"Unfunded Liabilities" and Uncertain Fiscal Financing

Troy Davig*, Eric M. Leeper† & Todd B. Walker†

*Federal Reserve Bank of Kansas City
† Indiana University

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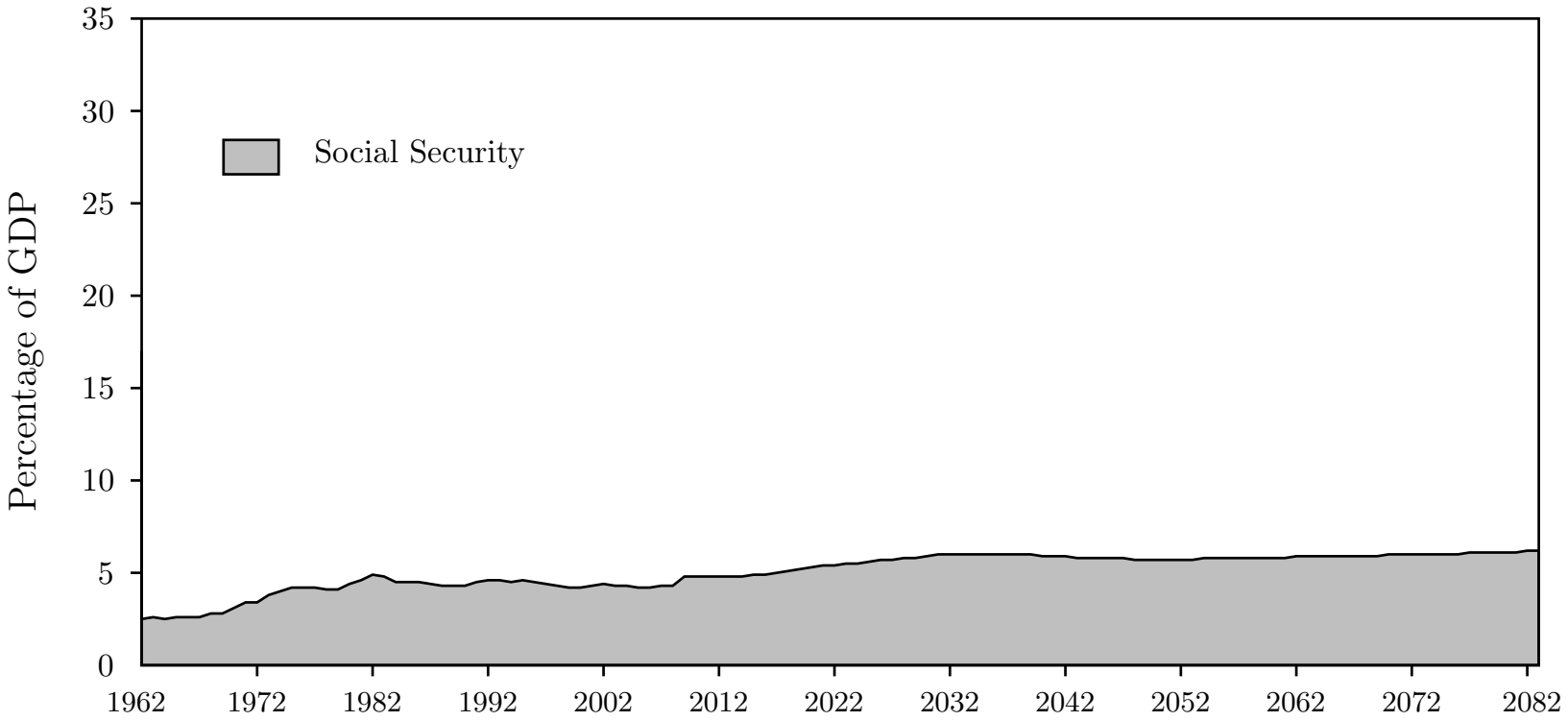
Introduction

- Profound uncertainty surrounds the funding of future *promised* transfers in the U.S.

“Unfunded Liabilities”



Source: CBO Long-Term Budget Outlook (June 2009)

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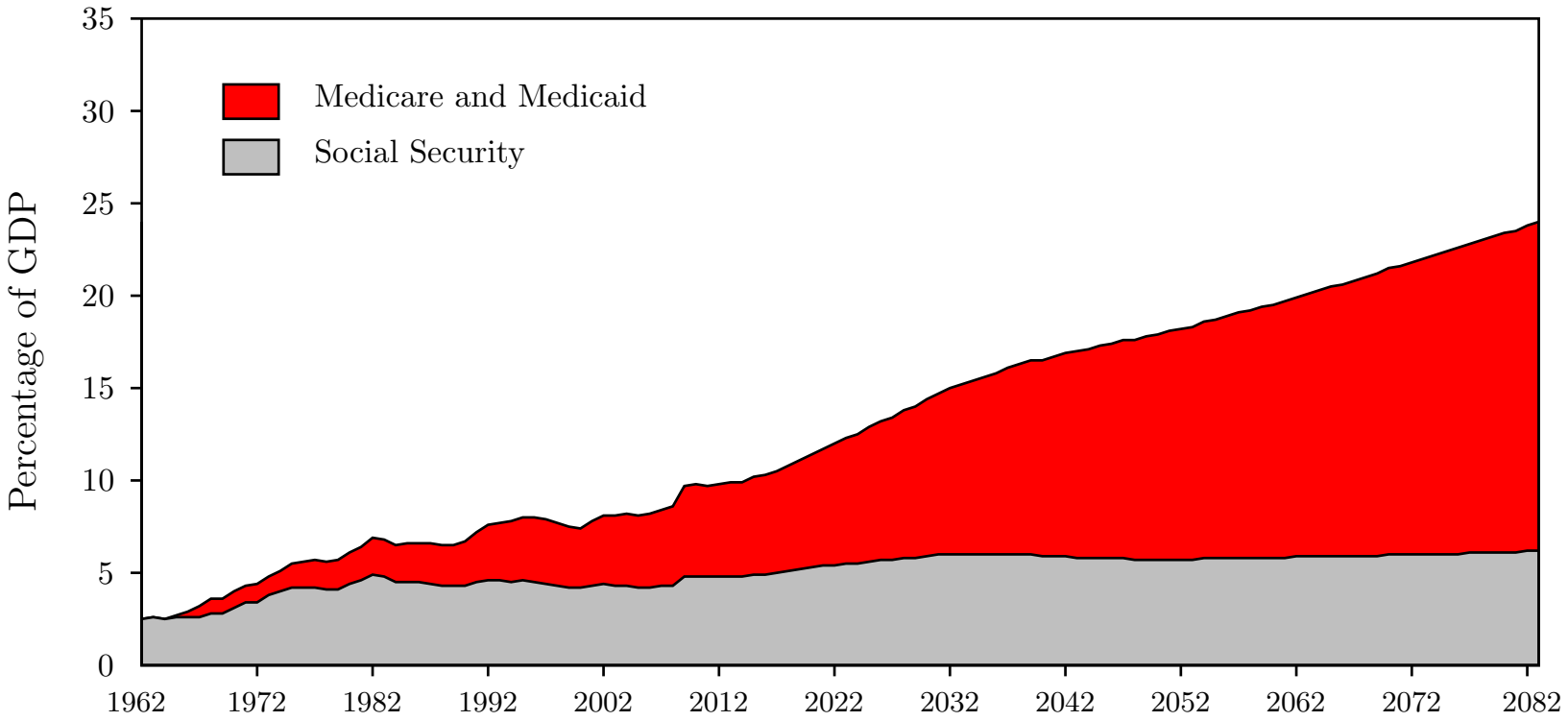

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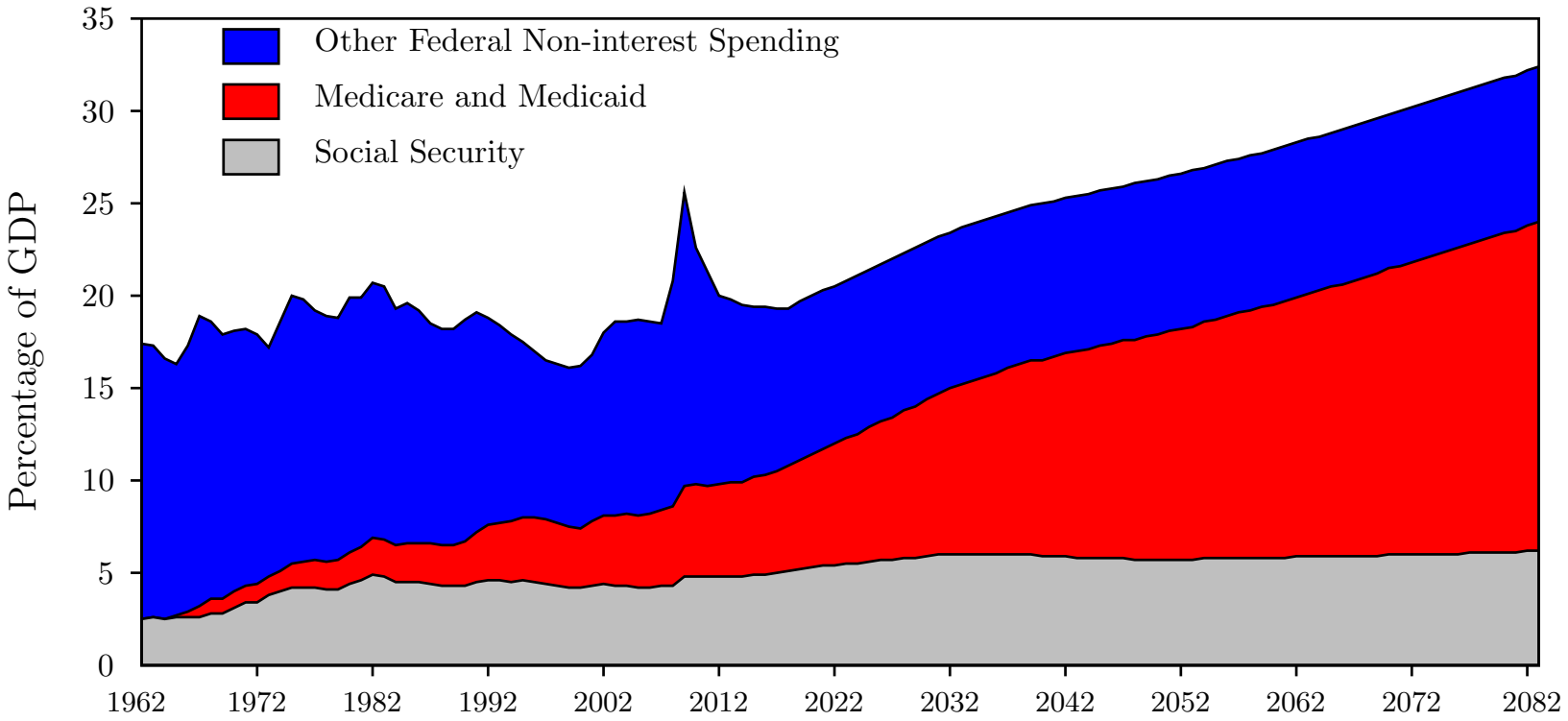

