Fiscal Redistribution Risk in Treasury Markets*

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Abstract

When governments and central banks are perceived to subsidize taxpayers at the expense of bondholders in the event of large spending increases, bondholders will raise the government's cost of funding by demanding higher risk premia. We formalize this redistribution mechanism in a two-agent model that features limited asset market participation and monetary-fiscal interactions. The use of inflationary finance in a fiscally-led policy regime reduces ex post real bond returns in response to surprise unfunded fiscal expansions, while the redistribution of resources from bondholders to taxpayers increases the pricing kernel, making government bonds a risky asset. This fiscal redistribution risk mechanism generates sizable nominal term premia in a calibrated New Keynesian framework with partially-funded spending.

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1 Introduction

Governments in the US and other mature economies have been running large deficits and accumulating debt rapidly over the past few decades. A tradeoff that governments and central banks face when choosing how to finance deficits is whether to protect bondholders or taxpayers. Policymakers have often chosen to protect taxpayers at the expense of bondholders in major fiscal expansions by relying significantly on inflationary rather than tax finance (e.g., Barro and Bianchi (2023) and Hall and Sargent (2021)). The Treasury portfolio suffered real losses of 25%–50% in the aftermath of each World War and the COVID pandemic, which saw unprecedented surges in unfunded government spending.[1] We show that bondholders will respond by increasing the government's funding costs through higher bond risk premia.

Important contributors to the current deteriorating US fiscal condition, besides the surge in pandemic-related expenditures, are lower frequency trends in the rising share of unfunded obligations. The increasing portions of transfer programs such as Social Security, Medicare, and Medicaid, along with a rising share of emergency discretionary spending, are not backed by legislation requiring offsetting taxation or spending cuts. Treasury portfolio returns systematically decline on days with news about unfunded deficits inferred from individual legislative proposals over the past two decades.[2]

We theoretically examine how the risk of unfunded fiscal expansions affects nominal government bond risk premia when the government commits and does not default, and the monetary authority accommodates unfunded expansionary fiscal policy by preventing interest rates from rising excessively. Such a policy framework subsidizes taxpayers at the expense of devaluing bondholders' returns and their wealth through inflationary finance. We are the first to demonstrate that fiscal redistribution risk between bondholders and taxpayers is a significant source of bond risk premia, thereby raising the government's funding costs. Standard macro models do not account for

[1] Hall and Sargent (2022) reports the cumulative bond return evidence from the World Wars and Gomez Cram, Kung, and Lustig (2024) for the years following COVID.

[2] Gomez Cram, Kung, and Lustig (2023); Gomez Cram et al. (2024) extract deficit news using cost revisions from individual legislative proposals, utilizing CBO cost releases and other media sources.

this fiscal risk premium margin, overstating the government's fiscal capacity.

To formalize how the policy stance dictates bond return dynamics and the pricing of fiscal redistribution risk, we construct a tractable two-agent endowment economy featuring limited asset participation (LAMP) and monetary-fiscal interactions, and solve it analytically. We assume that a constant fraction of agents are asset holders ("bondholders") with recursive preferences (e.g., Epstein and Zin (1989) and Bansal and Yaron (2004)), and the remaining agents are hand-to-mouth ("taxpayers"). We model the policy stance with simple monetary and fiscal policy rules. The government issues nominal bonds and levies lump-sum taxes to finance stochastic expenditures — the only shock in the baseline model — fully distributed as transfers.

We consider two distinct policy regimes characterized by parameterizations of the monetary and fiscal policy rules, as in Leeper (1991). The fiscally-led policy regime features unfunded spending risk, requiring inflationary finance to support fiscal expansions and accommodative monetary policy to stabilize interest rates and debt. Ex post real debt returns are reduced in fiscal expansions through nominal revaluations, making debt risky in the sense of Lucas and Stokey (1983). The monetary-led regime is characterized by the central bank pursuing inflation targeting and fully funded government spending, implying safe debt returns with respect to fiscal risk, as in Barro (1979).

Our key theoretical result is to show that the combination of LAMP and a fiscally-led policy regime enables fiscal risk to be priced through fiscal redistribution. Asset holders absorb the entire costs of unfunded fiscal expansions but receive only a fraction of the transfers, effectively subsidizing the remaining transfers for hand-to-mouth agents. A reduction in asset holders' real wealth increases the pricing kernel when real returns on nominal bonds are low, leading to a fiscal bond risk premium.

When fiscal inflation propagates through the interest rate rule, a surprise fiscal expansion reduces the real payoff of longer-maturity nominal bonds than shorter ones, leading to a positive nominal term premium. As fiscal shocks affect the real pricing kernel solely through redistribution in our model, we do not rely on stagflation dynamics to generate a positive bond risk premium, thereby differentiating our mechanism from representative-agent models of the term structure.[3] Indeed, aggregate consumption is constant in our endowment economy framework as we assume there are no deadweight costs.

To highlight the importance of the fiscally-led regime and LAMP for bond risk premia, we contrast it with other specifications of the baseline model. In the representative agent (RA) case of the fiscally-led regime, we also get nominal devaluations of bond returns from unfunded fiscal expansions. However, the agent now receives the entire transfer, which insulates wealth and the pricing kernel. Consequently, fiscal risk is not priced in the Fiscal RA analogue. The RA and LAMP cases of the monetary-led regime generate safe debt because fiscal expansions are fully funded by future taxation, insulating bond returns and the pricing kernel.

We extend our analytical endowment economy model to a standard two-agent New Keynesian (TANK) framework (e.g., Galí, López-Salido, and Vallés (2007) and Bilbiie (2008)) to quantify our fiscal redistribution mechanism. The extended model adds endogenous production, sticky prices, long-term nominal debt, and additional structural shocks. We focus on specifying policy rules to achieve partially funded government spending in a fiscally-led regime. We discipline the extent to which inflationary finance is used by calibrating the fiscal rule to match the share of government spending volatility accounted for by unfunded obligations.

When also calibrating to macroeconomic data, our model generates a sizable average five-year minus one-quarter nominal yield spread, with compensation for unfunded government spending risk accounting for over half of it. In short, our quantitative analysis demonstrates that the fiscal redistribution risk mechanism can be a significant source of bond risk premia, even when inflationary finance is partially used during fiscal expansions.

Our paper is related to the growing literature on examining asset prices in New Keynesian models. Rudebusch and Swanson (2012), Palomino (2012), Kung (2015), Campbell, Pflueger, and Viceira (2014), Hsu, Li, and Palomino (2021), Caballero and Simsek (2022), Pflueger and Rinaldi (2022), Bianchi, Kung, and Tirskikh (2023b), link

[3] Some examples of the representative agent models of the term structure featuring stagflation risk include Piazzesi and Schneider (2006), Bansal and Shaliastovich (2013), and Kung (2015).

monetary policy to asset prices in the RA setting, and Kekre and Lenel (2022), Bianchi, Ludvigson, and Ma (2022), David and Zeke (2022), D'Avernas and Vandeweyer (2024), and Caramp and Silva (2024) in a heterogeneous agents setting.

Another related strand of literature theoretically links fiscal policy to asset prices (e.g., Pastor and Veronesi (2012), Croce, Kung, Nguyen, and Schmid (2012), Bretscher, Hsu, and Tamoni (2020), Corhay, Kind, Kung, and Morales (2023), and Li, Zha, Zhang, and Zhou (2022)). We distinguish our paper from these two strands of literature by providing a novel mechanism for generating an endogenous fiscal bond risk premium through fiscal redistribution between bondholders and taxpayers.

The fiscally-led regime from our analytical model relates to the work of Sargent and Wallace (1981), Leeper (1991), Sims (1994), Woodford (1995), Cochrane (1998), and Bassetto (2002). Our extended quantitative framework is connected to NK models with heterogeneous agents that feature monetary-fiscal interactions (e.g., Bianchi, Faccini, and Melosi (2023a), Diamond, Landvoigt, and Sánchez (2024), Angeletos, Lian, and Wolf (2024), Kaplan (2025), Elenev, Landvoigt, Van Nieuwerburgh, and Schultz (2021), Rachel and Ravn (2025), and Barro, Fernández-Villaverde, Levintal, and Mollerus (2022)).

Our paper highlights how the joint monetary-fiscal policy stance affects the riskiness of nominal government bonds. In that sense, we also relate to the literature considering the role of government policies in manufacturing safe or risky debt (e.g., Barro (1979), Lucas and Stokey (1983), Aiyagari, Marcet, Sargent, and Seppälä (2002), and Buera and Nicolini (2004)), and more recent contributions include Jiang, Lustig, Van Nieuwerburgh, and Xiaolan (2020), Liu, Schmid, and Yaron (2021), and Jiang, Sargent, Wang, and Yang (2022).

Our quantitative model broadly relates to the literature studying the transmission of fiscal policy shocks in New Keynesian models with heterogeneous agents (e.g., Galí et al. (2007), Kaplan, Moll, and Violante (2018), Hagedorn, Manovskii, and Mitman (2019), Bilbiie (2020), Aguiar, Amador, and Arellano (2023), and Auclert, Rognlie, and Straub (2024)). We complement this literature by demonstrating that redistribution risk from partially funded government spending shocks is a significant source of bond risk premia, and thus raises the government's funding costs.

2 Analytical Framework

We construct a tractable endowment economy framework to demonstrate how the combination of (i) limited asset market participation (LAMP) and (ii) a fiscally-led policy framework utilizing inflationary finance to pay down debt during unfunded fiscal expansions generates a bond risk premium through fiscal redistribution.

We model LAMP with a constant fraction of hand-to-mouth households that do not save, while the remaining ones smooth consumption intertemporally through their asset holdings (e.g., Campbell and Mankiw (1989) and Bilbiie (2008)). Monetary and fiscal policy are characterized by interest rate and tax policy rules. The government issues one-period nominal debt. The only stochastic disturbance is a government spending shock, which is transferred to households. Taxes and transfers are implemented in a lump-sum, uniform manner across all agents.

We characterize the bond pricing implications under monetary-led and fiscally-led policy regimes using risk-adjusted approximate analytical solutions. These policy regimes are defined by partitioning the parameter space of the policy rules admitting bounded solutions for inflation and debt (e.g., Leeper (1991)). We also compare the LAMP framework with the representative agent (RA) case in each regime.

The monetary-led regime creates a safe debt environment in both the RA and LAMP cases. This regime is characterized by the central bank aggressively targeting inflation, and the fiscal authority accommodating the central bank's inflation-targeting objectives by fully funding fiscal expansions through higher future taxation. The Ricardian tax policy insulates inflation and bond returns by having future tax adjustments fully absorb surprise fiscal expansions.

The fiscally led regime exposes bond returns to fiscal shocks, and LAMP allows fiscal risk to be priced in equilibrium. The fiscal authority does not finance fiscal expansions fully through higher future taxation, and the monetary authority accommodates by preventing interest rates from rising too aggressively. This regime requires inflationary finance to ensure fiscal solvency, thereby reducing the real returns on nominal bonds in response to surprise fiscal expansions.

