left(\mathcal{B}_t - \mathcal{O}_t \right)$$

- $\mathcal{O}_t = \mathcal{B}_t - \widetilde{\mathcal{B}_t}$: current + future repression on valuation
- Redistribution in utility depends on monetary/fiscal/repression policy

Determinacy Regions



- Parameter space $(\rho_\pi, \delta_b, \omega_b)$ can be partitioned into regions as in Leeper (1991).
- Two regions deliver unique and bounded solutions:

  - **Fiscally-led**: passive monetary $\langle \rho_\pi < 1 \rangle$, active fiscal $\langle \delta_b / s^\star < 1 \rangle$
  - **Monetary-led**: active monetary $\langle \rho_\pi > 1 \rangle$, passive fiscal $\langle \delta_b / s^\star > 1 \rangle$

- Financial repression can restore determinacy when neither monetary nor fiscal policy alone satisfies stability conditions.

Taxonomy of Policy Regimes without Financial Repression

Fiscally-led	**Monetary-led**	**AM/AF**
$\langle \rho_\pi < 1, \ \delta_b < s^\star \rangle$	$\langle \rho_\pi > 1, \ \delta_b > s^\star \rangle$	$\langle \rho_\pi > 1, \ \delta_b < s^\star \rangle$
Fiscal shocks create inflation, reduce value of government bonds	no inflationary impact of fiscal expansions, bonds riskless	no stable equilibrium
1. Gov't spending partially unbacked	1. Spending fully backed by taxes	
2. CB accomodates fiscal expansion	2. CB achieves inflation target	
3. Fiscal shocks entail redistribution away from bondholders	3. Fiscal expansions entail no wealth redistribution	
4. Positive risk premium in government bonds	4. No risk premia on bonds	

Taxonomy of Policy Regimes with Financial Repression

Fiscally-led + Repression	**Monetary-led + Repression**	**AM/AF + Repression**
$\langle \rho_\pi < 1,\ \delta_b < s^\star,\ \omega_b < 0 \rangle$	$\langle \rho_\pi > 1,\ \delta_b > s^\star,\ \omega_b > 0 \rangle$	$\langle \rho_\pi > 1,\ \delta_b < s^\star,\ \omega_b > \omega_b^\star \rangle$
dampens bondholder exposure to fiscal shocks	real wealth still insulated, but bonds no longer riskless	restores determinacy in active-monetary/active-fiscal region
1. Wedge supports bond prices $\Longrightarrow$ less inflationary finance needed	1. Wedge Ω_t depends on b_t, which still moves with fiscal shocks $\Longrightarrow$ new bond return variation	1. Determinate iff $\omega_b > \omega_b^\star \equiv (1 - \delta_b/s^\star)(R^g - 1)/R^g$
2. Bondholders pay via lower future returns rather than current inflation	2. Bond returns higher on impact but lower therafter	2. Repression substitutes for future tax backing as the fiscal-solvency margin
3. If $\delta_b = 0$: bondholder utility unaffected by ω_b	3. Lowers bondholder utility as spending is partially repaid via repression intead of taxes	3. CB can target inflation while gov't runs partially-unfunded deficits
4.Lowers risk premia on bonds	4.Lowers risk premia	4.Lowers risk premia

Monetary Regime

Eqm with Unfunded Fiscal Expansions, Accomodative M.P.

- Partially unbacked fiscal expansions most likely scenario for repression
- FTPL framework with the risk of the gov't pursuing **unbacked fiscal expansions** ($\delta_b/s^\star < 1$) that reduce PDV of surpluses

$$\underbrace{(R_{gt}/\Pi_t)b_{t-1}}_{\text{real value of debt}} = \underbrace{\mathbb{E}_t\left[\sum_{j=0}^{\infty} \Omega_{t,t+j} M_{t,t+j} s_{t+j}\right]}_{\text{PDV of real surpluses}}$$