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- Unfunded liabilities is not an economically meaningful term—inconsistent with equilibrium
  - The government will renege on promised transfers (i.e. “liabilities” do not exist)
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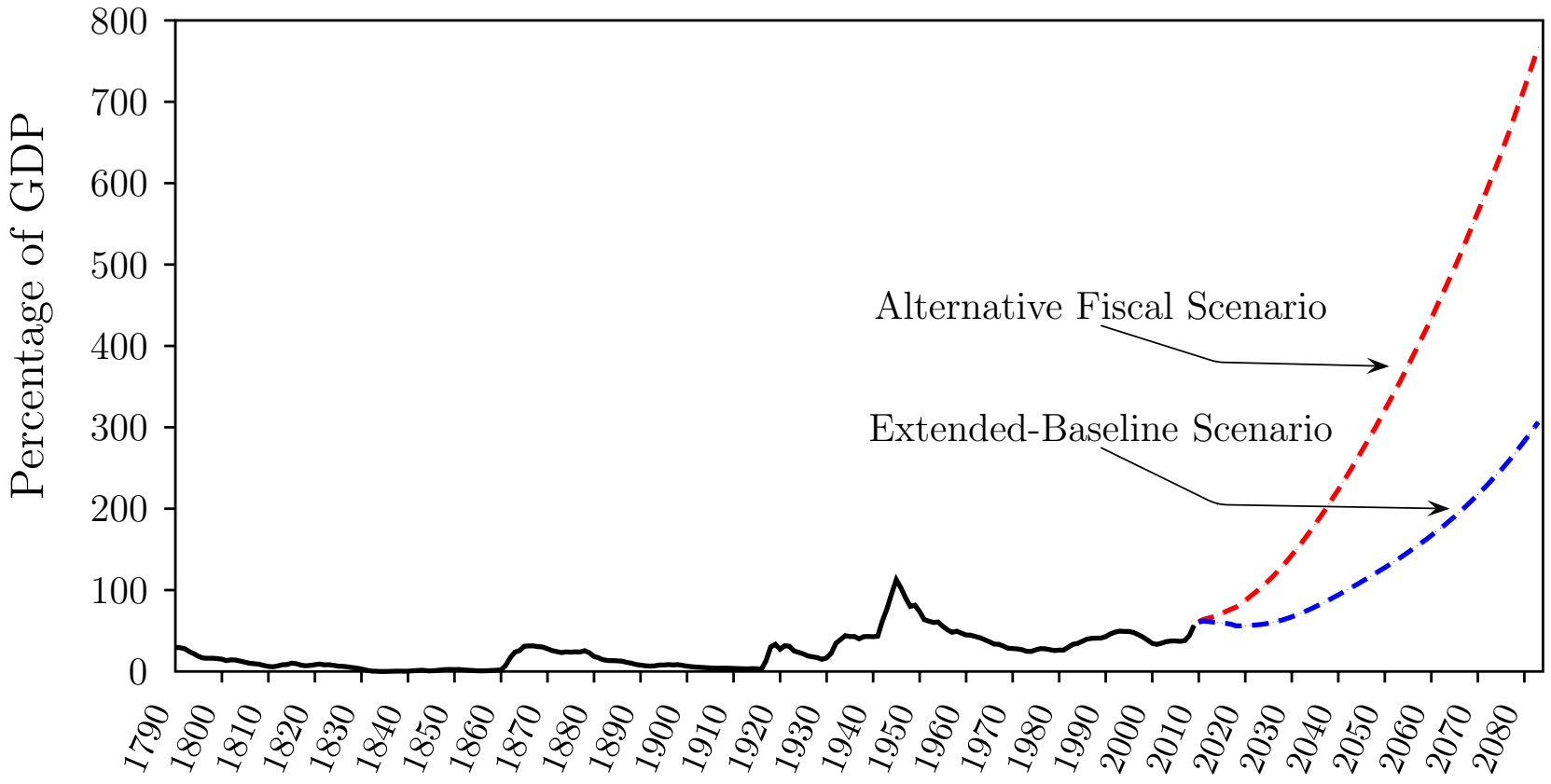
Rolling Spending Commitments into Debt



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$\Rightarrow$ future policy will change...how and when?

Introduction

- Nearly every advanced economy faces this problem

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  5. Debt default

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  5. Debt default $\Rightarrow$ Are U.S. Treasuries risk-free assets?

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  We model a *combination* of 1–3, emphasizing uncertainty about *which* policies adjust and *when* policies adjust.

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- Allow for switching among policy solutions
- Model fiscal limit as random variable $= f$(fiscal variables)
- Focus on expectational effects in otherwise standard macroeconomic DSGE model

Analytic Intuition: Simple Model

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- Government's Budget Constraint:

$$\frac{B_t}{P_t} + \tau_t = z_t + \frac{R_{t-1}B_{t-1}}{P_t}$$

Analytic Intuition: Policy Specification

At time T economy reaches fiscal limit

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	Regime 1 $t = 0, 1, \ldots, T-1$
Monetary Policy	$R_t^{-1} = R^{*-1} + \alpha \left(\frac{P_{t-1}}{P_t} - \frac{1}{\pi^*} \right)$
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Fiscal limit may be *economic* (peak of Laffer curve) or *political* (intolerance of taxation)

Analytic Intuition: Polar Case 1

If Regime 1 were absorbing state (No Fiscal Limit)

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$$\frac{\alpha}{\beta} E_t \left(\frac{P_t}{P_{t+1}} - \frac{1}{\pi^*} \right) = \frac{P_{t-1}}{P_t} - \frac{1}{\pi^*} \qquad \text{(Regime 1)}$$

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$$E_{t-1}\left(\frac{B_t}{P_t}-b^*\right)=E_{t-1}(z_t-z^*)+(\beta^{-1}-\gamma)\left(\frac{B_{t-1}}{P_{t-1}}-b^*\right)$$

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$\alpha/\beta > 1$, $\beta^{-1}-\gamma < 1 \Rightarrow$ Equilibrium $\pi_t = \pi^*$

A Standard Monetary Equilibrium

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$$E_t\left(\frac{P_t}{P_{t+1}}\right) = \frac{1}{\beta R^*} = \frac{1}{\pi^*} \qquad \text{(Regime 2)}$$

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$\alpha = 0, \gamma = 0 \Rightarrow$ Actual Inflation

$$P_t = \frac{R_{t-1}B_{t-1}}{\left(\frac{1}{1-\beta}\right)\tau^* - E_t\sum_{j=0}^{\infty}\beta^j z_{t+j}}$$

A Standard Fiscal Equilibrium

Fiscal Limit: Reneging

	$t = 0, 1, \ldots, T-1$	$t = T, T+1, \ldots$
Monetary Policy	$R_t^{-1} = R^{*-1} + \alpha\left(\frac{P_{t-1}}{P_t} - \frac{1}{\pi^*}\right)$	same
Tax Policy	$\tau_t = \tau^* + \gamma\left(\frac{B_{t-1}}{P_{t-1}} - b^*\right)$	$\tau_t = \tau^{\max}$
Transfer Policy	z_t	$\lambda_t z_t$

$$E_{t-1}[B_t/P_t] + \tau^{\max} = E_{t-1}\lambda_t z_t + (\beta^{-1} - \gamma)(B_{t-1}/P_{t-1})$$

$$\pi_t = \pi^*$$

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Fiscal Limit: No Reneging

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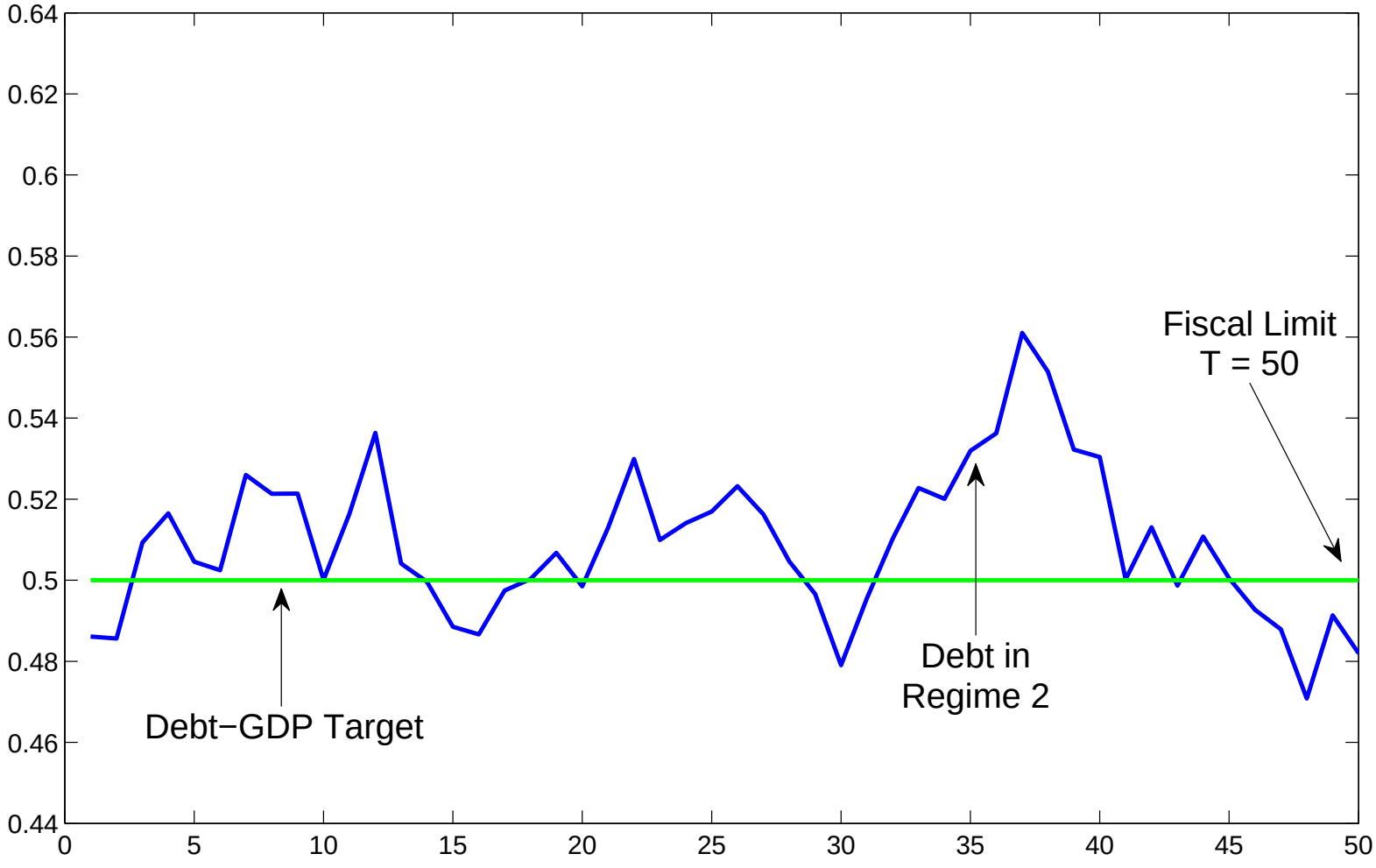
Transfer Policy	z_t	same