The fiscal shocks impact the real stochastic discount factor because of LAMP. Asset holders receive a fraction of the transfers but bear the entire costs of the unfunded fiscal expansion by owning all the bonds. The inflationary finance of fiscal expansions devalues debt, redistributing the real wealth of asset holders to subsidize the higher transfers to hand-to-mouth households. The reduction in the real wealth of marginal bond investors when the real returns to nominal bonds are low generates a positive bond risk premium.

In the RA case of the fiscally-led regime, the representative household receives the entire government transfer, which offsets the real wealth loss from the debt devaluation, insulating the real pricing kernel from fiscal shocks. Therefore, the combination of the fiscally-led regime and LAMP is crucial for generating a bond risk premium in our baseline endowment economy model.

When fiscal inflation propagates through the interest rate rule in the Fiscal LAMP framework, a surprise fiscal expansion reduces the real payoff of longer-maturity nominal bonds more than shorter ones, leading to a positive nominal term premium. As the fiscal shocks affect the real pricing kernel through redistribution, we are not relying on stagflation risk to generate the positive term premium.

Our analytical framework abstracts from other structural shocks, endogenous production, labor decisions, sticky prices, long-term debt, and other distortions to isolate the essential model ingredients that endogenously generate priced fiscal redistribution risk in bond markets. Our quantitative framework in Section 3 extends the analytical framework to incorporate these additional features.

2.1 Households

There is a continuum of households on the unit interval with the same utility function and preference parameters. We assume that asset holders have a mass of $\zeta \in (0,1]$ and hand-to-mouth agents are the remaining mass of $1-\zeta$. Each household receives the constant real endowment $\overline{Y} > 0$ in each period.

2.1.1 Asset holders

Asset holders make intertemporal consumption-savings decisions and have identical preferences. We assume that an asset holder has recursive Epstein and Zin (1989) (EZ) utility defined over a single consumption good according to

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

where C_{At} is the consumption of an asset holder, γ is the coefficient of relative risk aversion, $\theta \equiv (1-\gamma)/(1-1/\psi)$, and ψ is the intertemporal elasticity of substitution (IES).

The asset holders trade in one-period nominal government bonds (in positive supply) in addition to a set of assets (in zero net supply) that can be used to create a full set of Arrow securities. The asset holders are subject to a sequence of budget constraints given by

$$P_t C_{At} + \mathbb{V}'_{At} \iota + \mathcal{B}_{At} \leq P_t \overline{Y} + \mathbb{V}'_{At-1} \mathbb{R}_t + \mathcal{B}_{At-1} R_{gt} + P_t T_{At}, \tag{2}$$

where P_t is the price level, $\mathbb{V}_{At} \equiv \mathbb{Q}_t \circ \mathbb{S}_{At}$ is the vector of asset holdings (excluding nominal government bonds) in nominal market values with $\mathbb{Q}_t$ as the vector of nominal prices per share and $\mathbb{S}_{At}$ corresponding to the shares, $\mathcal{B}_{At} \equiv Q_t^b \cdot B_{At}$ is the one-period nominal bond holdings in nominal market values with Q_t^b as the nominal bond price and B_{At} as the face value, $\log(R_{gt}) = i_{t-1}$ is the nominal government portfolio return, $\mathbb{R}_t$ is the vector of nominal asset returns excluding bonds, and T_{At} are real net government transfers to the asset holder.

The intertemporal budget equation can be expressed recursively in terms of the wealth dynamics according to

$$V_{ct+1}^{A} \geq (V_{ct}^{A} - C_{At}) \omega'_{At} \hat{\mathbb{R}}_{t+1}, \tag{3}$$

where V_{ct+1}^{A} is the asset holder's real wealth, $\hat{\mathbb{R}}_{t+1}$ is the vector of spanning deflated asset returns, ω_{At} is the corresponding vector of portfolio weights, $R_{ct+1}^{A} = \omega'_{At} \hat{\mathbb{R}}_{t+1}$ is the return on wealth in real terms.

For more tractable analytical solutions, we focus on the limit case of an infinite IES ($\psi \to \infty$) when deriving the approximate closed-form solutions in this section. This limit case implies a "CAPM" style equilibrium pricing kernel that only depends on the return to wealth of asset holders. We demonstrate in the impulse responses of Appendix A and in the quantitative model in Section 3 that the main insights carry through qualitatively and quantitatively in the finite IES case since the main effects of fiscal shocks on the real pricing kernel in our framework operate through the redistribution of asset holders' wealth.[4] The log real pricing kernel in this limit case can be expressed as

$$m_{t+1} = (1-\gamma)\log(\beta) - \gamma r^{A}_{ct+1}, \tag{4}$$

where $m_{t+1} \equiv \log(M_{t+1})$ is the log one-period real stochastic discount factor and r^{A}_{ct+1} is the log real return on wealth for asset holders.

The optimal consumption and savings decision yields the following asset holder's Euler equation

$$1 = \mathbb{E}_t \left[M^{\$}_{t+1} R_{gt+1} \right], \tag{5}$$

where $M^{\$}_{t+1} \equiv M_{t+1}/\Pi_{t+1}$ is the nominal stochastic discount factor.

2.1.2 Hand-to-mouth

Hand-to-mouth agents have the same preferences as the asset holders, but they cannot save. The budget constraint of a hand-to-mouth agent is given by

$$P_t C_{Ht} \leq P_t \overline{Y} + P_t T_{Ht}, \tag{6}$$

where C_{Ht} is the real consumption and T_{Ht} is the net real transfers.

[4] An analytical solution can be obtained for the finite IES case, but the expressions are significantly more complex. The limit case yields neater analytical expressions that help to elucidate the key economic forces.

2.2 *Monetary policy*

The monetary authority follows a nominal interest rate rule specified as

$$i_t = i^\star + \rho_\pi(\pi_t - \pi^\star), \tag{7}$$

where i_t is the log nominal short rate, $i^\star$ is the risk-adjusted steady state for the short rate, ρ_π captures the monetary policy stance towards the inflation gap, π_t is log inflation, and $\pi^\star$ is inflation target set by the central bank.

2.3 *Fiscal policy*

The fiscal authority follows a real tax revenue rule according to

$$\tau_t = \tau^\star + \delta_b(b_{t-1} - b^\star), \tag{8}$$

where τ_t is the real tax revenue, $\tau^\star$ is the risk-adjusted steady-state tax revenue set by the fiscal authority, δ_b captures the fiscal stance towards debt deviations from target, b_t is the log real market value of debt, $b^\star$ is the risk-adjusted log real value of debt.

Real government spending follows a stochastic process

$$g_t = g^\star + x_t, \quad x_t = \rho x_{t-1} + \sigma\epsilon_t, \tag{9}$$

where $g^\star$ is the government spending target, x_t represents a net spending shock (e.g., including surprise tax increases or spending increases), ρ captures the persistence of the shock, σ represents the volatility of the innovation, and $\epsilon_t \sim$ i.i.d. $N(0,1)$ is standard normal. Primary real surpluses are tax revenues minus government expenditures, $s_t = \tau_t - g_t$. The surplus target is therefore given by $s^\star \equiv \tau^\star - g^\star$.

The government budget equation in nominal terms is given by

$$B_{t-1} = P_t s_t + Q_t^b B_t, \tag{10}$$

where B_{t-1} is the face value of one-period nominal bonds issued by the government.

We can rewrite the budget equation in terms of market values according to

$$R_{gt}\mathcal{B}_{t-1} = P_t s_t + \mathcal{B}_t, \tag{11}$$

where $\mathcal{B}_t \equiv Q_t^b B_t$ is the aggregate nominal market value of government debt held by the public, R_{gt} represents the corresponding nominal portfolio return on government debt, P_t denotes the price level, and s_t corresponds to real primary surpluses. Rearranging the budget identity, we can express it equivalently in terms of returns as

$$R_{gt}/\Pi_t = R_{st}, \tag{12}$$

where $\Pi_t \equiv P_t/P_{t-1}$ is the gross inflation rate, let $\widetilde{\mathcal{B}}_t \equiv \mathcal{B}_t/P_t$ be real market value of nominal debt, and $R_{st} \equiv (\widetilde{\mathcal{B}}_t + s_t)/\widetilde{\mathcal{B}}_{t-1}$ is the gross return on a hypothetical claim to real surplus.

We assume that each dollar spent by the government generates η_g units of consumption that are distributed to households as transfers. Let ζ^G denote the fraction of transfers to asset holders and ζ^T denote the fraction of taxes levied on asset holders. Taxes are uniformly distributed across all agents. Thus, net transfers to an asset holder scaled by GDP are $T_{At} = g_t\eta_g\zeta^G/\zeta - \tau_t\zeta^T/\zeta$ and net transfers to a hand-to-mouth agent scaled by GDP are $T_{ht} = g_t\eta_g(1-\zeta^G)/(1-\zeta) - \tau_t(1-\zeta^T)/(1-\zeta)$.

We focus on the case of full government efficiency where all government spending is transferred back to households ($\eta_g = 1$), and the transfers are uniformly distributed across all agents ($\zeta^T = \zeta^G = \zeta$). Therefore, the transfer to each agent is given by $T_{At} = T_{Ht} = g_t - \tau_t$.

2.4 *Market clearing*

Asset market clearing requires that the asset holders own all outstanding nominal government bonds according to $\zeta\mathcal{B}_{At} = \mathcal{B}_t$. All other assets are held in zero net supply. Final consumption goods market clear according to the following resource constraint $\overline{Y} = \zeta C_{At} + (1-\zeta)C_{Ht}$.

2.5 *Log-linear approximations*

We implement a risk-adjusted log-linear approximation around stochastic steady states, which accurately captures endogenous risk premia in our model.[5] We rely on two approximations for analytical tractability. First, we linearize the log stochastic discount factor, implying that the log pricing kernel depends linearly on wealth innovations. Second, we log-linearize the return on surplus as Corhay et al. (2023).

2.5.1 *Pricing kernel approximation*

The real pricing kernel can also be expressed in terms of utility. Using the approximation $\log(\mathbb{E}_t[U_{At+1}^{1-\gamma}]) \approx \mathbb{E}_t[(1-\gamma)u_{at+1}]$ in the pricing kernel yields

$$m_{t+1} = \log(\beta) - \gamma\left(u_{At+1} - \mathbb{E}_t[u_{At+1}]\right), \tag{13}$$

where $u_{At+1} \equiv \log(U_{At+1})$ is log utility for the asset holder. We can use the equilibrium relation between wealth and utility $v_{At} = u_{At} - \log(1-\beta)$ to get

$$m_{t+1} = \log(\beta) - \gamma\left(v_{ct+1} - \mathbb{E}_t[v_{ct+1}]\right), \tag{14}$$

where $v_{At} = \log(V_{At})$ is log wealth of the asset holder. For notational convenience, we define the innovation to log wealth as $\epsilon_{vt} \equiv v_{At+1} - \mathbb{E}_t[v_{At+1}]$.