  $\longrightarrow$ absent repression, requires inflationary finance

  $\longrightarrow$ devalues real gov't bond returns

- CB **accommodates** ($\rho_\pi < 1$), prevents gov't funding costs from exploding.
- Financial repression ($\omega_b < 0$): **additional margin** for funding gov't
  - Increases bond values $\longrightarrow$ reduces financing needs
  - Lower interest costs of government debt
  - Less inflation required for given fiscal expansion

Fiscal Regime Equilibrium Dynamics

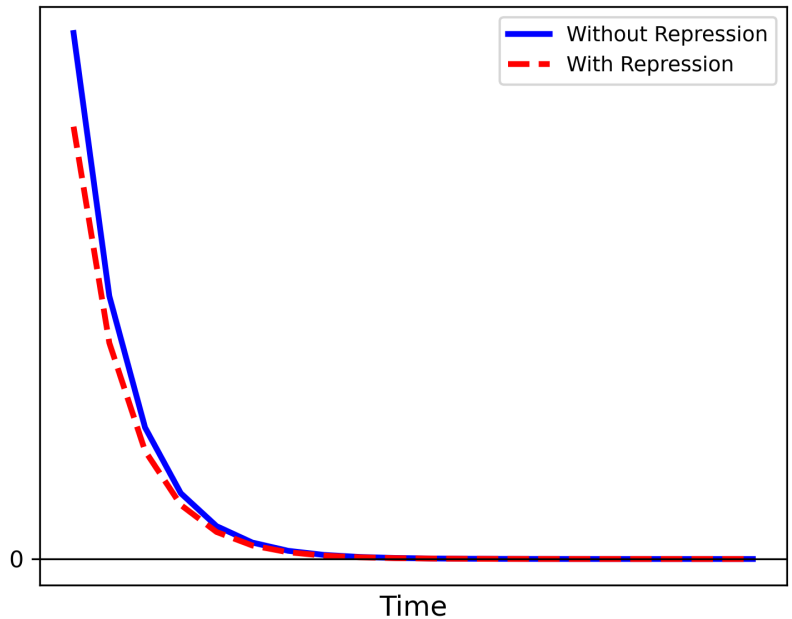
Derive closed-form solution for dynamics:

$$b_t = b_g g_t \qquad q_t = q_\pi \pi_t + q_g g_t \qquad \pi_t = \pi_\varepsilon \rho_\pi^t$$

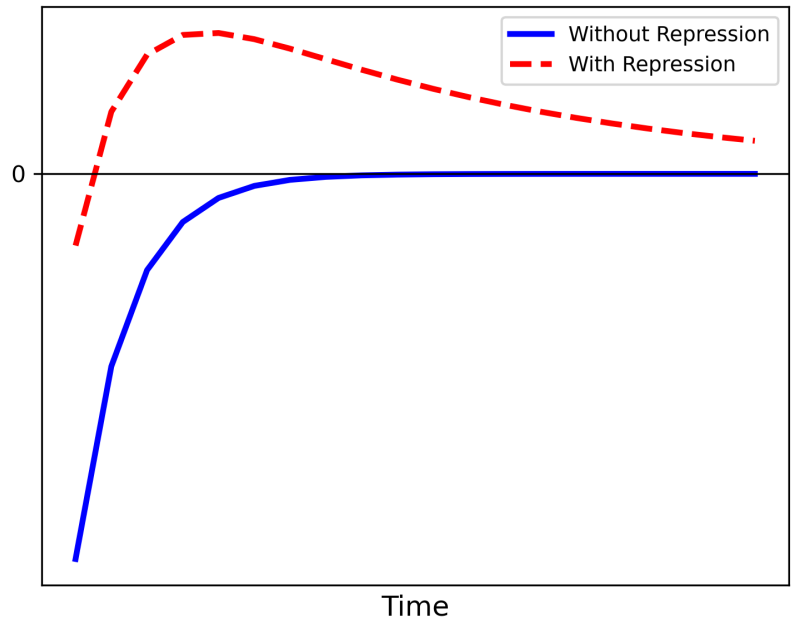
Solution coefficients: $\left(\Phi \equiv \frac{1+\frac{\delta_b}{S}(R^g-1)}{R^g} \in (0,1) \right)$