$$E_t\left(\frac{P_t}{P_{t+1}} - \frac{1}{\pi^*}\right) = \frac{\alpha}{\beta}\left(\frac{P_{t-1}}{P_t} - \frac{1}{\pi^*}\right), \quad \frac{\alpha}{\beta} > 1$$

$$P_t = f(z_t; \gamma, \mu, \beta, \pi^*)$$

A New Fiscal Equilibrium Before the Limit

Analytic Intuition: Debt



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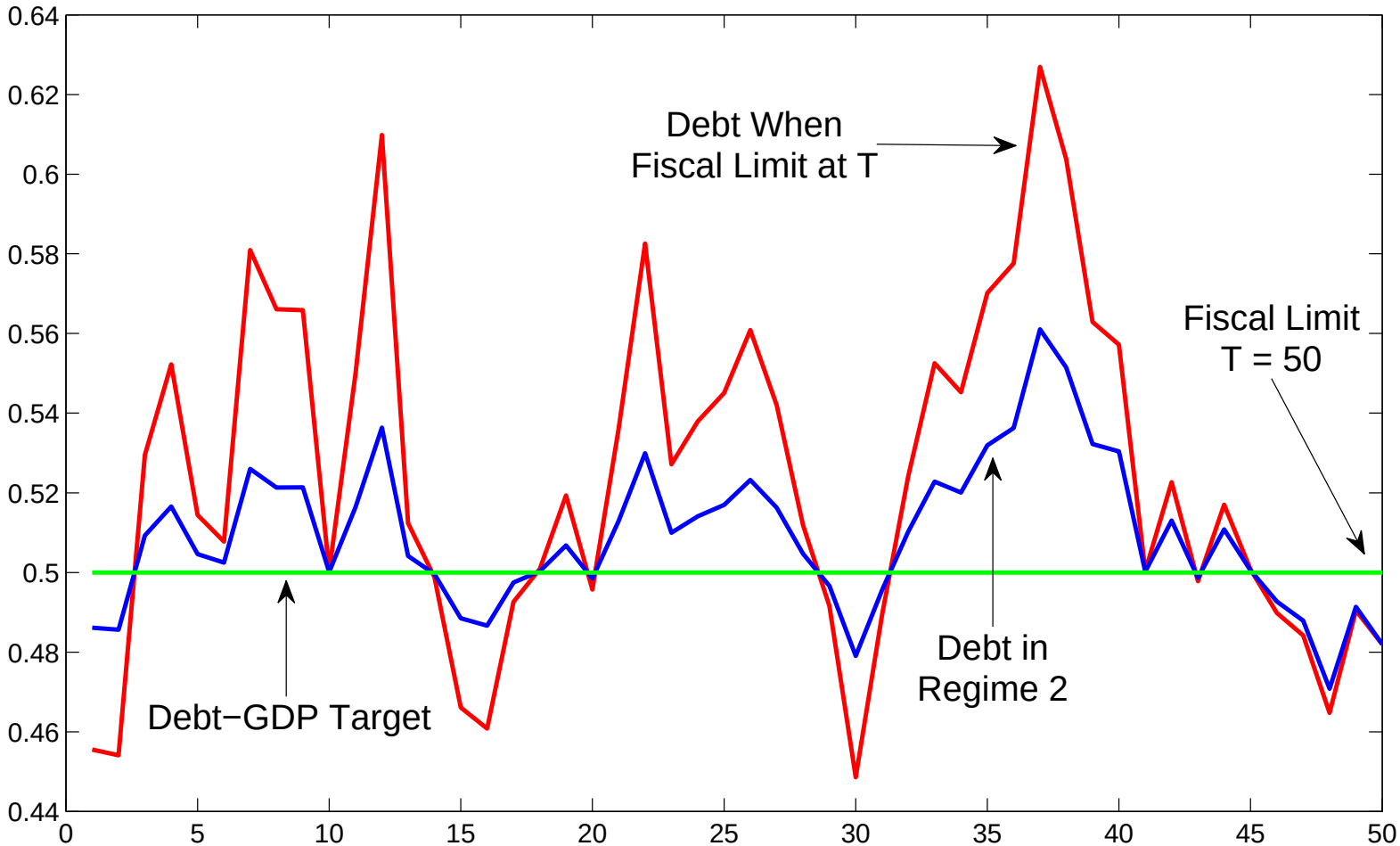

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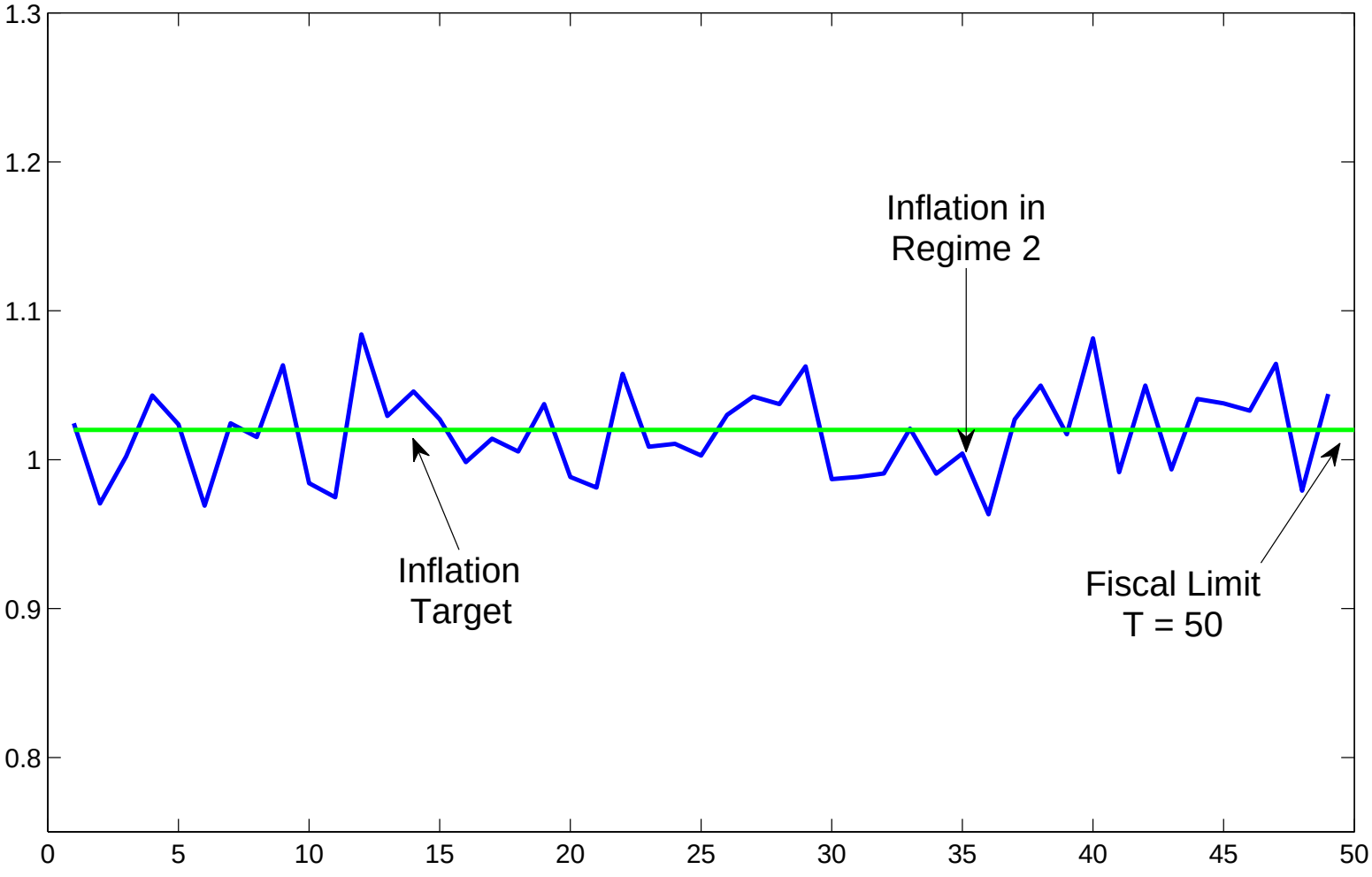