2.5.2 *Return approximation*

To obtain approximate analytical solutions for the model, we use a Campbell and Shiller (1988) style approximation of the log return on surplus

$$r_{st+1} = \kappa_0 + \kappa_1 b_{t+1} + \kappa_2 s_{t+1} - b_t, \tag{15}$$

where κ_0, κ_1, and κ_2 are approximating constants that depend on the risk-adjusted steady state of the real value of debt, $b^\star$. To solve for the risk-adjusted steady-states,

[5] We verify that this approximation is accurate for a wide range of parameter values with a nonlinear numerical solution.

we employ an iterative procedure following Campbell and Koo (1997). Additionally, we approximate around the level of the surplus to accommodate deficits.

We focus on bounded solutions for inflation and the real market value of debt as in Leeper (1991). The stability conditions depend on the policy parameters ρ_π and δ_b. The two determinacy regions are the monetary and fiscally-led regimes, which we characterize next.

2.6 *Monetary-led regime (safe debt)*

The monetary-led regime relates to the policy mix from standard textbook monetary models (e.g., Woodford (2015) and Galí (2015)). This regime is characterized by a monetary authority that determines inflation by adjusting the nominal short rate more than one-for-one with the inflation gap ($\rho_\pi > 1$). The fiscal authority adjusts real taxes sufficiently to the debt burden, by ensuring the elasticity of surpluses to the value of debt is greater than one ($\delta_b / s^\star > 1$), to stabilize the real market value of debt around the target.

This policy regime produces safe government debt returns with respect to fiscal shocks (e.g., Barro (1979)). We demonstrate below that Ricardian tax adjustments ensure the intertemporal government budget equation holds, insulating inflation and bond returns from fiscal shocks. Therefore, debt is safe whether we have LAMP ($\zeta \neq 1$) or the RA case ($\zeta = 1$).

In the LAMP case, this policy regime also protects asset holders' real wealth against surprise fiscal expansions as the tax rule offsets the effects of government spending on current asset holders' consumption through future tax adjustments. Consequently, the spending shocks have a neutral effect on the pricing kernel, which only depends on wealth innovations as characterized in equation (14).

2.6.1 Inflation solution

We solve inflation forward in the monetary-led regime using the nominal bond pricing Euler equation given by

$$\exp(-i_t) = E_t\left[\exp\left(m_{t+1} - \pi_{t+1}\right)\right], \tag{16}$$

and then, substitute in the interest rate rule to give us

$$\exp\left(-i^\star - \rho_\pi(\pi_t - \pi^\star)\right) = \mathbb{E}_t\left[\exp\left(\log(\beta) - \gamma\epsilon_{vt+1} - \pi_{t+1}\right)\right], \tag{17}$$

where the stability condition for solving inflation forward is given by $\rho_\pi > 1$ (active monetary policy).[6] The inflation solution is independent of the fiscal disturbances, leading to the constant inflation policy anchored at the target $\pi_t = \pi^\star$. The interest rate target $i^\star$ is chosen to anchor inflation at the target by setting $i^\star = \pi^\star - \log(\beta)$.

2.6.2 Debt solution

Given the inflation solution, we can solve for the debt policy backward in the monetary-led regime using the budget identity (equation 12) expressed as a log return identity according to

$$r_{gt} - \pi_t = r_{st}.$$

The government bond return is equal to the nominal short rate $r_{gt} = i_{t-1}$ since the government only issues one-period nominal debt.

Given the constant inflation policy anchored at the target and substituting in the interest rate rule, we get that the nominal government bond return is constant $r_{gt} = i^\star$, implying that the real bondholder's return is also constant,

$$r_{gt} - \pi_t = i^\star - \pi^\star. \tag{18}$$

[6]The two-sided condition is $\rho_\pi > 1$ and $\rho_\pi < -1$.

Therefore, in the monetary regime, the real return on nominal government debt is constant, as tax adjustments insulate bond returns. Furthermore, the budget identity implies that the return on surplus is constant, $r_{st} = i^\star - \pi^\star$.

We can then plug in the linearized return on surplus and surplus rule for r_{st} to solve for the log real value debt backward according to

$$i^\star - \pi^\star \;=\; \kappa_0 + \kappa_1 b_t + \kappa_2 \Big(s^\star + \delta_b (b_{t-1} - b^\star) - \rho x_{t-1} - \sigma \epsilon_t \Big) - b_{t-1}, \tag{19}$$

where the stability condition is given by $\delta_b > s^\star$ (passive fiscal policy).[7] Equation (19) implies the following equilibrium debt policy

$$b_t = \Gamma_b + \left(\frac{1 - \kappa_2 \delta_b}{\kappa_1} \right) b_{t-1} + \left(\frac{\kappa_2 \rho}{\kappa_1} \right) x_{t-1} + \left(\frac{\kappa_2 \sigma}{\kappa_1} \right) \epsilon_t, \tag{20}$$

where $\Gamma_b \equiv \frac{1}{\kappa_1}(i^\star - \pi^\star - \kappa_0 - \kappa_2 s^\star + \kappa_2 \delta_b b^\star)$.

2.6.3 *Consumption solutions*

Given the debt solution, we can determine the optimal consumption policies for each agent type. The aggregate resource constraint allows us to write the consumption of an asset holder in terms of surpluses as $C_{At} = \overline{Y} - \frac{1-\zeta}{\zeta}(g_t - \tau_t) = \overline{Y} + \frac{1-\zeta}{\zeta} s_t$. We then plug in the tax rule and spending process to obtain the consumption policy for an asset holder

$$C_{At} = \overline{Y} + \frac{1-\zeta}{\zeta} \Big(- g^\star - \rho x_{t-1} - \sigma \epsilon_t + \tau^\star + \delta_b b_{t-1} - \delta_b b^\star \Big). \tag{21}$$

where $(1-\zeta)/\zeta > 0$ when we have LAMP. In the RA case ($\zeta = 1$), consumption of the representative household equals the constant endowment.

We use the budget constraint of a hand-to-mouth agent to express their consumption in terms of surpluses as $C_{Ht} = \overline{Y} + g_t - \tau_t = \overline{Y} - s_t$. We then substitute the tax rule and the government spending process to obtain the consumption policy for a

[7] The two-sided stability condition is $2\exp(b^\star) + s^\star > \delta_b > s^\star$.

hand-to-mouth agent

$$C_{Ht} = \overline{Y} + g^\star + \delta_b b^\star - \tau^\star + \rho x_{t-1} - \delta_b b_{t-1} + \sigma \epsilon_t. \tag{22}$$

The initial consumption responses go in opposite directions across the two agent types. The section below highlights how the response of the future consumption path depends on the policy stance. We describe the fiscal redistribution mechanics in the monetary-led regime next.

2.6.4 Fiscal redistribution dynamics

This section characterizes the consumption redistribution effects from a fiscal shock over different horizons in the monetary-led regime. For each agent type, we demonstrate that the response of realized consumption offsets the response of the future consumption path to a fiscal shock in present value terms. Consequently, the realized wealth of asset holders is insulated from the fiscal shock. In contrast, we demonstrate in Section 2.7.4 that the wealth of asset holders is adversely affected by fiscal expansions in the fiscally-led regime.

We can express the consumption policies from Section 2.6.3 in innovations to illustrate that a surprise fiscal expansion ($\epsilon_t > 0$) initially decreases consumption of asset holders

$$C_{At} - \mathbb{E}_{t-1}[C_{At}] = -\left(\frac{1-\zeta}{\zeta}\right)\sigma\epsilon_t < 0, \tag{23}$$

but increases the consumption of the hand-to-mouth agent

$$C_{Ht} - \mathbb{E}_{t-1}[C_{Ht}] = \sigma\epsilon_t > 0. \tag{24}$$

Asset holders' consumption falls because they pay for the entire cost of the initial fiscal expansion—by absorbing the new debt issuance—but only receive part of the higher government transfers. Taxes do not respond initially since the tax rule depends on lagged debt. Hand-to-mouth agents increase their consumption because they receive higher transfers without facing initial upfront costs.

The Ricardian tax policy ensures that the entire path of future consumption responses offset realized consumption within each agent, such that they cancel each other out in present value terms. To illustrate this, we price hypothetical claims to the consumption of asset holders and hand-to-mouth agents. We define $V_{jt} = C_{jt} + \mathbb{E}_t[M_{t+1}V_{jt+1}]$ for $j \in \{A, H\}$ as the present value of current and future consumption and $P_{jt} = V_{jt} - C_{jt}$ as the present value of future consumption. For asset holders, V_{At} also corresponds to their real wealth.

Imposing market clearing allows us to express the present value of a asset holders' future consumption as the real value of a long position on real consol bonds (i.e., claim to the future endowment income) and a long position on government bonds (claim to real surpluses), yielding $P_{At} = \frac{\overline{Y}}{R^{\star}-1} + \left(\frac{1-\zeta}{\zeta}\right)\widetilde{\mathcal{B}}_t$. Similarly, the present value of a hand-to-mouth agent's future consumption can be expressed as the real value of a long position on real consol bonds and a short position on government bonds according to $P_{Ht} = \frac{\overline{Y}}{R^{\star}-1} - \widetilde{\mathcal{B}}_t$. Intuitively, a higher value of government bonds implies a higher discounted value of tax revenues, thereby reducing the present value of hand-to-mouth consumption.

Using a log-linear approximation of debt and plugging in the log debt solution allows us to show that the present value of an asset holder's future consumption responds positively to the surprise fiscal expansion, according to

$$P_{At} - \mathbb{E}_{t-1}[P_{At}] = \left(\frac{1-\zeta}{\zeta}\right)\sigma\epsilon_t > 0, \tag{25}$$

but the present value of a hand-to-mouth agent's future consumption responds negatively, given by

$$P_{Ht} - \mathbb{E}_{t-1}[P_{Ht}] = -\sigma\epsilon_t < 0. \tag{26}$$

Equations (25) and (26) highlight that the cumulative future consumption redistribution effects go from hand-to-mouth agents to asset holders due to the higher future taxation required to pay for the fiscal expansion in present value terms, whereas the realized consumption redistribution effects shift resources in the opposite direction since net transfers are initially positive. Asset holders eventually increase future consumption because they enjoy the entire benefit of higher future surpluses by owning all the bonds, while only servicing a fraction of the higher total future tax liability. Hand-to-mouth agents eventually lower future consumption in response to higher future net taxation.