- Gov't debt real value falls on fiscal expansion: $b_g = \frac{-\rho_g \frac{1}{S} \frac{R^g-1}{R^g}}{1-\omega_b-\rho_g \Phi} < 0$
  - $\omega_b < 0 \longrightarrow$ repression increases bond price in fiscal expansion
  - Repression makes fall in the real value of debt smaller $\frac{\partial b_g}{\partial \omega_b} < 0$
- Price of government bonds falling in inflation $q_\pi = \frac{-\rho_\pi}{1-\rho_\pi \frac{1-\delta}{R^g}} < 0$
  - This fall dampened by repression $q_g = \frac{\omega_b b_g}{1-\rho_g \frac{1-\delta}{R^g}} > 0$
- Fiscal shock increases inflation: $\pi_\varepsilon = \frac{1-\rho_\pi \frac{1-\delta}{R^g}}{1-\rho_g \frac{1-\delta}{R^g}} \cdot \frac{1}{S} \frac{R^g-1}{R^g} \cdot \frac{1-\omega_b-\rho_g \frac{1-\delta}{R^g}}{1-\omega_b-\rho_g \Phi} > 0$
  - Repression reduces inflationary impact of fiscal shock $\frac{\partial \pi_\varepsilon}{\partial \omega_b} > 0$