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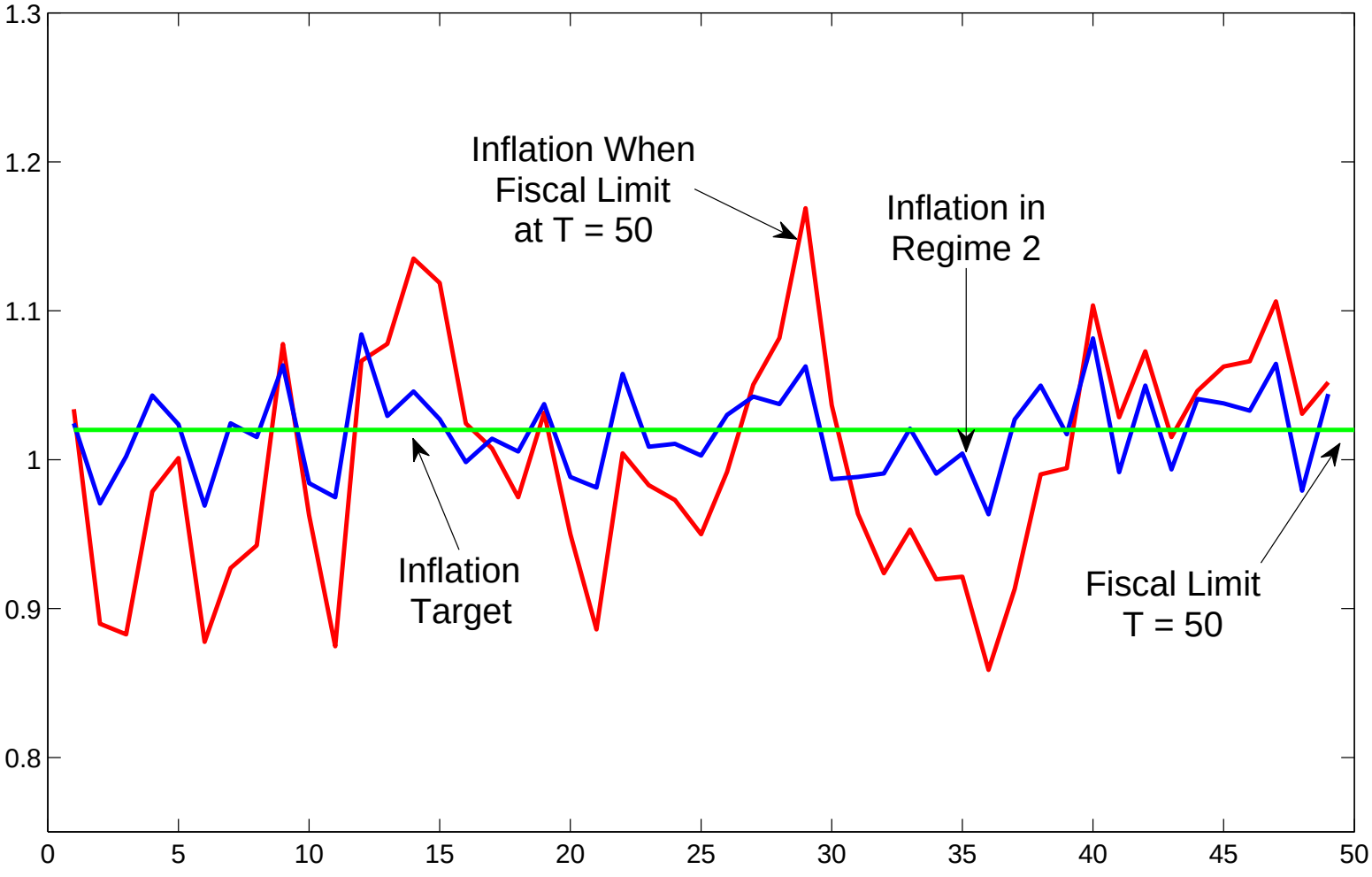
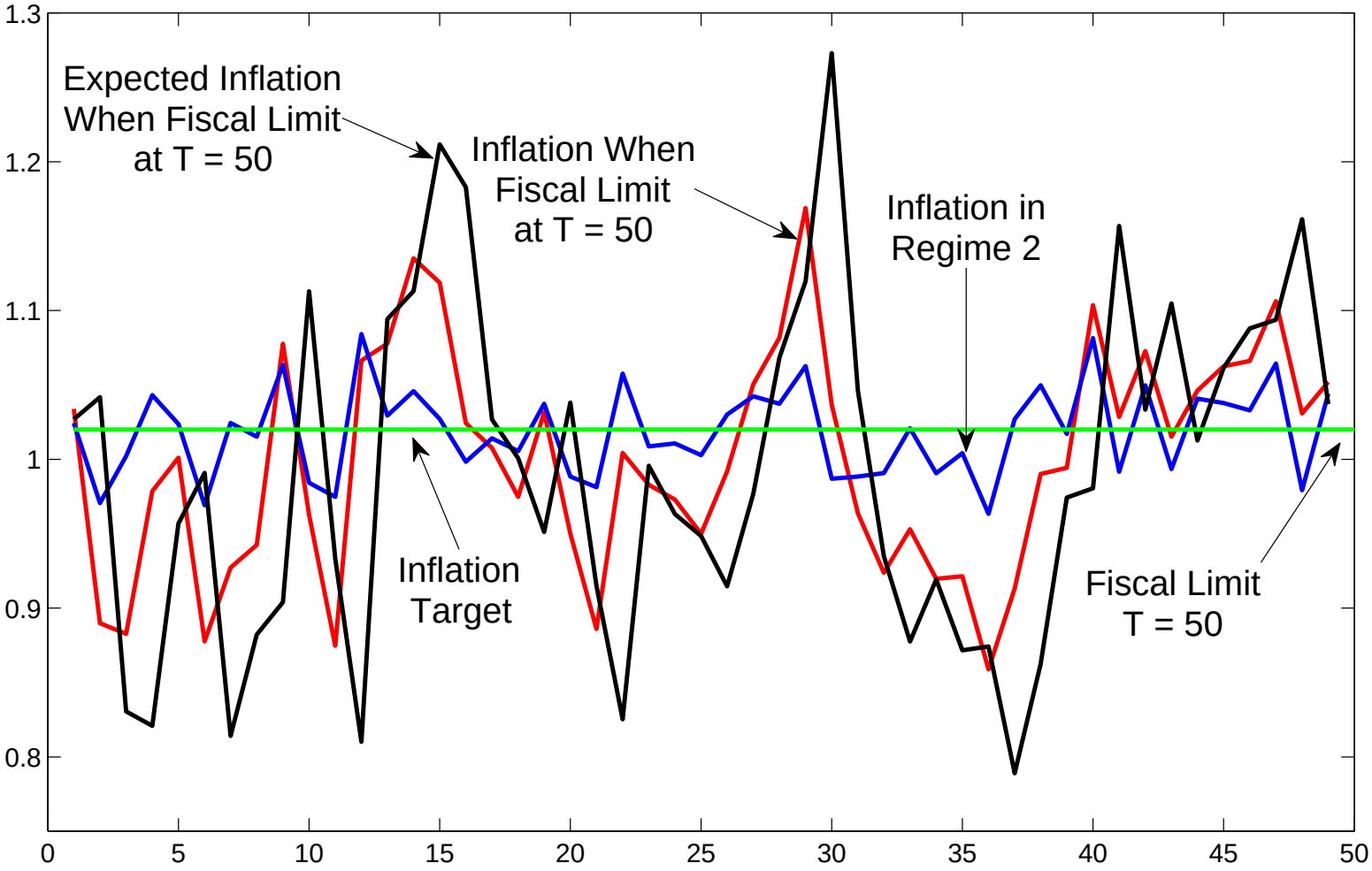


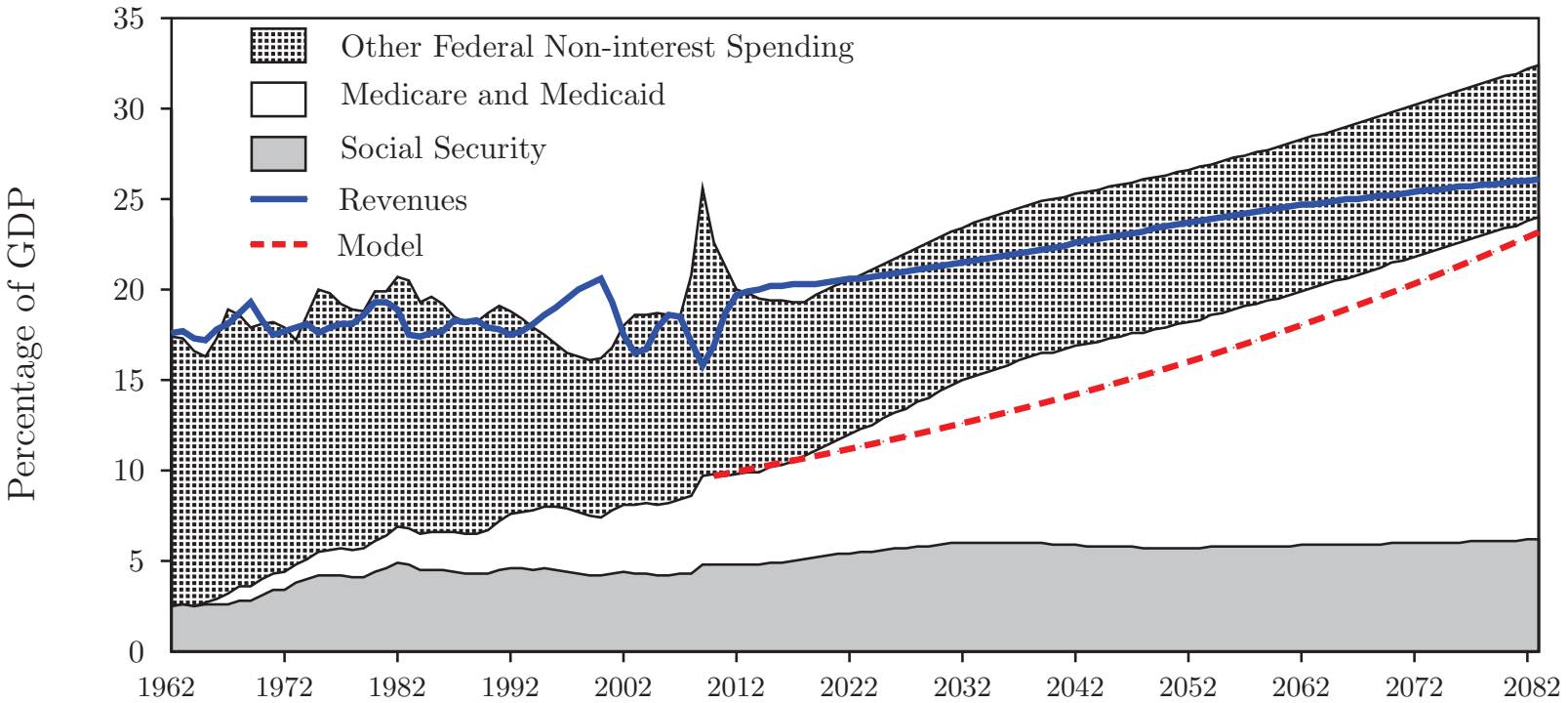
Analytic Intuition: Expected Inflation



Fiscal Limit: Implications

- Expectations of post-limit policies determine *pre*-limit equilibrium
- Inflation and debt *not* anchored on targets
- Expectations—and equilibrium—time varying as approach limit
- Pre-limit equilibrium converges to post-limit equilibrium

Promised Transfers in a DSGE Model



Full-Blown Model

- Standard DSGE model: capital accumulation, sticky prices, distorting taxation
- Government announces path of *promised* transfers
- Government debt and taxes grow until the economy hits fiscal limit
- Specify a set of policies that stabilize debt after fiscal limit
- Multiple layers of policy uncertainty

Households and Firms

- Household utility depends on consumption, leisure and real balances
- Household's budget constraint is

$$C_t + K_t + \frac{B_t}{P_t} + \frac{M_t}{P_t} \leq (1 - \tau_t)\left(\frac{W_t}{P_t}N_t + R_t^k K_{t-1}\right)$$

$$+ (1 - \delta) K_{t-1} + \frac{R_{t-1}B_{t-1}}{P_t} + \frac{M_{t-1}}{P_t} + \lambda_t z_t + \frac{D_t}{P_t}$$