The realized and future consumption responses within agents offset each other in present value terms. The innovations in an asset holder's realized consumption and present value of future consumption displayed in equations (23) and (25) cancel out so that the present value of current and future consumption (i.e., the asset holder's realized wealth) is insulated from the fiscal disturbance, $V^A_{ct} - \mathbb{E}_{t-1}[V^A_{ct}] = 0$. In the RA case ($\zeta = 1$), both the innovations to realized consumption and the future path of consumption are zero because the representative agent receives the entire transfer. The realized innovations shown in equations (24) and (26) also cancel each other out for a hand-to-mouth agent, so that $V^H_{ct} - \mathbb{E}_{t-1}[V^H_{ct}] = 0$.[8]

2.6.5 *Equilibrium pricing kernel*

The previous section demonstrated how the monetary-led policy regime insulates the real wealth of asset holders from fiscal shocks. Since the real pricing kernel only depends on the wealth innovation (as shown in equation (14)), this implies a constant real pricing kernel, $m_{t+1} = \log(\beta)$. Furthermore, the nominal pricing kernel is also constant $m^{\$}_{t+1} = \log(\beta) - \pi^{\star}$, given that inflation is insulated from fiscal disturbances as well in this regime.

2.6.6 *Bond pricing*

The constant nominal pricing kernel implies that a zero shadow nominal term premium. The constant real return to nominal bonds in this regime, shown in equation (18), implies safe riskfree government debt that earns the constant real return

[8] We also get this neutrality result with respect to fiscal shocks for realized utility in the monetary-led regime.

$r_{gt} - \pi_t = i^\star - \pi^\star$. The monetary-led regime protects asset holders' wealth and bond returns from surprise fiscal expansions, creating a safe debt environment.

2.7 *Fiscally-led regime (risky debt)*

The fiscally-led regime relates to the work of Sargent and Wallace (1981), Leeper (1991), Sims (1994), Woodford (1995), Cochrane (1998), and Bassetto (2002). This regime is characterized by a monetary authority passively responding to the inflation gap ($\rho_\pi < 1$) and a non-Ricardian fiscal authority that raises taxes insufficiently to finance higher government spending ($\delta_b/s^\star < 1$). Nominal revaluations of debt are used to achieve fiscal solvency, which helps pin down inflation. The real value of debt is stabilized by the passive stance of monetary policy that prevents explosive interest rate paths.

Ex post real government debt returns respond to fiscal shocks in this regime like Lucas and Stokey (1983), because the inflationary finance of unfunded fiscal expansions devalues nominal bond returns. The LAMP case ($\zeta \neq 1$) allows fiscal risk to be priced, leading to a positive risk premium for debt and a positive shadow nominal term premium, relying on redistribution risk rather than stagflation risk. In contrast, the RA case ($\zeta = 1$) produces a zero risk premium for debt and a negative shadow nominal term premium.

In the LAMP case, the real wealth of asset holders is adversely affected by fiscal expansions, as they bear the entire unfunded costs due to the nominal devaluation of their bond holdings, but only receive a portion of the transfers. This raises the marginal utility of asset holders when real returns to nominal bonds are low, generating a risk premium on bond holdings. The interest rate rule propagates the fiscal inflation response so that the payoffs to long nominal bonds are more adversely affected, making long nominal bonds riskier than short nominal bonds.

In the RA case, the bond holdings of the representative agent are also devalued in fiscal expansions, but they now receive the entire transfer, insulating their wealth. Therefore, the real pricing kernel is independent of fiscal shocks, implying that the real risk premium on nominal debt is zero. Persistent fiscal inflation lowers the nominal stochastic discount factor in this case, making long nominal bonds a better hedge than short nominal bonds, which implies a negative nominal term premium.

2.7.1 Debt solution

We solve for the log real value of debt forward in this regime using the Euler equation for the return on real surplus according to

$$1 = E_t\left[\exp\left(m_{t+1} + r_{st+1}\right)\right], \tag{27}$$

and substituting in the approximated log return on surplus and tax rule to give us

$$1 = \mathbb{E}_t\left[\exp\left(\log(\beta) - \gamma\epsilon_{vt+1} + \kappa_0 + \kappa_1 b_{t+1} + \kappa_2\left(s^\star + \delta_b(b_t - b^\star) - \rho x_t - \sigma\epsilon_{t+1}\right) - b_t\right)\right], \tag{28}$$

where the stability condition for solving debt forward is given by $\delta_b < s^\star$ (active fiscal policy). The solution for the log real value of debt has the form $b_t = A_0 + A_1 x_t$.

We also need to solve for the endogenous wealth innovation in the pricing kernel. The return on wealth for an asset holder is given by $R_{At+1} = V_{At+1}/(V_{At} - C_{At})$. The price of a hypothetical claim delivering an asset holder's future consumption as dividends is the ex-consumption value of wealth ($P_{At} \equiv V_{At} - C_{At}$). We approximate log wealth according to

$$v_{At+1} = \log\left(\exp(p_{At+1}) + C_{At+1}\right) \approx \alpha_{A0} + \alpha_{A1}p_{At+1} + \alpha_{A2}C_{At+1}, \tag{29}$$

where p_{At} is the log price of a claim to future consumption. We then approximate the log return to wealth as

$$r_{At+1} = \alpha_{A0} + \alpha_{A1}p_{At+1} + \alpha_{A2}C_{At+1} - p_{ct}, \tag{30}$$

where the coefficients α_{A0}, α_{A1}, and α_{A2} are approximating constants that depend on the risk-adjusted steady states of debt and the price of consumption. We solve for these steady states using an iterative procedure.

We solve for the log price of consumption using the Euler equation given by

$$1 = \mathbb{E}_t\Big[\exp(m_{t+1} + r_{At+1})\Big], \tag{31}$$

and then plug in our approximated pricing kernel and return approximation

$$0 = \log \mathbb{E}_t\Big[\exp\Big(\log(\beta) - \gamma\Big(v_{At+1} - \mathbb{E}_t[v_{At+1}]\Big) + \alpha_{A0} + \alpha_{A1}p_{At+1} + \alpha_{A2}C_{At+1} - p_{At}\Big)\Big]. \tag{32}$$

We next substitute in the consumption expression from market clearing $C_{At} = \overline{Y} + \frac{1-\zeta}{\zeta}s_t$, the process for government spending, and the tax rule to obtain

$$\begin{aligned} 0 \;=\; & \log \mathbb{E}_t\Big[\exp\Big(\log(\beta) - \gamma\Big(v_{At+1} - \mathbb{E}_t[v_{At+1}]\Big) + \alpha_{A0} + \alpha_{A1}p_{At+1} \\ & + \alpha_{A2}\Big(\overline{Y} + \frac{1-\zeta}{\zeta}\Big(-g^\star - \rho x_t - \sigma\epsilon_{t+1} + \tau^\star + \delta_b b_t - \delta_b b^\star\Big)\Big) - p_{At}\Big)\Big]. \end{aligned} \tag{33}$$

We use the wealth approximation from equation (29) to obtain a log-linear wealth innovation.

Given that the solution for log debt has the form, $b_t = A_0 + A_1 x_t$, the log price of the claim to an asset holder's future consumption is also linear in x_t according to

$$p_{At} = D_{A0} + D_{A1}x_t. \tag{34}$$

The affine solutions for b_t and p_{At} imply that an asset holder's log wealth innovation can be expressed in terms of these coefficients as

$$v_{At+1} - \mathbb{E}_t[v_{At+1}] = \left\{\alpha_{A0}D_{A1} - \alpha_{A2}\left(\frac{1-\zeta}{\zeta}\right)\right\}\sigma\epsilon_{t+1}. \tag{35}$$

We then express the log real pricing kernel in terms of the spending shock as

$$m_{t+1} = \log(\beta) - \gamma\Phi_v\sigma\epsilon_{t+1}, \tag{36}$$

where $\Phi_v \equiv \alpha_{A0}D_{A1} - \alpha_{A2}\left(\frac{1-\zeta}{\zeta}\right)$. After solving for the debt policy in terms of the coefficients D_{A0} and D_{A1}, we will later solve for these coefficients in Section 2.7.4 and show that $D_{A1} < 0$, which implies that $\Phi_v < 0$ so that a surprise fiscal expansion increases the real pricing kernel. We also later show that in the RA case, the pricing kernel is independent of the fiscal shock.

Substitute the solution form for debt and the pricing kernel innovation into equation (28) to solve for the coefficients A_0 and A_1 given by

$$\begin{aligned} 1 \;=\; \mathbb{E}_t\Big[\exp\Big\{ & \log(\beta) - \gamma\Phi_v\sigma\epsilon_{t+1} + \kappa_0 + \kappa_1 A_0 + \kappa_1 A_1 x_{t+1} + \kappa_2 s^\star + \kappa_2\delta_b A_0 + \kappa_2\delta_b A_1 x_t \\ & -\kappa_2\delta_b b^\star - \kappa_2\rho x_t - \kappa_2\sigma\epsilon_{t+1} - A_0 - A_1 x_t \Big\}\Big]. \end{aligned} \tag{37}$$

The solution coefficient governing the impact of spending shocks on the real value of debt is given by

$$A_1 = \frac{\rho}{(\delta_b - s^\star) + (\rho - 1)\exp(b^\star)} < 0. \tag{38}$$

The real value of debt decreases with an increase in government spending ($A_1 < 0$) because of non-Ricardian fiscal policy ($\delta_b - s^\star < 0$), because future taxation does not fund a surprise increase in spending. Instead, higher inflation devalues debt to satisfy the intertemporal government budget equation, which we characterize in the next section with the inflation solution. The devaluation effect is magnified as the fiscal authority responds more to the debt burden (higher δ_b), and if the shock is more persistent (higher ρ).

We use the debt solution to write the return on surplus as

$$r_{st+1} = \bar{r}_s + \Big(\kappa_1 A_1 - \kappa_2\Big)\sigma\epsilon_{t+1}. \tag{39}$$

The loading on the spending innovation is negative since $A_1 < 0$ and $\kappa_1, \kappa_2 > 0$. Additionally, these coefficients do not depend on the fraction of asset holders ζ.[9] Therefore, in the LAMP and RA cases, the real return to debt is risky, as it depends on the fiscal shock. However, we show in Section 2.7.5 that fiscal risk is priced in the

[9]The coefficients only indirectly depend on ζ through the risky steady states because ζ directly impacts the response of the pricing kernel, but this risk adjustment does not affect the sign of the coefficients.

LAMP case but not in the RA case.

2.7.2 *Inflation solution*

Given the debt solution, we then solve for realized inflation using the flow budget identity (equation (12)) written in terms of returns and inflation $\pi_t = r_{gt} - r_{st}$. Given that the government only issues one-period debt, the nominal return is equal to the short rate $r^{\$}_{gt} = i_{t-1}$. Using this and then plugging in the interest rate rule along with the solution for r_{st} into the budget equation yields the inflation policy given by

$$\pi_t = \Gamma_\pi + \rho_\pi \pi_{t-1} - \Big(\kappa_1 A_1 - \kappa_2\Big)\sigma\epsilon_t, \tag{40}$$

where $\Gamma_\pi \equiv i^\star - \rho_\pi \pi^\star - \bar{r}_s$. This recursion allows us to solve inflation backward if monetary policy is passive ($\rho_\pi < 1$).[10] Positive spending shocks are inflated away in this regime since $-(\kappa_1 A_1 - \kappa_2) > 0$, reducing the ex-post real returns to bondholders.