Fiscal Impulse Responses: Inflation & Bond Prices



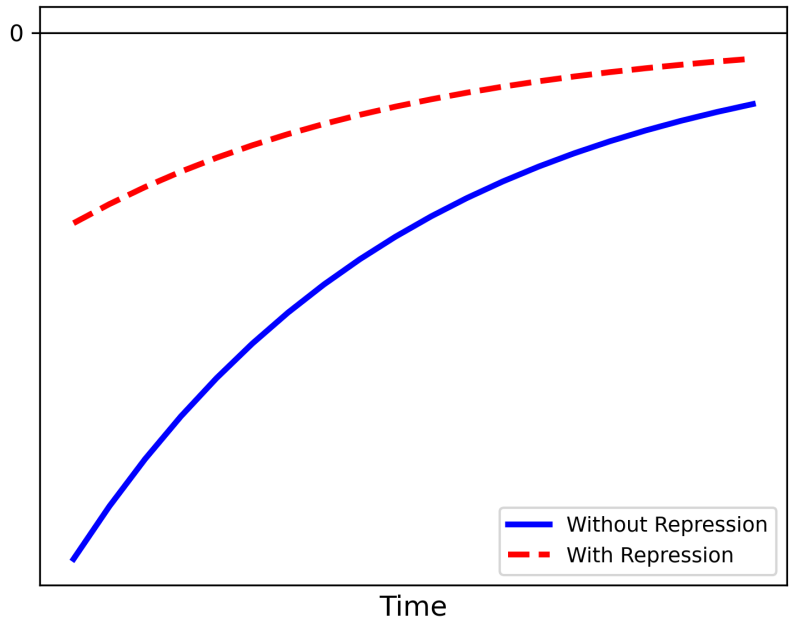
(a) Inflation



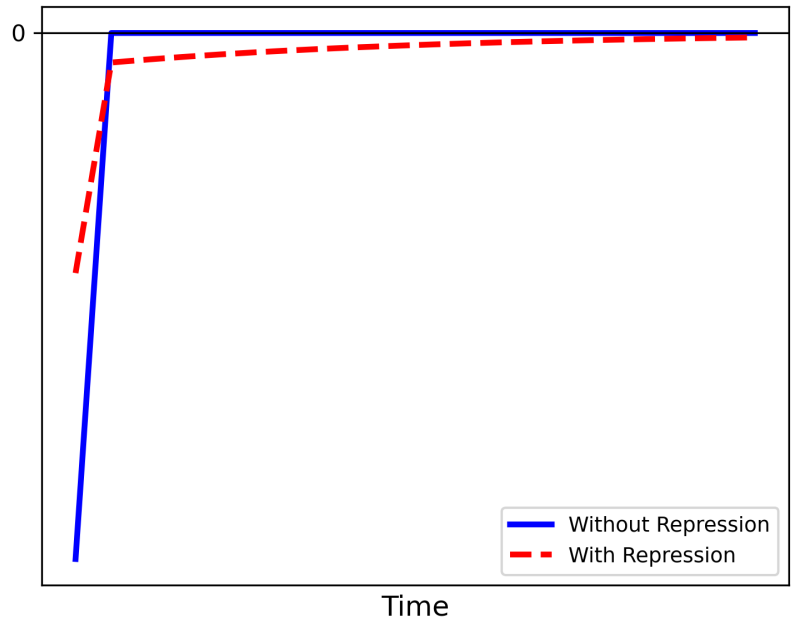
(b) Bond Prices

- Repression ($\omega_b = -0.5$, blue) vs. no repression ($\omega_b = 0$, red).
- Repression $\downarrow$ inflation and $\uparrow$ bond prices following fiscal expansion.

Fiscal Impulse Responses: Debt & Returns



(a) Real Debt Outstanding



(b) Real Bond Returns

- Repression expands debt capacity—gov't can issue more debt (lower $|b_t|$).
- Return effects: improves impact return, but worsens future returns.

Proposition: Repression Effects (Fiscal Regime)

- Repression rule increases bond values during fiscal expansion ($\omega_b < 0$)

Proposition 1 (Fiscal Regime):

1. Reduces inflation from expansionary fiscal shocks: $\partial \pi_{\varepsilon,n} / \partial \omega_b > 0$
2. Reduces decline in bond prices: $\partial q_{\varepsilon,n} / \partial \omega_b < 0$
3. Reduces fall in real debt outstanding: $\partial b_{\varepsilon,n} / \partial \omega_b < 0$
4. Mixed effects on returns: reduces impact loss ($\partial r^{gr}_{\varepsilon,0} / \partial \omega_b < 0$) but lowers future returns ($\partial r^{gr}_{\varepsilon,n} / \partial \omega_b > 0$ for $n > 1$)

- Intuition: Repression artificially supports bond values
  - Reduces yield, lowering financing cost, less inflationary finance
- But bondholders pay via lower future returns rather than current inflation.
  - If fiscal policy exogenous ($\delta_b = 0$), bondholder utility unaffected by repression
- Repression reduces bond risk premia if $\delta > -\delta^*$
  - Repression dampens volatility of real bond returns

Fiscal Regime: Key Takeaways

- Financial repression helps fund unfunded fiscal expansions by:
  1. Reducing required inflationary finance
  2. Supporting bond prices and expanding debt capacity
  3. Lowering bond risk premia

- **But**: Repression is not a free lunch for bondholders.
  - If fiscal policy doesn't respond ($\delta_b = 0$), bondholders' utility unchanged
  - Loss shifted from current inflation to lower future returns
  - Present value of consumption falls by same amount

- Repression does benefit government:
  - Lower funding costs (reduced interest payments)
  - Can pursue larger expansions for given inflation tolerance

Extensions

- Results very similar for alternative repression rules
  - Rule in spending g, or price of government bond q
- Forced holdings of HTM do not generate pricing wedge Ω
  - Instead, they change portfolio shares
  - Reduce redistributive effects of fiscal expansions
  - Reduce the magnitude of risk premia
- Limits to repression: stochastic duration Details
  - Historically, repression is temporary: e.g. 1951 Treasury-Fed accord
  - We can obtain analytical results
  - Effectiveness of repression dependent on expected persistence
  - End of repression (in fiscal regime): inflation $\uparrow$, bond price $\downarrow$