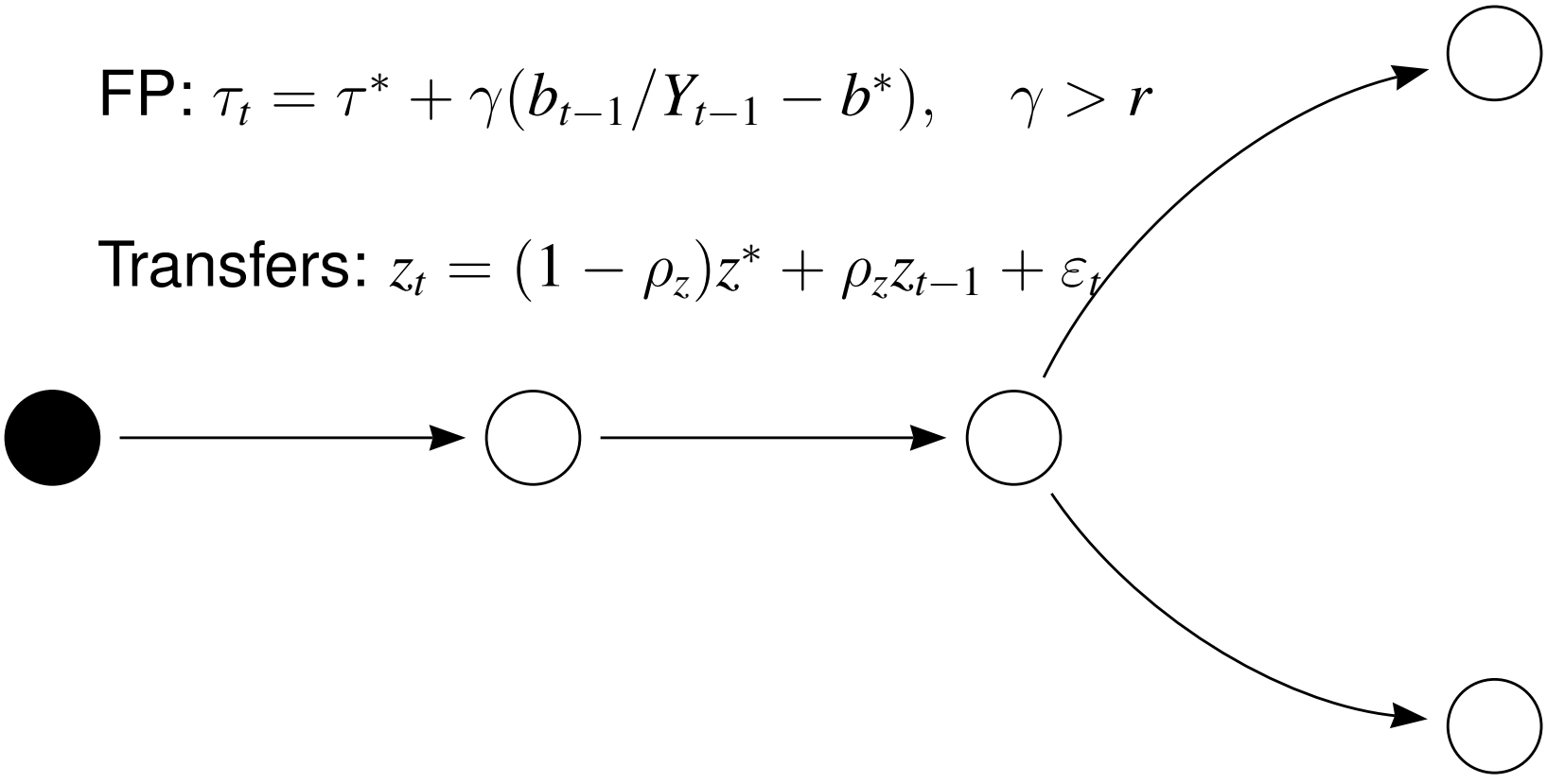
- Firms set prices as a markup over marginal costs (Rotemberg costly adjustment)

Initial Period: Stationary Transfers

MP: $R_t = R^* + \alpha(\pi_t - \pi^*), \quad \alpha > 1/\beta$

FP: $\tau_t = \tau^* + \gamma(b_{t-1}/Y_{t-1} - b^*), \quad \gamma > r$

Transfers: $z_t = (1 - \rho_z)z^* + \rho_z z_{t-1} + \varepsilon_t$

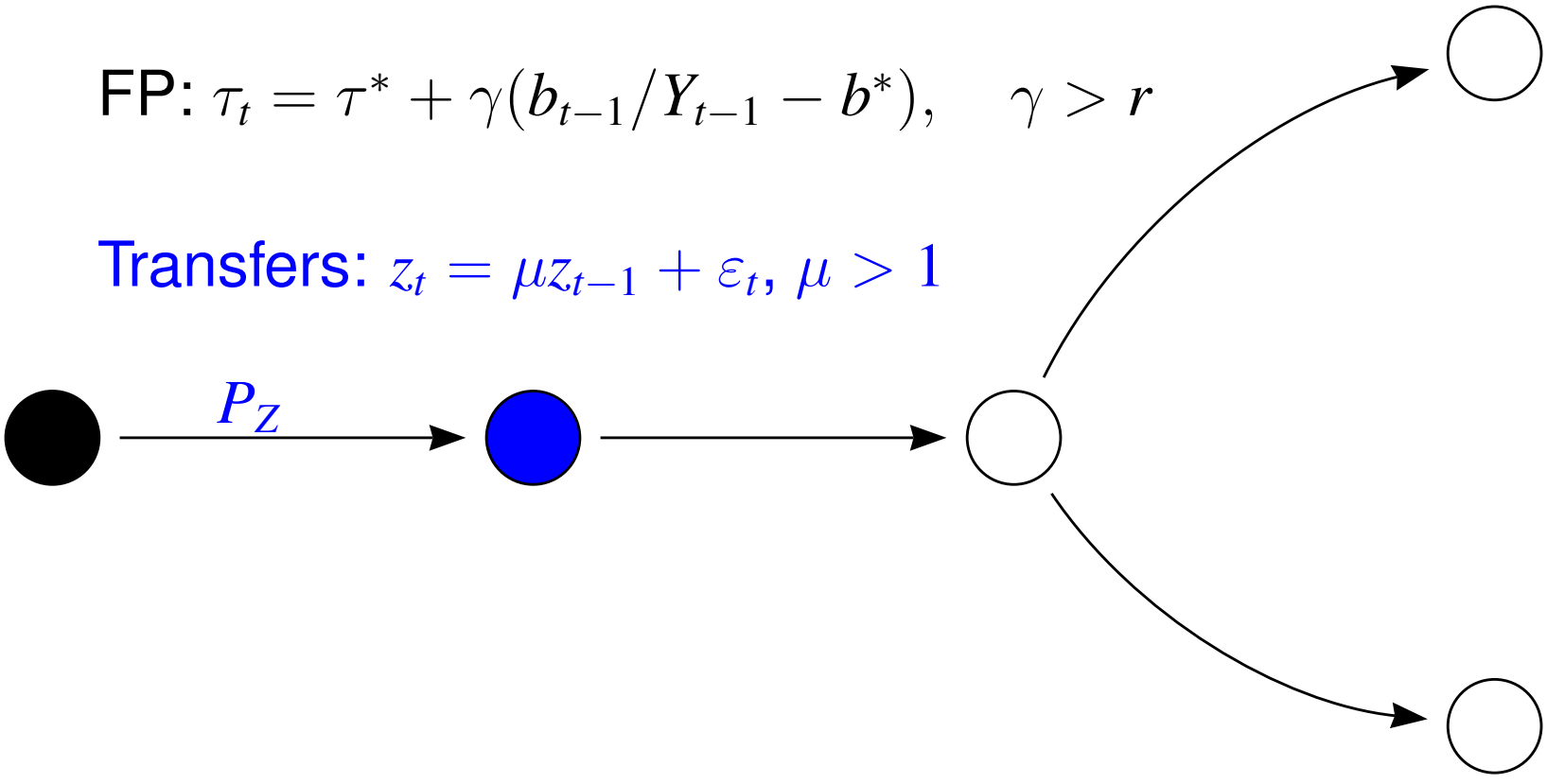


Non-Stationary *Promised* Transfers

MP: $R_t = R^* + \alpha(\pi_t - \pi^*), \quad \alpha > 1/\beta$

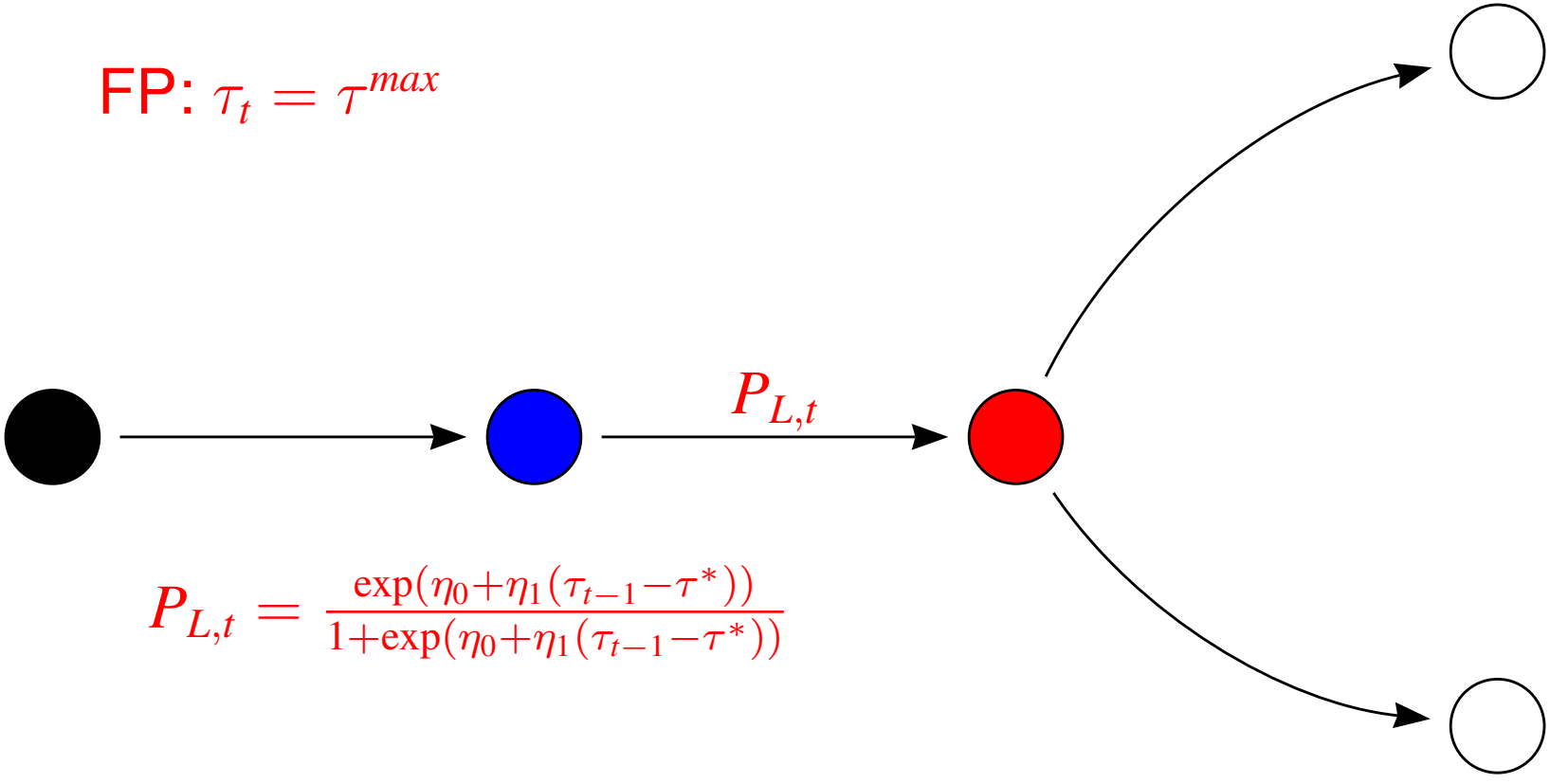
FP: $\tau_t = \tau^* + \gamma(b_{t-1}/Y_{t-1} - b^*), \quad \gamma > r$