2.7.3 *Consumption solutions*

We next characterize the consumption policies for each agent type. The aggregate resource constraint allows us to write the consumption of an asset holder in terms of surpluses as $C_{At} = \overline{Y} - \frac{1-\zeta}{\zeta}(g_t - \tau_t) = \overline{Y} + \frac{1-\zeta}{\zeta}s_t$. We then plug in the tax rule and spending process to obtain the consumption policy for an asset holder

$$C_{At} = \overline{Y} - \frac{1-\zeta}{\zeta}\Big(g^\star - \tau^\star - \delta_b A_0 + \delta_b b^\star\Big) - \frac{1-\zeta}{\zeta}\Big(\rho - \delta_b A_1\Big)x_{t-1} - \frac{1-\zeta}{\zeta}\sigma\epsilon_t, \tag{41}$$

where $(1-\zeta)/\zeta > 0$ when we have LAMP. In the RA case ($\zeta = 1$), consumption of the representative household equals the constant endowment.

We use the budget constraint of a hand-to-mouth agent to express their consumption in terms of surpluses as $C_{Ht} = \overline{Y} + g_t - \tau_t = \overline{Y} - s_t$. We then substitute the tax rule and the government spending process to obtain the consumption policy for a

[10]The two-sided condition is $-1 < \rho_\pi < 1$.

hand-to-mouth agent

$$C_{Ht} = \overline{Y} + g^{\star} - \tau^{\star} - \delta_b A_0 + \delta_b b^{\star} + (\rho - \delta_b A_1) x_{t-1} + \sigma \epsilon_t. \tag{42}$$

The initial consumption responses go in opposite directions across the two agent types, with consumption innovations being the same as those in the monetary-led regime. However, the expected future consumption response differs significantly between the two regimes as we describe next.

2.7.4 *Fiscal redistribution dynamics*

This section characterizes the consumption redistribution effects of a fiscal shock over different horizons in the fiscally-led regime and contrasts them with the responses from the monetary-led regime outlined in Section 2.6.4. Asset holders' wealth is adversely affected by fiscal expansions in the fiscally-led regime, whereas their wealth was insulated in the monetary-led regime. To characterize the intertemporal redistribution effects (and to pin down the debt and inflation policies), we still need to solve for the undetermined coefficients D_{A0} and D_{A1} of the log price to the future consumption claim introduced in equation (34).

We start with the realized consumption innovations to characterize the contemporaneous redistribution effects from a surprise fiscal expansion ($\epsilon_t > 0$), which initially decreases the consumption of an asset holder

$$C_{At} - \mathbb{E}_{t-1}[C_{At}] = -\left(\frac{1-\zeta}{\zeta}\right) \sigma \epsilon_t < 0, \tag{43}$$

but increases the consumption of a hand-to-mouth agent

$$C_{Ht} - \mathbb{E}_{t-1}[C_{Ht}] = \sigma \epsilon_t > 0. \tag{44}$$

These realized innovations are exactly the same as in the monetary-led regime (equations (23) and (24)), although the underlying mechanics of the redistribution differ. Asset holders' consumption falls because they bear the entire cost of the unfunded portion of the fiscal expansion through the real losses of owning all government bonds (claim on surpluses), but they only receive part of the higher government transfers. In the monetary-led regime, asset holders initially reduced consumption because they had to absorb new debt issuance. Hand-to-mouth agents increase their consumption because they receive higher initial transfers.

Unfunded spending in the fiscally-led regime reduces the future path of consumption for asset holders, reinforcing the initial redistribution of resources away from asset holders to hand-to-mouth agents. The non-Ricardian tax policy does not pay for the surprise fiscal expansion in present value terms, devaluing real bond returns and the real wealth of asset holders. Fiscal expansions effectively redistribute wealth from asset holders to fund a higher current and future consumption path for hand-to-mouth agents.

We illustrate the dynamics of future consumption redistribution by pricing claims to future consumption. We start with an asset holder's future consumption claim by substituting the debt solution into equation (33) to obtain

$$\begin{aligned} 0 \;=\; & \log \mathbb{E}_t\Big[\exp\Big\{\log(\beta) - \gamma\Phi_v\sigma\epsilon_{t+1} + \alpha_{A0} + \alpha_{A1}p_{At+1} \\ & +\alpha_{A2}\Big(\overline{Y} + \frac{1-\zeta}{\zeta}\Big(-g^\star - \rho x_t - \sigma\epsilon_{t+1} + \tau^\star + \delta_b\Big(A_0 + A_1 x_t\Big) - \delta_b b^\star\Big)\Big) - p_{At}\Big\}\Big], \end{aligned} \tag{45}$$

Plugging $p_{At} = D_{A0} + D_{A1}x_t$ into the Euler equation above allows us to solve for the coefficients D_{A0} and D_{A1}. The solution coefficient determining the impact of spending shocks on the present value of an asset holder's future consumption is given by

$$D_{A1} = \frac{\alpha_{A2}\left(\frac{1-\zeta}{\zeta}\right)\left(\rho - \delta_b A_1\right)}{\alpha_{A1}\rho - 1} < 0, \tag{46}$$

since $\alpha_{A2} > 0$, $\alpha_{A1}\rho - 1 < 0$, $\rho - \delta_b A_1 > 0$, and in the LAMP case $1 - \zeta > 0$. Note that in the RA case $\zeta = 1$, the price of the consumption claim is constant because the representative household receives the entire increase in transfers, which offsets their losses in bond wealth.

We can similarly compute the log present value of future consumption for a hand-to-mouth agent, $p_{Ht} = D_{H0} + D_{H1}x_t$, where the solution coefficient on the spending shock is given by

$$D_{H1} = \frac{\alpha_{H2}(\rho - \delta_b A_1)}{1 - \alpha_{H1}\rho} > 0, \tag{47}$$

since $\alpha_{H2} > 0$, $1 - \alpha_{H1}\rho > 0$, and $\rho - \delta_b A_1 > 0$.

Therefore, the present value of future consumption for an asset holder falls in response to a surprise fiscal expansion

$$p_{At} - \mathbb{E}_{t-1}[p_{At}] = D_{A1}\sigma\epsilon_t < 0, \tag{48}$$

while the present value of future consumption for a hand-to-mouth agent increases

$$p_{Ht} - \mathbb{E}_{t-1}[p_{Ht}] = D_{H1}\sigma\epsilon_t > 0. \tag{49}$$

Equations (48) and (49) highlight that the cumulative future consumption redistribution effects go from asset holders to hand-to-mouth agents, reinforcing the realized consumption responses. Asset holders bear the entire current and future costs of the unfunded portion of the fiscal expansion, while receiving only part of the transfer payments. Without sufficient future taxation to pay for the fiscal expansion, debt is devalued to reflect the reduction in fiscal backing. Hand-to-mouth agents benefit from receiving a part of the unfunded current and future transfer payments without bearing the costs.

While the realized consumption innovations are the same between the monetary and regimes (i.e., an initial redistribution from asset holders to hand-to-mouth agents), the responses of the present value of future consumption go in the opposite direction. In the monetary-led regime, the future redistribution effects flow from hand-to-mouth agents to asset holders, so that the fiscal shock is neutral with respect to the present value of current and future consumption. In the fiscally-led regime, the future redistribution effects flow from asset holders to hand-to-mouth agents. The differences in the future consumption responses between the two regimes have important consequences for the pricing kernel dynamics.

2.7.5 *Equilibrium pricing kernel*

Now that we have pinned down the equilibrium dynamics of the asset holder's consumption claim, we also determine the equilibrium real pricing kernel expressed in equation (36). The real pricing kernel increases with a surprise fiscal expansion ($\epsilon_{t+1} > 0$) in the fiscally-led regime for the LAMP case ($\zeta < 1$) according to

$$m_{t+1} - \mathbb{E}_t[m_{t+1}] = -\gamma \Phi_v \sigma \epsilon_{t+1} > 0, \tag{50}$$

where $\Phi_v \equiv \alpha_{A0} D_{A1} - \alpha_{A2} \left(\frac{1-\zeta}{\zeta}\right) < 0$ since $\alpha_{A1}, \alpha_{A2} > 0$ and we showed in equation (46) that $D_{A1} < 0$, so that $\Phi_\nu < 0$. Therefore, assets whose real payoff decreases in surprise fiscal expansions command positive risk premia.

In contrast, in the RA case ($\zeta = 1$) of the fiscally-led regime, we have $\Phi_v = 0$ because the representative agent receives the entire transfers, which offsets the losses in bond wealth to keep wealth insulated from fiscal shocks. Additionally, Section 2.6.5 highlighted that the real pricing kernel is insulated from fiscal shocks in the monetary-led regime for both the LAMP and RA cases. The combination of LAMP and the fiscally led regime is key for making fiscal expansions risky states of the world due to the persistent redistribution effects via bond markets, which shift wealth away from asset holders to fund a higher consumption path for hand-to-mouth agents.

2.7.6 *Bond pricing*

The persistent fiscal redistribution risk across agents in a fiscally-led regime implies that nominal government bonds command a real risk premium. Equation (39) shows that the real return to nominal government bonds declines in response to a surprise fiscal expansion because of inflationary finance in the LAMP and RA cases. Equation (50) demonstrates that a surprise fiscal expansion increases the real pricing kernel in the LAMP case, but the real pricing kernel is constant in the RA case. Consequently, in the LAMP case, government bonds have low real payoffs when asset holders are poorer, making bonds a positive beta asset in real terms.

We compute risk premium on the real return to nominal bonds (equivalent to the return to surplus from the budget identity $r^{\$}_{gt} - \pi_t = r_{st}$) using the Euler equation according to

$$\begin{aligned} \mathbb{E}_t[r_{st+1} - r_t] + \frac{1}{2}\text{Var}_t(r_{st+1}) &= -\text{Cov}_t(m_{t+1}, r_{st+1}), \\ &= \gamma\Phi_v\Big(\kappa_1 A_1 - \kappa_2\Big)\sigma^2 > 0. \end{aligned}$$

We established earlier that $\Phi_v < 0$ in the fiscal LAMP specification and that $\kappa_1 A_1 - \kappa_2 < 0$, which implies that the real risk premium on nominal government bonds is positive, but is zero in the RA case. The real risk premium to bondholders increases with δ_b and ρ, as they amplify the negative return response to spending shocks and the negative consumption response of asset holders. A larger coefficient of risk aversion γ and larger spending innovations σ also increase the risk premium.