Conclusion

- Financial repression affects bond pricing, inflation, equilibrium determinacy
- **Main findings**:
  1. Repression increases bond values and provides fiscal funding
  2. Can restore equilibrium determinacy with unfunded shocks + $\rho_\pi > 1$
  3. In fiscal dominance regime: reduces fiscal inflation and risk premia
  4. Persistence matters: fragile repression less effective
  5. When repression ends: inflation $\uparrow$ and bond prices $\downarrow$
- **Policy lesson**: Repression $\neq$ free lunch for bondholders.
  - Benefits government through lower funding costs
  - Bondholders still harmed by fiscal expansions
  - Bondholder losses from lower future returns + inflation
  - Requires long-term commitment to be effective

Backup Slides

Forced Holdings: Lagrangian Microfoundation

- Gov't mandates minimum bond holdings $\bar{B}_t$ for asset holders:

$$\mathcal{B}_{At} \geq \bar{B}_t$$

- Lagrangian attaches multiplier $\mu_t \geq 0$ to the constraint:

$$\mathcal{L} = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left[\mathcal{U}_{At} + \lambda_t \cdot (\text{budget}) + \mu_t (\mathcal{B}_{At} - \bar{B}_t) \right]$$

- FOC for bonds yields a **modified Euler equation**:

$$\begin{aligned} \frac{1}{\Omega_t} &= \mathbb{E}_t \left[M_{t+1} R_{gt+1} \right] \\ \Omega_t &= \frac{1}{1 - \frac{\mu_t}{\lambda_t}} \end{aligned}$$

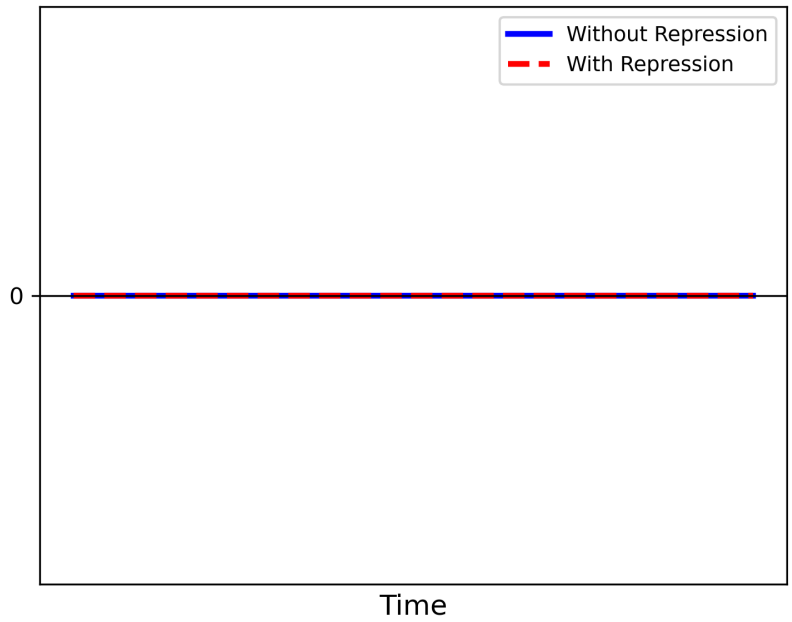
- Equivalently, the bond pricing equation carries a wedge: Back

$$Q_t^b = \Omega_t \, \mathbb{E}_t \left[M_{t+1} \frac{\delta + (1-\delta) Q_{t+1}^b}{\Pi_{t+1}} \right]$$