Transfers: $z_t = \mu z_{t-1} + \varepsilon_t, \ \mu > 1$



Fiscal Limit

FP: $\tau_t = \tau^{max}$



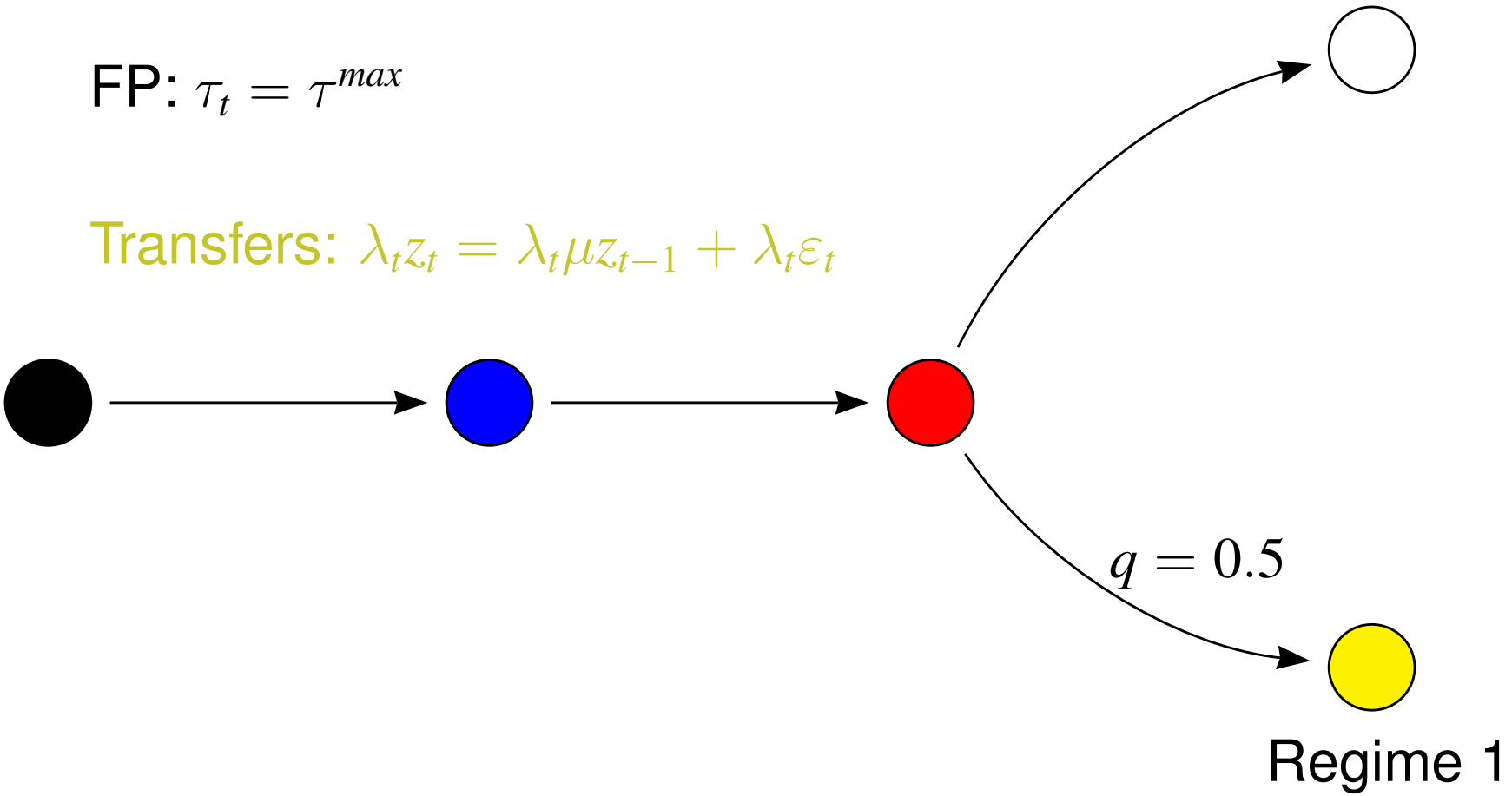
$$P_{L,t} = \frac{\exp(\eta_0 + \eta_1(\tau_{t-1} - \tau^*))}{1 + \exp(\eta_0 + \eta_1(\tau_{t-1} - \tau^*))}$$