Figure 1 compares the impulse responses to a surprise fiscal expansion in the fiscally-led and monetary-led regimes, where we consider both the LAMP and RA cases in each regime. This figure highlights the model's key mechanics, which underline the bond risk premia implications across the different specifications. For the fiscally-led regime, we are considering the fully unfunded specification ($\delta_b = 0$) with exogenous surpluses to contrast with the fully funded spending characterizing the monetary-led regime ($\delta_b > s^\star$).[11]

We observe the dichotomy in how the responses to inflation and debt depend on the policy regime. Future taxation increases in the monetary-led regime are used to pay for fiscal expansion in present-value terms, thereby insulating inflation from fiscal disturbances. Taxes do not rise sufficiently to fund the higher spending in the fiscally-led regime, but instead, inflationary finance is used to ensure fiscal solvency by devaluing debt.

The LAMP case generates an amplification effect on the inflation and real debt value responses relative to the RA case in the fiscally-led regime due to bond risk premia. The intuition for this amplification effect can be gleaned through the intertemporal government budget equation. A mean-reverting spending shock has a shorter duration

[11] The responses for the fiscally-led regime are qualitatively similar to other specifications of the fiscal rule $\delta_b < s^\star$, with the primary difference being that taxes respond to the shock when $\delta_b \neq 0$. We consider the partially funded case in the quantitative model with $\delta_b < 0$.

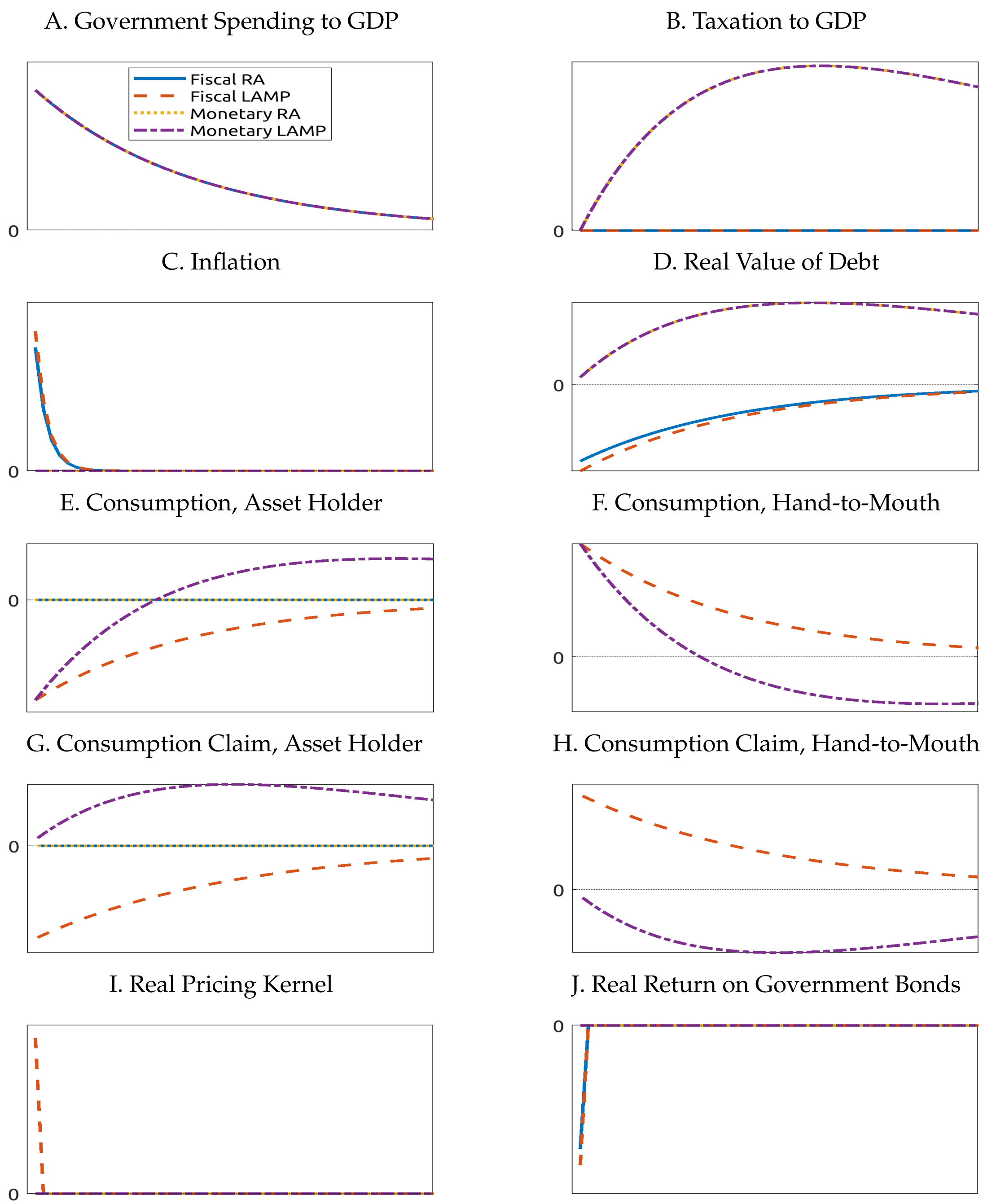

Fig. 1. **Impulse responses to a Government Spending Shock** This figure displays the impulse responses to a positive government spending shock ($\epsilon_t > 0$) in four specifications of the analytical model. The y-axis is the deviation from a risky steady-state, and the x-axis is time periods since the shock. Panels A and B display the impulse responses of government spending and taxation, relative to output. Panels C and D display the impulse responses of inflation and the real value of government debt, both in logs. Panels E and F display the impulse responses of the log-realized consumption of asset holders and hand-to-mouth agents. Panels G and H display the impulse responses of the log present value of future consumption for asset holders and hand-to-mouth agents. Panels I and J display the impulse responses of the real pricing kernel and the real return on government bonds. The calibration used to generate these is illustrative. We set preference and endowment parameters $\beta = 0.97, \gamma = 10, \overline{Y} = 1$ and policy parameters $g^{\star} = 0.2, \tau^{\star} = 0.23, \rho = 0.95, \sigma = 1\%, \zeta = 0.2$. In the fiscal regime, the fiscal and monetary rules use $\delta_b = 0$ and $\rho_\pi = 0.5$, while in the monetary regime they take on values of $\delta_b = 0.05, \rho_\pi = 1.5$.

than the entire future stream of surpluses. When discount rates are higher (e.g., due to higher risk premia), the impact of a shorter duration claim on the present value is magnified.[12] Since the inflation path adjusts to align bond values with the present value in the fiscally-led regime, we get amplification in the inflation response.

The initial consumption responses for each agent type are identical across policy regimes. There is an initial redistribution from asset holders to hand-to-mouth agents. However, the future path deviates as consumption eventually flips sign in the monetary-led regime, but not in the fiscally-led regime. Increases in future taxation that fund fiscal expansions in the monetary-led regime reverse the initial redistribution effects in present value terms, whereas inflationary finance in the fiscally-led regime reinforces the initial redistribution effects. The responses to the present value of future consumption characterize these future redistribution effects. Note that consumption is unaffected by fiscal shocks in the RA case since the representative agent owns all bonds and receives all net transfers.

The real wealth of asset holders is adversely affected by the positive government spending shock in the fiscally-led regime, leading to an increase in the real stochastic discount factor. In contrast, the real stochastic discount factor is neutral to fiscal shocks in the monetary-led regime since the reversal of the redistribution effects offsets for each agent in present value terms.[13] Since the consumption path is unaffected by fiscal shocks in the RA case, the pricing kernel is also constant. Therefore, fiscal risk is priced only in the fiscal LAMP case.

The real returns on nominal bonds decrease due to inflationary finance in the fiscally-led regime, where the larger response in the LAMP case arises from the amplification effects of risk premia. We only obtain a positive bond risk premium in the LAMP case of the fiscally-led regime because the real pricing kernel increases. Bond returns and the real pricing kernel are constant in the monetary-led regime in both the LAMP and RA cases, implying safe debt.

[12] We can see this amplification effect in the debt solution through the dependence of the coefficient A_1 on the debt steady state. First, the magnified response of real debt values to spending shocks requires a larger increase in inflation. Second, the amount of inflation required to offset a given change in current surpluses decreases with the market value of government debt.

[13] Note that the y-scale is different for the realized consumption response and the consumption claim in Figure 1, but these two components offset each other initially in the monetary-led regime.

Nominal term structure We next present the model implications for the shadow nominal term structure of interest rates. The log price of an n-period zero nominal coupon bond

$$p_t^{(n)} = \log \mathbb{E}_t \left[\exp \left(m_{t+1}^{\$} + p_{t+1}^{(n-1)} \right) \right], \tag{51}$$

where $m_{t+1}^{\$} \equiv m_{t+1} - \pi_{t+1}$ is the log nominal pricing kernel. We use the Euler equation for the n-period bond to solve for the bond prices recursively. Substituting in the policy functions for m_{t+1} and π_{t+1} from the fiscal regime, we can express our equilibrium nominal pricing kernel as a single-factor affine model according to

$$-m_{t+1}^{\$} = \theta_m + \rho_\pi \pi_t + \lambda_m \sigma \epsilon_{t+1} \tag{52}$$

where $\theta_m \equiv -\log(\beta) + \Gamma_\pi$, $\lambda_m \equiv \gamma \Phi_v - \kappa_1 A_1 + \kappa_2$ is the market price of risk parameter, and the state variable dynamics are given by the inflation policy function, derived in equation (40), and reproduced below as

$$\pi_t = \Gamma_\pi + \rho_\pi \pi_{t-1} + \eta_\pi \sigma \epsilon_t \tag{53}$$

where $\Gamma_\pi \equiv i^\star - \rho_\pi \pi^\star - \bar{r}_s$ and $\eta_\pi \equiv -(\kappa_1 A_1 - \kappa_2) > 0$.

Using the fact that $p_t^{(0)} = 0$ in the Euler equation, we can solve for the one-period nominal bond price using the Euler equation as

$$\begin{aligned} p_t^{(1)} &= \mathbb{E}_t[m_{t+1}^{\$}] + \frac{1}{2}\text{Var}_t(m_{t+1}^{\$}), \\ &= -\theta_m - \rho_\pi \pi_t + \frac{1}{2}\lambda_m^2 \sigma^2, \end{aligned} \tag{54}$$

implying that the nominal short rate is given by $i_t = y_t^{(1)} = \theta_m + \rho_\pi \pi_t - \frac{1}{2}\lambda_m^2 \sigma^2$.

The solution form for the inverse log bond price is affine in log inflation, according to

$$-p_t^{(n)} = \chi_0^{(n)} + \chi_1^{(n)} \pi_t, \tag{55}$$

and the corresponding n-period log nominal yield is then $y_t^{(n)} = -(1/n)p_t^{(n)}$. Given the earlier calculations, we know that $\chi_0^{(0)} = \chi_1^{(0)} = 0$, $\chi_0^{(1)} = \theta_m - \frac{1}{2}\lambda_m^2\sigma^2$ and $\chi_0^{(1)} = \rho_\pi$.