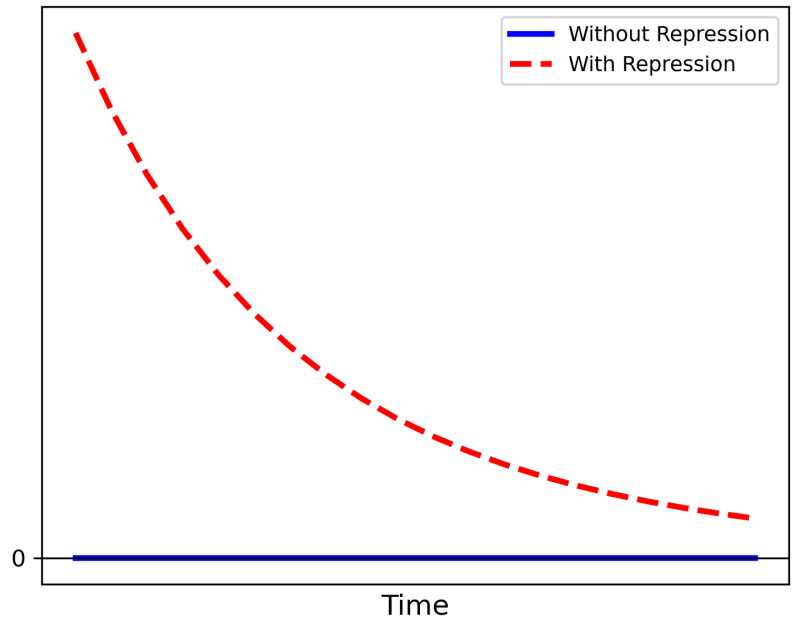
Monetary-Led ⟨Overview⟩

- Textbook monetary framework where CB targets & stabilizes inflation ($\rho_\pi > 1$) independently of fiscal concerns.
- Fiscal expansions fully backed by expected **future taxation** or repression
- If tax policy sufficient to back fiscal expansion ($\delta_b / s^\star > 1$):
  - Repression pays for part of fiscal expansion
  - Reduces taxes that have to be raised to repay bondholders
  - Lead to redistribution from bondholders to taxpayers
- If tax policy is not sufficient to back fiscal expansion ($\delta_b / s^\star < 1$)
  - Repression can restore determinacy
  - Government financing costs $\downarrow$ so its budget constraint satisfied

Impulse Responses: Monetary Regime



(a) Inflation



(b) Bond Prices

- With sufficient fiscal backing, inflation remains stable and bond prices show minimal variation.
- Repression plays minimal role when Taylor principle satisfied and fiscal backing strong. Back

Limits to Repression: Motivation

- Assumed permanent repression—but historically, repression is temporary.
- Examples of unwinding:
  - U.S. Treasury-Federal Reserve Accord (1951)
  - Financial liberalization waves (1980s-1990s)
  - Post-crisis QE tapering
- Forward-looking agents $\longrightarrow$ prob. of repression ending affects bond prices
- **Model extension**: Two-state Markov switching model:
  - r Repression state: $\omega_t = \omega_b^r < 0$, persists with probability ρ_ω^r
  - n No repression state: $\omega_t = \omega_b^n = 0$, persists with probability ρ_ω^n
- Policy functions state-dependent: e.g. $b_t^i = b_g^i g_t, i \in r, g$

Model Solution: Stochastic Duration of Repression

- State-dependent policy functions with jump coefficients if repression ends:

$$\pi_t = \begin{cases} \pi_0^r + \pi_\varepsilon^r \epsilon_t + \pi_g^r g_{t-1} & \text{if repression active} \\ \pi_0^n + \pi_\varepsilon^n \epsilon_t + \pi_g^n g_{t-1} & \text{if no repression} \end{cases}$$

- When repression ends ($r \longrightarrow n$), inflation experiences discrete jump:

$$\pi_t = \pi_0^n + \pi_\varepsilon^n \epsilon_t + \pi_g^n g_{t-1} + \pi_g^{r,n} g_{t-1}$$