Fiscal Limit: Regime 1 AM/AF/PT

MP: $R_t = R^* + \alpha(\pi_t - \pi^*), \quad \alpha > 1/\beta$

FP: $\tau_t = \tau^{max}$

Transfers: $\lambda_t z_t = \lambda_t \mu z_{t-1} + \lambda_t \varepsilon_t$

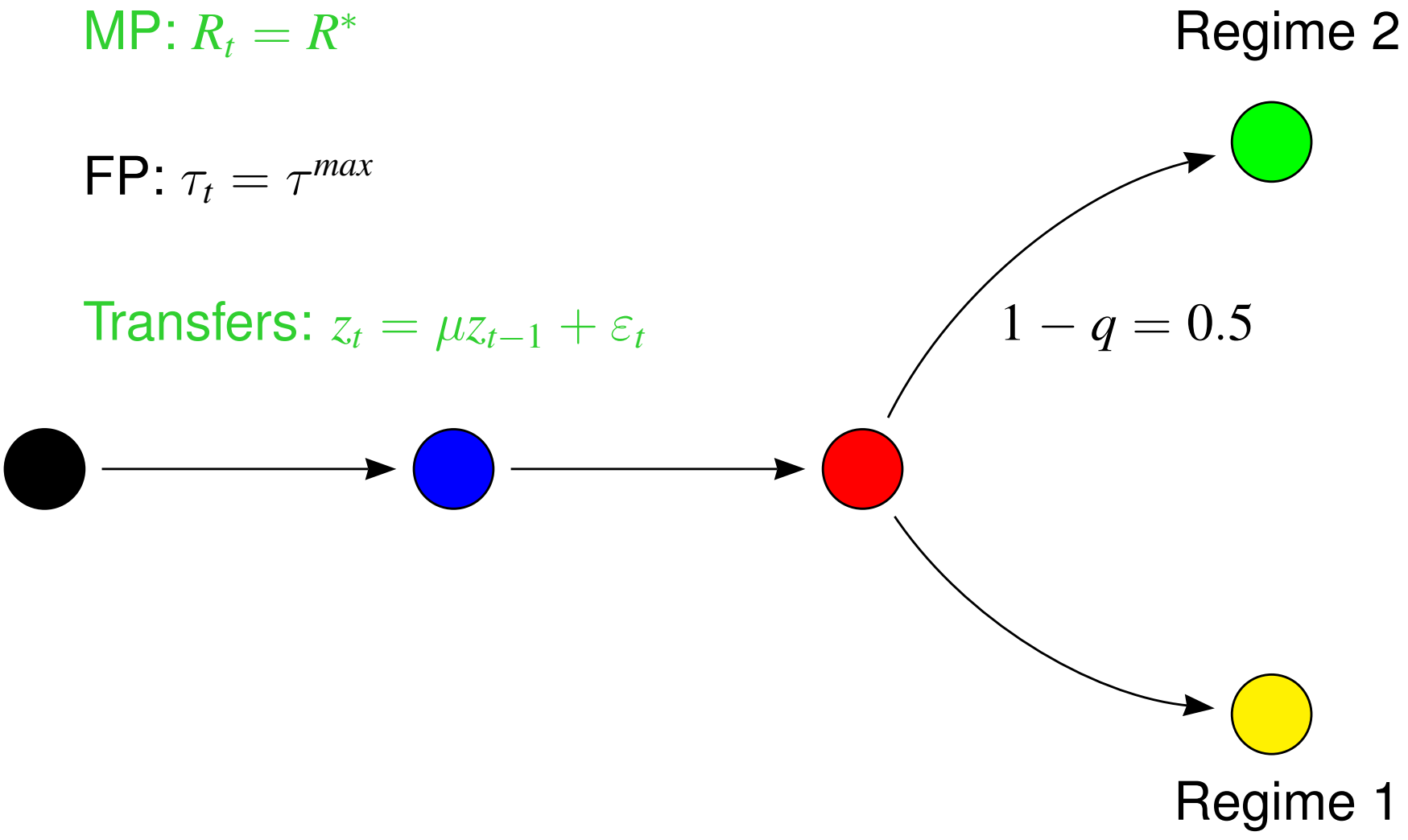


Fiscal Limit: Regime 2 PM/AF/AT

MP: $R_t = R^*$

FP: $\tau_t = \tau^{max}$

Transfers: $z_t = \mu z_{t-1} + \varepsilon_t$

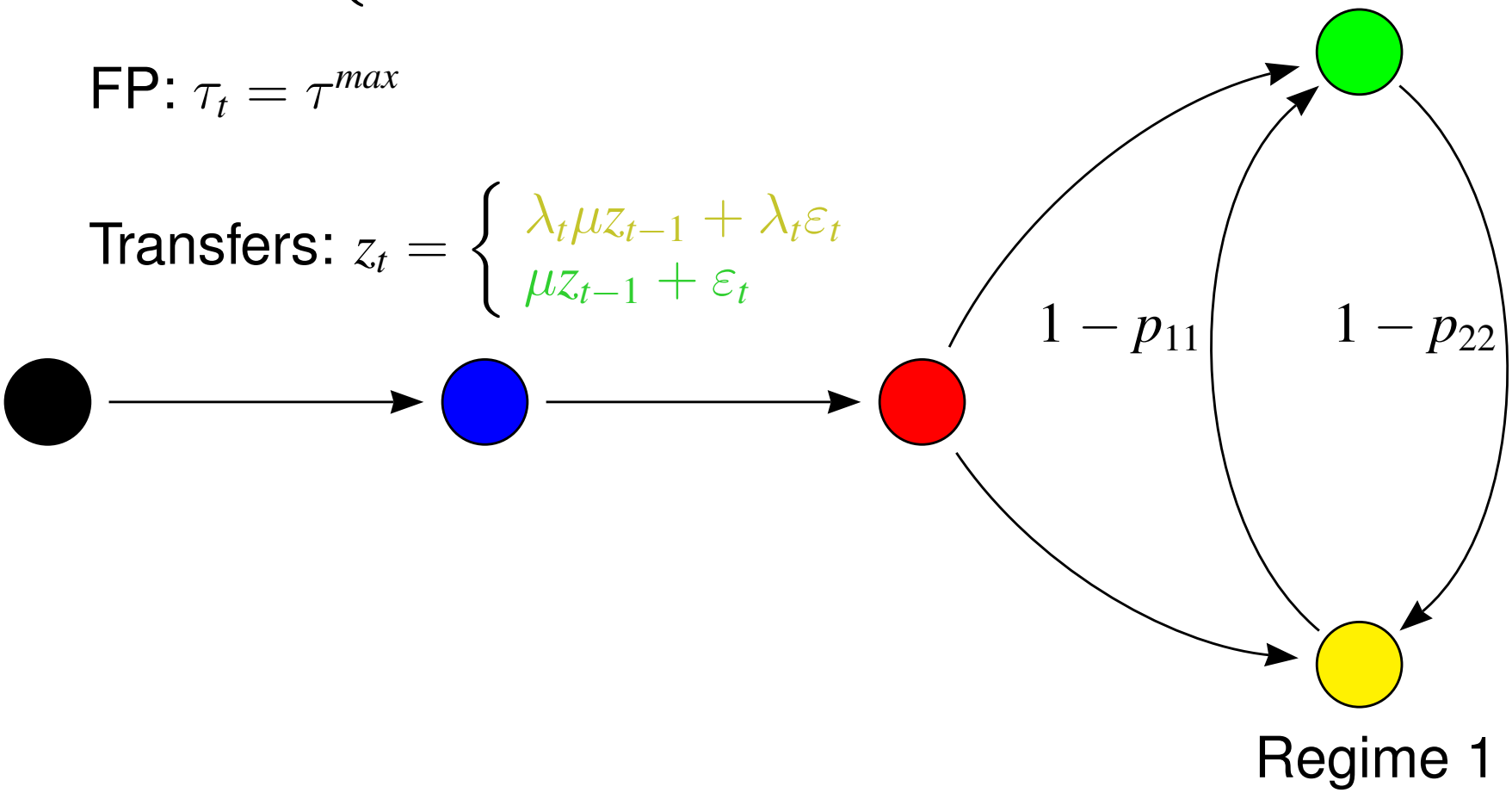


Fiscal Limit: Switch Between Regimes

MP: $R_t = \begin{cases} R^* + \alpha(\pi_t - \pi^*), & \alpha > 1/\beta \\ R^* \end{cases}$

FP: $\tau_t = \tau^{max}$

Transfers: $z_t = \begin{cases} \lambda_t \mu z_{t-1} + \lambda_t \varepsilon_t \\ \mu z_{t-1} + \varepsilon_t \end{cases}$



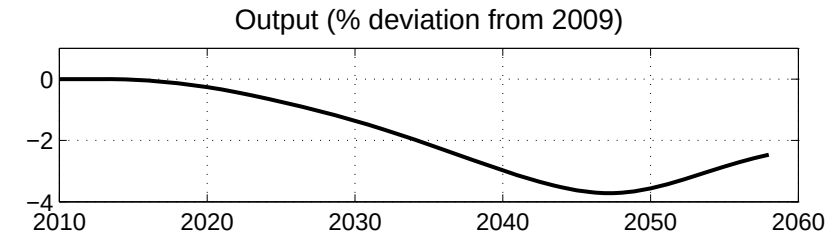
Counterfactual Experiments

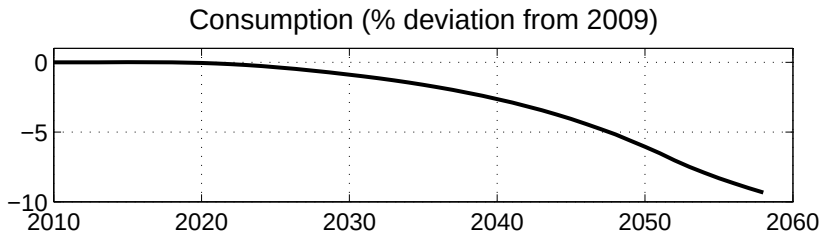
- Layers of uncertainty call for a probabilistic description of outcomes
- Report equilibrium transition paths conditional on *particular* realizations of policies
  - decision rules based on true probability distributions
  - agents always place probability on alternative future regimes
  - these are counterfactual exercises that induce policy regime *surprises* every period

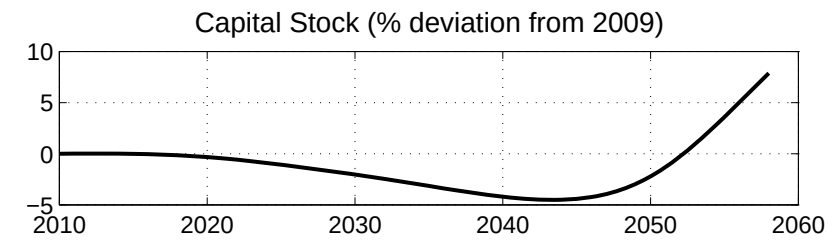
Pre-Limit as Transfers Grow

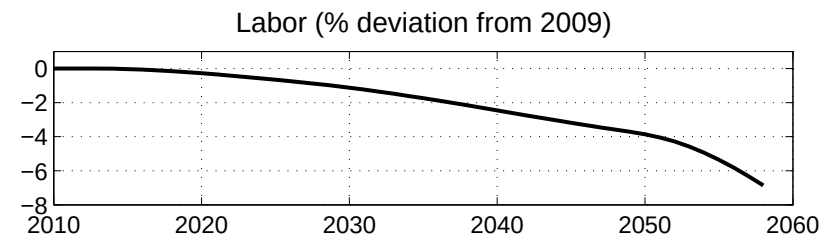
- Dominate forces are rising debt and taxes
- Rising tax rates discourage labor effort and reduce consumption
- Inflection point in dynamics arises at limit, τ^{max}
- Capital falls when $\tau_t < \tau^{max}$, then rises when $\tau_t > \tau^{max}$, in expectation of a future reduction in tax rates