Plugging the bond price guess into the Euler equation yields the following difference equations for the coefficients $\chi_0^{(n)}$ and $\chi_1^{(n)}$ according to

$$\chi_1^{(n)} = \rho_\pi + \rho_\pi \chi_1^{(n-1)}, \tag{56}$$

$$\chi_0^{(n)} - \chi_0^{(n-1)} = \theta_m + \chi_1^{(n-1)}\Gamma_\pi - \frac{1}{2}\left(\lambda_m + \chi_1^{(n-1)}\eta_\pi\right)^2 \sigma^2. \tag{57}$$

Using the initial conditions $\chi_0^{(0)} = \chi_1^{(n)} = 0$, we solve for the coefficient $\chi_1^{(n)}$ according to

$$\chi_1^{(n)} = \rho_\pi \left(\frac{1-\rho_\pi^n}{1-\rho_\pi}\right) > 0, \tag{58}$$

which is positive when fiscal inflation exhibits dynamics (i.e., when $\rho_\pi > 0$). In the fiscally-led regime, monetary policy is passive ($\rho_\pi < 1$), implying that the bond price sensitivity to fiscal inflation $\chi_1^{(n)}$ increases with maturity and converges to the limit

$$\chi_1^{(\infty)} = \frac{\rho_\pi}{1-\rho_\pi}. \tag{59}$$

Given the solution for $\chi_1^{(n)}$ and the initial condition ($\chi_0^{(0)} = 0$), we can solve for $\chi_0^{(n)}$ recursively according to

$$\chi_0^{(n)} = \chi_0^{(n-1)} + \theta_m + \chi_1^{(n-1)}\Gamma_\pi - \frac{1}{2}\left(\lambda_m + \chi_1^{(n-1)}\eta_\pi\right)^2 \sigma^2. \tag{60}$$

We can compute the nominal bond risk premium at maturity n using the Euler equation according to

$$\begin{aligned} \mathbb{E}_t[r_{t+1}^{(n)}] - i_t + \frac{1}{2}\text{Var}_t(r_{t+1}^{(n)}) &= -\text{Cov}_t(m_{t+1}^{\$}, r_{t+1}^{(n)}), \\ &= -\chi_1^{(n-1)}\eta_\pi\lambda_m\sigma^2, \end{aligned} \tag{61}$$

which is positive when $\lambda_m < 0$ given that $\eta_\pi, \chi_1^{(n-1)} > 0$. The endogenous market price of risk parameter λ_m is negative when $-\gamma\Phi_v > \eta_\pi$, implying that the elasticity of the fiscal shock on the real pricing kernel is larger than that of inflation, which is satisfied with calibrations featuring realistic inflation dynamics and risk premia.

The nominal term premium is increasing with maturity n when $\lambda_m < 0$, as $\chi_1^{(n-1)}$ is increasing with n and bounded above by the limit value $-\chi_1^{(\infty)}\eta_\pi\lambda_m\sigma^2$. The persistent fiscal redistribution risk drives our nominal term premium, rather than stagflation risk, as aggregate consumption equals the constant endowment. In the RA case, $\lambda_m > 0$ so that the nominal term premium is negative as the nominal pricing kernel is driven only by inflation. Finally, recall from that in the monetary-led regime, the nominal term premium is zero in both the LAMP and RA cases with respect to fiscal risk.

3 Quantitative Evaluation

This section integrates the insights from the analytical endowment economy framework into a small-scale New Keynesian model (e.g., Woodford (2015) and Galí (2015)). We utilize a calibrated version of this model to quantify the importance of the fiscal redistribution risk mechanism arising from a fiscally-led regime and LAMP for bond markets and the macroeconomy. Our mechanism can generate realistic bond risk premia with standard macroeconomic shocks and moderate risk aversion.

Our baseline model focuses on a fiscally-led policy regime like in Section 2.7, but with partially funded government spending achieved through the parametrization of the fiscal rule. We calibrate the model to match the fraction of government spending volatility accounted for by unfunded obligations, thereby disciplining the extent to which inflationary finance is used.

We demonstrate that the baseline model generates a sizable bond risk premium on public debt and a significant average slope of the nominal yield curve, while being consistent with key macroeconomic fluctuations. Extending the baseline model to account for stochastic volatility in government spending enables the model to fit the remaining quarter of the nominal yield spread and generate time-varying bond risk premia.

We decompose the five-year nominal yield spread into the contributions from each of the structural shocks to highlight that unfunded fiscal shocks account for the majority of the nominal term premium in our framework. Overall, we find that the persistent fiscal redistribution risk mechanism highlighted in Section 2.7 can be a significant source of bond risk premia, even when inflationary finance is partially used to cover the observed dynamics of unfunded government spending.

3.1 *Model outline*

We highlight the key departures from the analytical model in what follows and defer the details of the quantitative model to Appendix B.

Preferences The asset holders have EZ preferences, but we now allow for a finite intertemporal elasticity of substitution (IES). The finite IES generates a real rate channel absent in our analytical framework. A fraction ζ are asset holders. The utility kernel for asset holders and hand-to-mouth agents ($j = \{A, H\}$) is modified to include a preference for leisure according to

$$U_{jt} = \left\{(1-\beta)\varrho_t u\left(C_{jt}, L_{jt}\right) + \beta\left(\mathbb{E}_t\left[U_{jt+1}^{1-\gamma}\right]\right)^{\frac{1}{\theta}}\right\}^{\frac{\theta}{1-\gamma}}, \tag{62}$$

$$u\left(C_{jt}, L_{jt}\right) = \frac{C_{jt}^{1-1/\psi}}{1-1/\psi} + \chi_0 \frac{\left(\bar{L}-L_{jt}\right)^{1-\chi}}{1-\chi}, \tag{63}$$

where ρ_t is a preference shock (defined below), L_{jt} is labor hours worked, χ captures the Frisch elasticity of labor, $\chi_0 > 0$ is a scaling parameter, and $\bar{L}$ is the total time endowment.

Production technology A constant elasticity of substitution (CES) aggregator packages differentiated intermediate goods X_{it} to form the final consumption good $Y_t = (\int_0^1 X_{it}^{(\nu-1)/\nu} di)^{\nu/(\nu-1)}$, where ν is the elasticity of substitution between goods. Intermediate firms have access to linear production technology, $X_{it} = A_t L_{it}$, where A_t is an aggregate technology shock, and L_{it} is the labor input.

Sticky prices The intermediate firms set nominal prices for goods, subject to Rotemberg quadratic price adjustment costs, $\frac{\phi_R}{2}(P_{it}/(\Pi^\star P_{it-1}) - 1)^2 Y_t$, where $\Pi^\star \geq 1$ is the gross risk-adjusted target inflation rate and ϕ_R dictates the magnitude of the costs.

Structural shocks The quantitative model features a government spending shock g_t as in the analytical model, plus two standard shocks: a monetary policy shock to the interest rate rule $\epsilon_{it} = \varphi_i \epsilon_{it-1} + \sigma_i e_{it}$, stationary productivity shock, $a_t = \rho_a a_{t-1} + \sigma_a \varepsilon_{at}$, and preference shock $\log(\varrho_{t+1}/\varrho_t) \equiv x_{\varrho,t} = \rho_\varrho x_{\varrho,t-1} + \sigma_\varrho \varepsilon_{\varrho,t}$, following Albuquerque, Eichenbaum, Luo, and Rebelo (2016). The innovations are standard normal variables that are independent and identically distributed (i.i.d.) and uncorrelated with each other.

Geometric debt We assume that the government issues nominal consol bonds whose coupons decay at a rate of δ. The government budget equation is given by $(1 + \delta Q_t)B_{t-1} = P_t S_t + Q_t B_t$, where B_t is the total nominal face value outstanding at time t.

Policy specification The monetary authority follows a log interest rate rule $i_t = i^\star + \rho_\pi(\pi_t - \pi^\star) + \epsilon_{it}$. The fiscal authority follows the tax rule $\widehat{\tau}_t = \tau^\star + \delta_b(\widehat{b}_t - b^\star)$, where $\widehat{\tau}_t$ and $\widehat{b}_t$ are tax revenues and debt scaled by GDP. The government process is given by $\widehat{g}_t = (1 - \rho_g)g^\star + \rho_g \widehat{g}_{t-1} + \sigma_g \epsilon_{gt}$, where $\widehat{g}_t$ is government spending to GDP. We consider a fiscally-led policy regime with $\delta_b < 0$, implying partially funded debt. A spending shock reduces the real value of debt in a fiscally-led regime, implying higher future taxes that partially fund the spending when the coefficient is negative in the tax rule.

Solution method We solve the quantitative model as an affine approximation around a risky steady state that incorporates endogenous risk premia, similar to the analytical model. We employ an iterative procedure as follows. We start by guessing that the vector of risk premiums is zero, solve for equilibrium dynamics, calculate the implied level of risk premia, and then update our guess until the vector of risk premia is consistent with the equilibrium dynamics of the pricing kernel and other endogenous variables.

3.2 *Calibration*

The model is calibrated at a quarterly frequency. The subjective discount factor parameter (β) is set to 0.993 to be consistent with the level of the short rate. The risk aversion parameter (γ) is set to 10 and the intertemporal elasticity of substitution (ψ) is calibrated to 2 as in Kung (2015). We set the share of asset holders in the economy (ζ) to 20% to match the average fraction of households that directly participate in capital markets.

The curvature parameter of leisure (χ) and the level shifter (χ_0) take on values of 0.1 and 0.45 to generate an aggregate Frisch elasticity of 0.35. The volatility of the preference shock (σ_ϱ) is calibrated to 2.575 basis points while its persistence (ρ_ϱ) is set to 0.95, following Corhay et al. (2023).

We set the price elasticity of demand (ν) to 4, which generates a steady-state markup of 33%, in line with estimates from De Loecker, Eeckhout, and Unger (2020). The price adjustment cost parameter (ϕ_R) is calibrated to a value of 6, which is similar to that in Kung (2015). The parameters governing the dynamics of the stationary productivity shock (ρ_a and σ_a) take on values of 0.9 and 0.5% quarterly, to match the annual persistence of cyclical variation in utilization-adjusted tfp and its volatility.[14]

The inflation coefficient (ρ_π) is set to 0.95. The risk-adjusted inflation target ($\pi^\star$) is set to 2.9% annualized. The volatility of the monetary policy shock (σ_i) is set to 5 basis points quarterly matching the orthogonalized shock series in Bauer and Swanson (2023), while its persistence (φ_i) takes a value of 0.25, reflecting the quick reversion of these shocks documented in Bauer and Swanson (2023).

The debt coefficient (δ_b) is calibrated to -0.004 to match the 3/4 fraction of government spending volatility accounted for by unfunded spending.[15] We explain the total government spending volatility and persistence by setting σ_g and ρ_g to values of 0.9% and 0.95. The risk-adjusted surplus target ($\tau^\star - g^\star$) is set so the model generates a

[14]The annual persistence and volatility of one-side HP-filtered utilization-adjusted TFP from Fernald (2014) are approximately 0.7 and 1% annually, which correspond to the quarterly values of our calibration.