  Jump coefficient $\pi_g^{r,n} > 0$. Opposite sign jump when repression begins

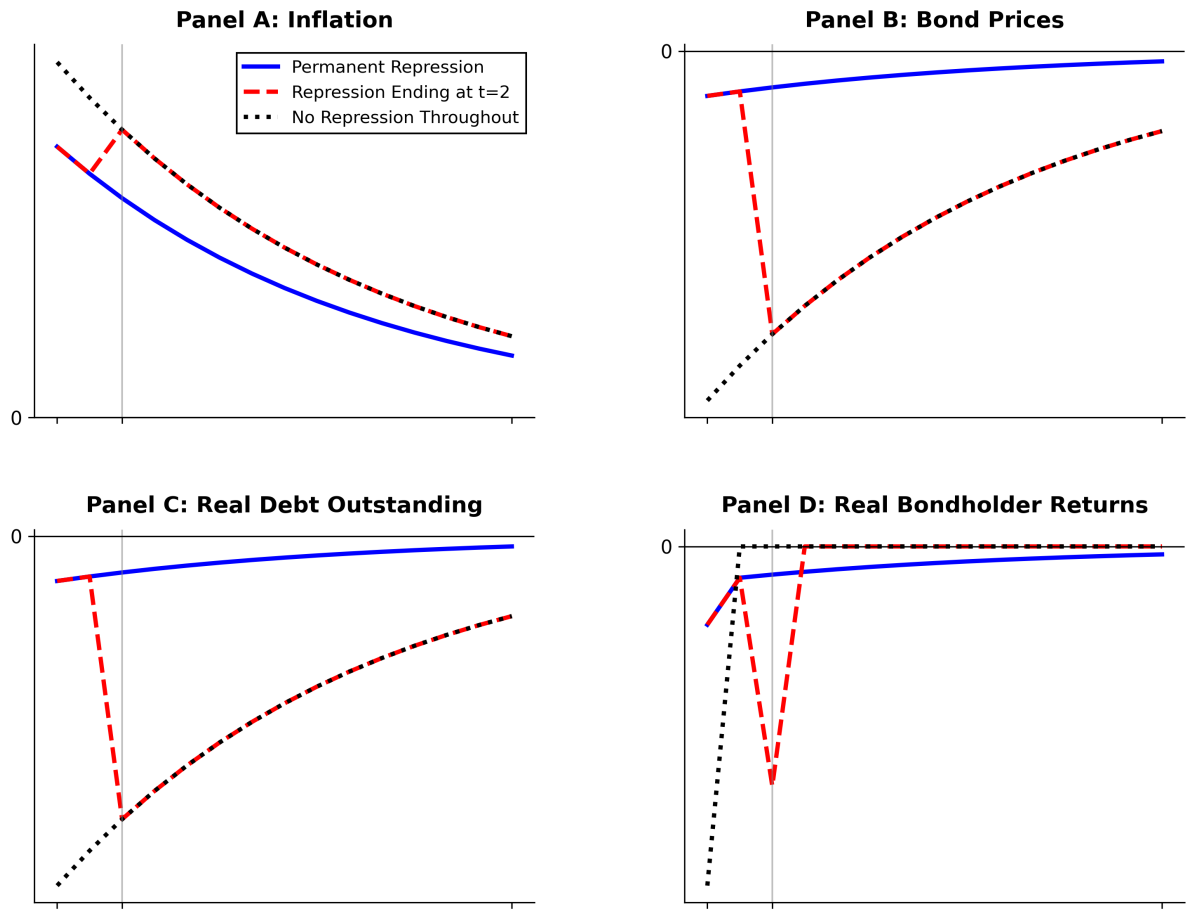
- Forward-looking bond prices incorporate transition probabilities:

$$q_t^i = q_\varepsilon^i \epsilon_t + q_g^i g_{t-1}, \quad i \in \{r, n\}$$

  with q_g^i depending on ρ_ω^r and ρ_ω^n.