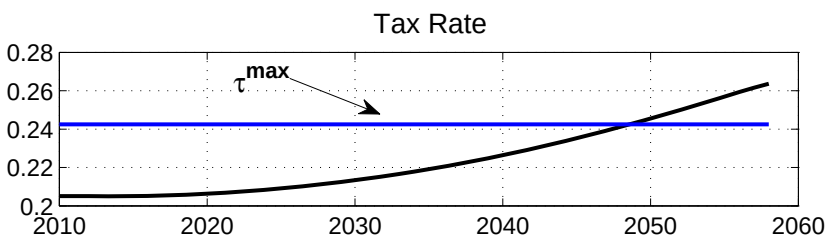
Pre-Limit as Transfers Grow

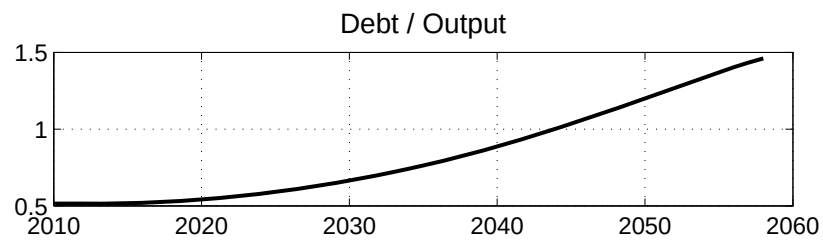


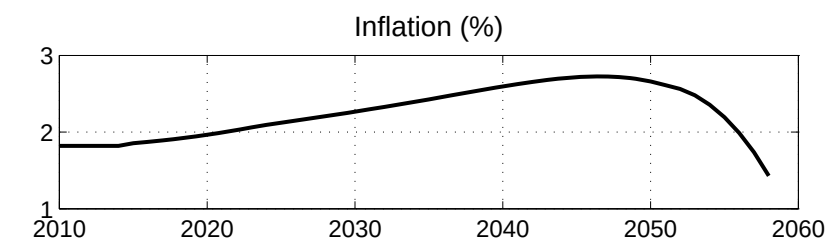


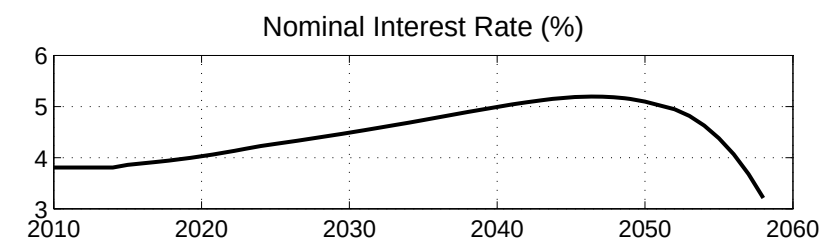








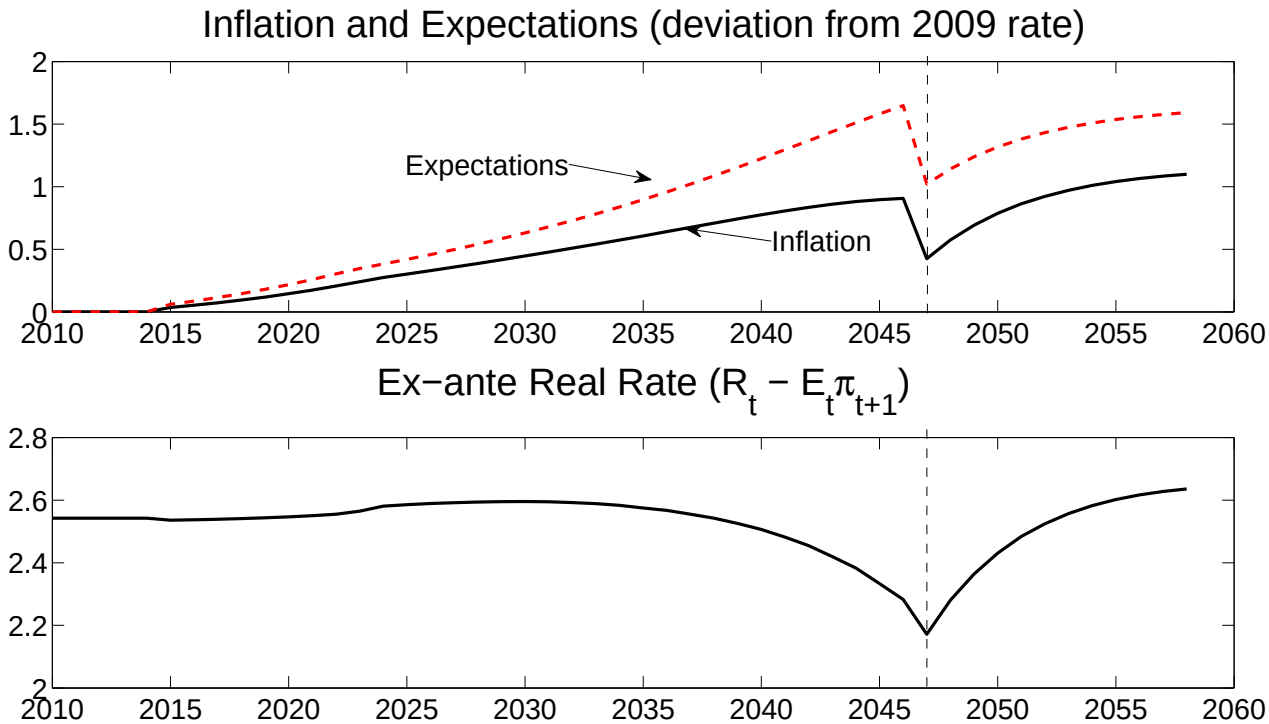




Conditional on *not* triggering fiscal limit

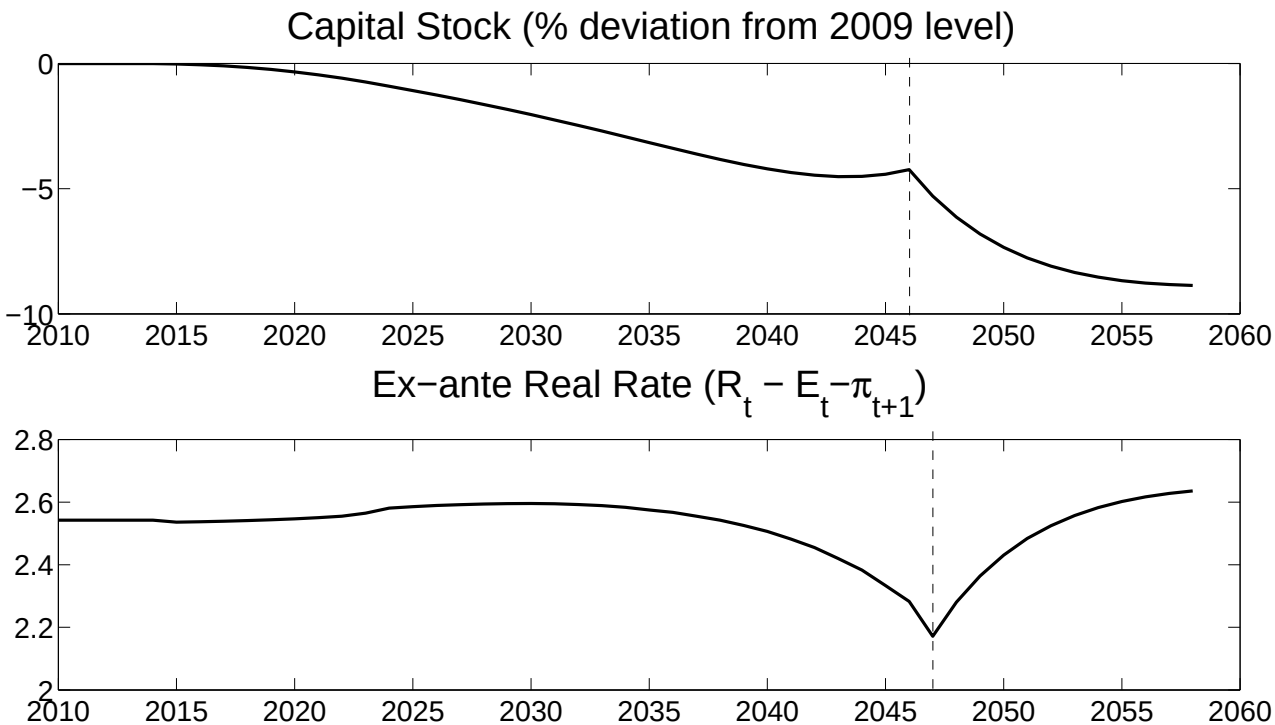
Post-Limit Reneging ($\lambda_t < 1$)

- Monetary policy is active, but can't stabilize inflation
- Agents believe can return to regime without reneging, but with passive monetary policy



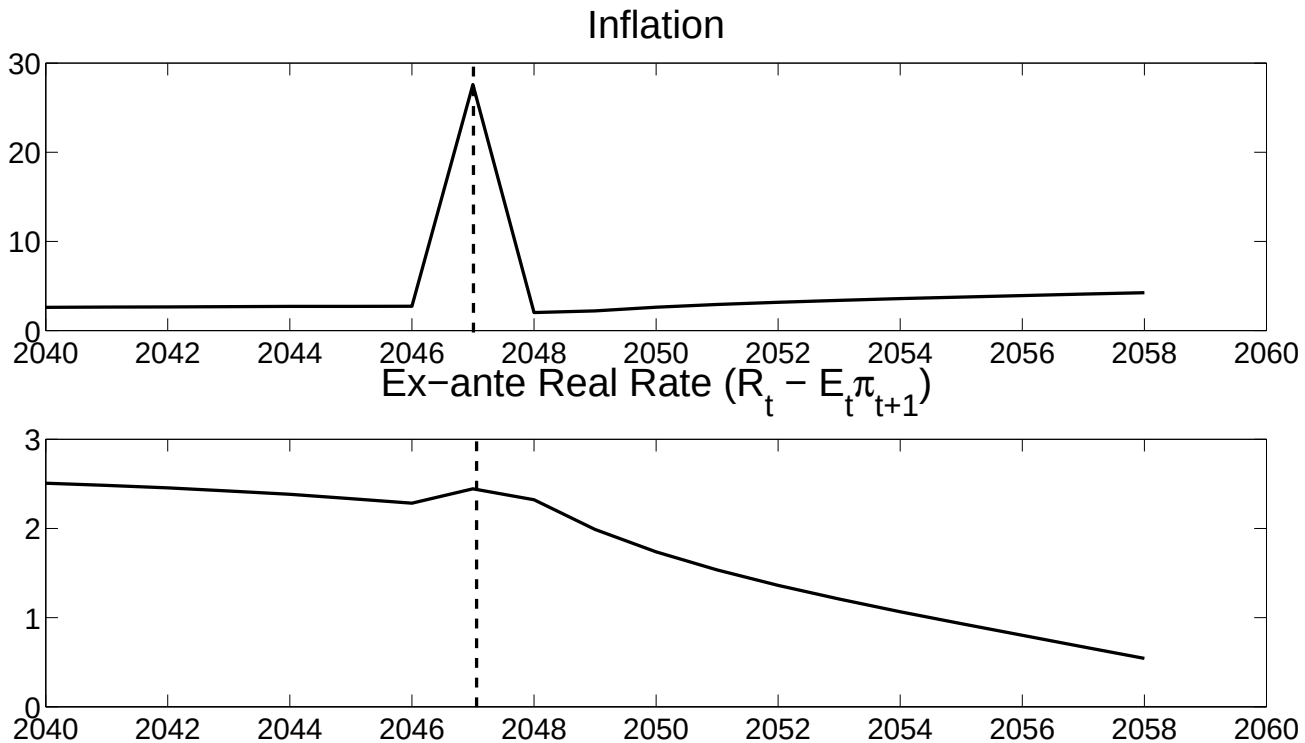
Post-Limit Reneging ($\lambda_t < 1$)

- Low real rates reduce savings
- Capital stock declines



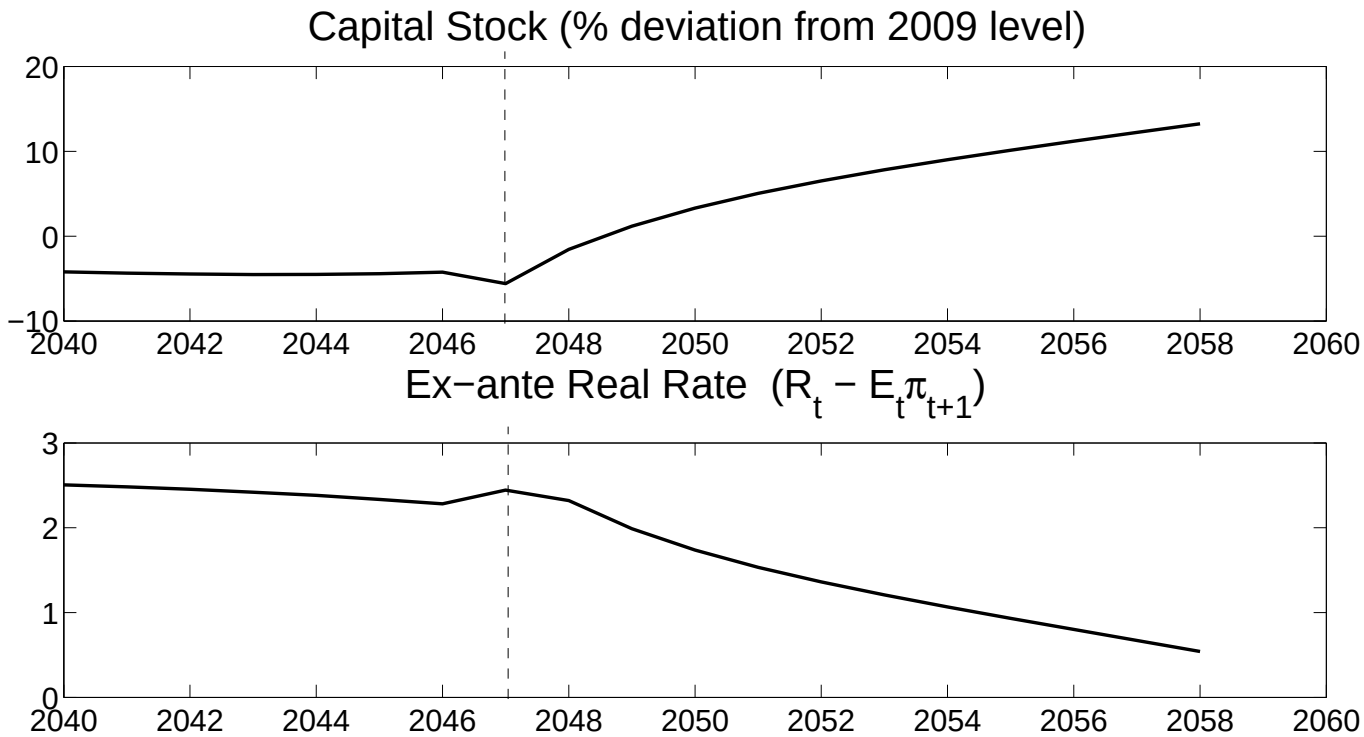
Post-Limit Passive Monetary Policy

- Monetary policy is passive and $\lambda_t = 1$
- Agents still believe can move to reneging regime



Post-Limit Passive Monetary Policy

- Possibility of reneging in future increases savings and postpones consumption
- Drives capital accumulation



Conclusions

- Profound uncertainty surrounds the future financing of promised transfers
- Fiscal pressures will likely impair efforts to achieve any inflation objective
  - Expected inflation will rise faster than inflation if households believe the economy may hit the fiscal limit
- In the presence of a fiscal limit, effects of the limit kick in even during “normal” times
- Underscores that to understand an intrinsically “fiscal issue,” must integrate monetary policy