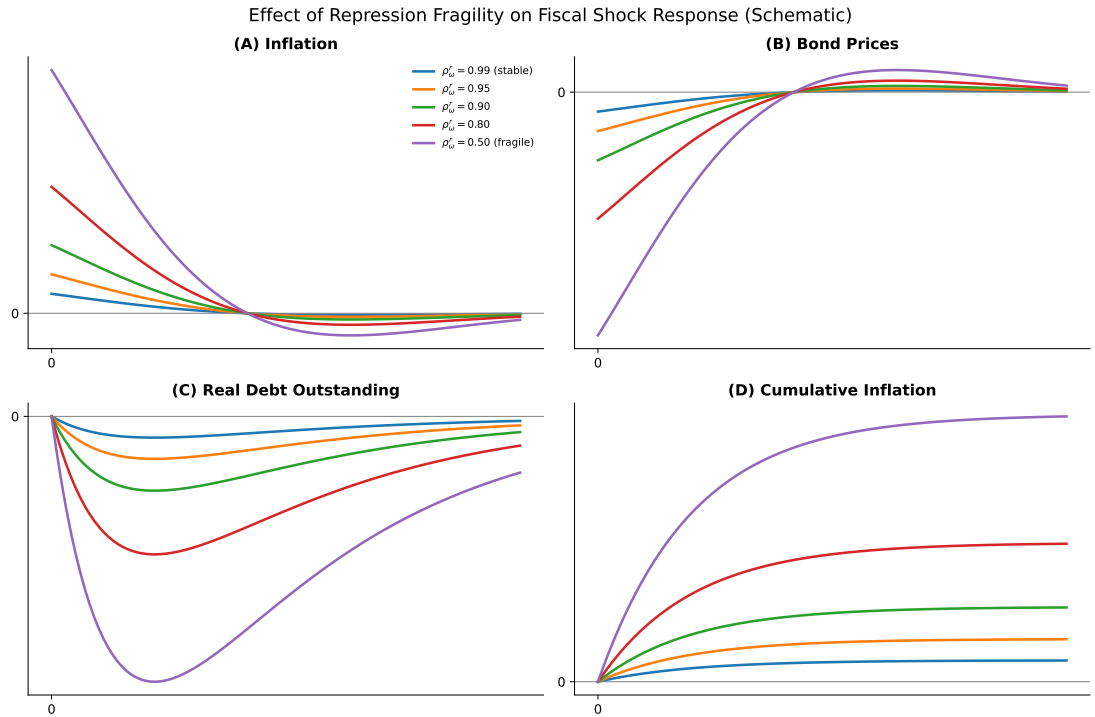
- Key insight: When ρ_ω^r is low (fragile repression), agents heavily discount its future value $\longrightarrow$ reduced effectiveness today.

Early Unwinding of Repression



- 3 scenarios: remain in repression (blue), unwinding at $t = 2$ (red), no repression (black).
- **Proposition 4**: When repression ends, inflation jumps upward and bond prices fall.
- Vertical line marks regime transition—sudden loss of captive demand.

Fragility Reduces Effectiveness



- Five different persistence levels: $\rho^r_\omega \in \{0.99, 0.95, 0.90, 0.80, 0.50\}$.
- **Corollary (Fragility)**: Less persistent repression is less effective:

$$\frac{\partial \pi^r_\varepsilon}{\partial \rho^r_\omega} < 0, \quad \frac{\partial q^r_g}{\partial \rho^r_\omega} > 0, \quad \frac{\partial b^r_g}{\partial \rho^r_\omega} > 0$$

- Lower persistence $\longrightarrow$ higher inflation, lower bond prices. Back

Policy Implications

- **Repression requires credible long-term commitment.**
  - Temporary/fragile policies dramatically less effective
  - Agents anticipate removal and adjust behavior accordingly
- **Sudden unwinding is costly.**
  - Inflation surges, bond prices collapse
  - Discontinuous adjustments impose welfare costs on bondholders
  - Historical example: U.S. Treasury-Fed Accord (1951)
- **Gradual phaseout preferable to "big bang".**
  - Allows markets to adjust more smoothly
  - Reduces size of discrete jumps
  - Consistent with successful financial liberalization episodes
- **Fragility constraint on fiscal-monetary coordination.**
  - Gov't operating under fragile repression has less policy space than baseline model suggests
  - Agents internalize probability of future liberalization