[15]We construct our series of unfunded government spending as in Gomez Cram et al. (2023), where we take expenditures exempted from budget rules, such as emergency spending, supplemental appropriations, and PAYGO waivers.

Table 1. Summary Statistics

	Model	Data
Panel A: First Moments		
E(5y-1q yield spread)	87 bps	98 bps
E(Inflation)	2.9%	2.9%
Panel B: Second Moments		
σ(Unfunded)/σ(total)	74%	79%
σ(Nominal short rate)	3.7%	3.1%
σ(Inflation)	3.9%	3.6%
σ(Δ Consumption)	1.1%	2.2%
σ(Δ Surplus to GDP)	1.0%	3.2%

Notes: This table compares key summary statistics from the baseline model with the data. Panel A presents the mean values of the 5y-1q nominal yield spread. Panel B reports the ratio of unfunded spending volatility to total government spending volatility, together with the standard deviations of inflation, per capita consumption growth (nondurables and services, from NIPA Tables), and changes in the government surplus-to-GDP ratio (from FRED). The sample period for the yield spread spans 1961–2024; for the ratio of unfunded to total government spending volatility, 1997–2025; and for the macroeconomic variables (inflation, consumption growth, and the surplus-to-GDP ratio) 1929–2024. Sample periods correspond to the longest available data for each series. All statistics are expressed in annualized percentage points.

debt-to-GDP of approximately 100%, in line with current U.S. debt levels. The parameter governing the duration of government debt (δ) is set to 0.975 generate a duration of the public debt portfolio of 7 years.

3.3 *Results*

Table 1 presents key summary statistics generated from the baseline model. Panel A shows that our baseline model generates a sizable average nominal yield spread of 87 bps, which is close to the empirical estimate of 98 bps. The first column of Table 2, labeled as 'Base', provides a decomposition of the shock contribution to the yield spread. The fiscal shock accounts for over 50% of the average yield spread in the baseline model, and preference shocks account for most of the remaining spread, while TFP and monetary policy shocks have smaller contributions.[16]

The bond pricing moments illustrate how the unfunded portion of the government spending shock has powerful redistributive effects described in Section 2.7. The

[16]Incorporating habit formation in preferences (e.g., Pflueger and Rinaldi (2022)) can increase the role of monetary policy shocks and adding the endogenous growth margin can magnify the impact of stationary TFP shocks (e.g., Kung (2015)) for bond risk premia.

combination of a fiscally-led regime and LAMP generates a positive risk premium on government debt. The fiscally-led regime uses inflationary finance to cover unfunded spending, which lowers real returns on nominal government bonds. LAMP and the fiscally-led regime make fiscal expansions redistribute wealth away from asset holders to fund higher current and future transfers to hand-to-mouth agents. The drop in asset holders' wealth increases the real pricing kernel with EZ preferences.

Panel B of Table 1 displays the second moments. The tax rule was parameterized to match the fraction of government spending volatility attributed to unfunded spending. The standard deviation of the short rate is in the ballpark of the data counterpart. Importantly, the model can generate realistic bond risk premia with moderate risk aversion and without generating excessively volatile inflation, output growth, or surplus growth.

Table 2. Term Spread Decomposition

	Base LAMP	Base-S LAMP	Fisc RA	Mon LAMP	Mon RA	Fisc-U LAMP	Fisc-U RA	Hybrid LAMP
Total (bps)	**87**	**126**	**39**	**21**	**18**	**91**	**40**	**95**
Contribution (bps):								
Preference	39	40	38	18	17	40	38	40
Monetary Policy	0	0	0	0	0	0	0	0
TFP	2	2	1	1	1	2	1	2
Fiscal (total)	45	84	-0	1	0	49	-0	52
Unfunded								51
Funded								1

Notes: This table reports the average 5Y–1Q nominal term spread for various specifications of the quantitative model, along with the contribution of each shock. 'Base LAMP' corresponds to the baseline model, 'Base-S LAMP' refers to the extension of the baseline with stochastic volatility in government spending, 'Fisc RA' denotes the RA version of the baseline, 'Mon' corresponds to the monetary-led analogue of the baseline, 'Mon RA' refers to the RA version of the monetary-led case, 'Fisc-U' denotes the fully unfunded analogue of the baseline, 'Fisc-U RA' corresponds to the RA version of the fully unfunded case, 'Hybrid' is the extension of the baseline with elements of both monetary and fiscal regimes.

3.3.1 *Extensions and other specifications*

We next explore extensions and other parameterizations of the baseline model as a way to emphasize the importance of unfunded spending shocks for the nominal term premium. Table 2 reports the implications for the nominal spread in each of these cases. The first column, 'Base LAMP', refers to the baseline model described previously. We describe the remaining seven cases in what follows.

The second column of Table 2, labeled as 'Base-S' is the model extension with stochastic volatility in government spending, $\widehat{g}_t = (1-\rho_g)g^\star + \rho_g \widehat{g}_{t-1} + \sigma_{gt-1}\epsilon_{gt}$, where $\sigma_{gt} = (1-\nu_g)\sigma_g + \nu_g \sigma_{gt-1} + \xi_g(\widehat{g}_t - g^\star)$, and the parameter ξ_g governs the covariance between the level and second moment. We calibrate the volatility process to match the quarterly elasticity between the volatility of government spending and its level ($\xi_g = 0.02$) and set the persistence to $\nu_g = 0.875$ quarterly.[17] The strong positive comovement between the level and volatility of government spending — in conjunction with volatility risk being priced with EZ preferences (e.g., Bansal and Yaron (2004)) — amplifies the fiscal risk effects on bond risk premia, raising the contribution from 45 to 84 basis points. This extension also implies that deficit shocks increase nominal term premia, consistent with evidence from Gomez Cram et al. (2023).

Columns three through five emphasize how the combination of the fiscally-led regime and LAMP makes government spending shocks a quantitatively important source of bond risk premia, as without both elements the term spread is negligible, echoing the results from the analytical model. Column three ('Fisc RA') corresponds to the RA case ($\zeta = 1$) of our baseline model with partially funded spending. Column four ('Mon LAMP') refers to the monetary-led specification of the baseline, where we set $\rho_\pi = 1.5$ and $\delta_b = 0.05$. Column five ('Mon RA') is the RA case of the monetary-led specification. We showed in the analytical model that the Ricardian tax policy in the monetary-led regime insulates bond returns and wealth from fiscal shocks. In the quantitative model, fiscal shocks in the monetary LAMP case now have a small effect on the term premium because contemporaneous consumption redistribution impacts

[17] This calibration implies that a 1 ppt increase in government spending to GDP raises the quarterly standard deviation of government spending by 2 bps upon impact, with the effect having a half-life of around 5 quarters.

the real pricing kernel with finite IES, but this effect is not quantitatively significant.

Column six ('Fisc-U LAMP') corresponds to the fully unfunded version ($\delta_b = 0$ and spending/taxation rules that do not respond to gdp) of the baseline model with a fiscally-led regime and LAMP. Without any tax offsets, the entire cost of the fiscal shock is now passed through to asset holders, amplifying the redistribution effects on asset holders' real wealth and bond returns through a larger inflation response. The risk premia amplification is exhibited in a term spread that is 10% greater than the baseline. Column seven ('Fisc-U RA') is the RA version of the unfunded case, which still leads to negligible term premia.

The last column ('Hybrid LAMP') considers an alternative hybrid policy specification, following Bianchi et al. (2023a), that allows monetary-led and fiscally-led dynamics to coexist and separates funded from unfunded shocks. We employ this alternative specification to demonstrate the robustness of our fiscal redistribution mechanism with partially funded spending within a more flexible and alternative policy framework. The log interest rate rule is given by $i_t = i^\star + \rho^M(\pi_t - \pi_t^F) + \rho^F(\pi_t^F - \pi^\star) + \epsilon_{it}$. The tax rule follows $\tau_t = \tau^\star + \delta^M(b_t - b_t^F) + \delta^F(b_t^F - b^\star)$. Government spending scaled by GDP is given by $g_t = g^\star + \nu_t^M + \nu_t^F$, where $\nu_t^M = \varphi^M \nu_{t-1}^M + \sigma^M \epsilon_t^M$ is the funded shock and $\nu_t^F = \varphi^F \nu_{t-1}^F + \sigma^F \epsilon_t^F$ is the unfunded shock, where $\epsilon_t^M \perp \epsilon_t^F$.

We parameterize the M policy coefficients to the monetary-led case ($\rho^M = 1.5$, $\delta^M = 0.05$) and the F policy coefficients to the unfunded fiscally-led version ($\rho^F = 0.8$, $\delta^F = 0$). The remaining policy parameters are identical to those of the baseline. The parameters governing the size of the funded and unfunded shocks (σ^M and σ^F) are calibrated to match the unfunded share and total government spending volatility. Inflationary finance covers the unfunded spending shock, while future taxation pays for the funded shock.

We find that the 'Hybrid LAMP' specification produces an average nominal term spread of 95 bps, with more than half of the spread resulting from unfunded fiscal shocks through fiscal redistribution. This model is also consistent with empirical evidence from Gomez Cram et al. (2023), which documents that the negative Treasury return response to unfunded deficit shocks extracted from individual legislative proposals is three times larger than that for funded deficit shocks.

Each of our partially funded government spending specifications in Table 2 highlights that a policy of using inflationary finance — whether in a hybrid or fiscally-led policy framework — to cover the unfunded portion of government spending results in a significant bond risk premium. In short, the fiscal redistribution risk from unfunded fiscal surprises is a quantitatively important contributor to the government's cost of capital.

4 Conclusion

This paper demonstrates how the risk of unfunded fiscal spending is a significant source of bond risk premia through fiscal redistribution. A policy requiring partial inflationary finance implies that the unfunded portion of fiscal expansions subsidizes higher current and future transfers to hand-to-mouth households at the expense of lowering asset holders' real wealth today, leading to an increase in the real pricing kernel. Moreover, unfunded spending also devalues real returns on nominal bonds in these high pricing kernel states, leading to a positive bond risk premium.

We illustrate this fiscal redistribution risk mechanism in an endowment economy using approximate analytical solutions. The combination of a fiscally-led policy regime and LAMP exposes asset holders' wealth and bond returns to the risk of unfunded fiscal expansions through inflationary finance while protecting hand-to-mouth agents. In the RA analogue, the bond return losses are offset by the agent receiving the entire transfers. In a monetary-led regime, bond returns are insulated from fiscal expansions because they are funded by future taxation.

We extend the endowment economy model to a TANK framework to quantify the fiscal redistribution risk mechanism. We discipline the extent to which inflationary finance is used in fiscal expansions by calibrating the model to explain the unfunded share of total government spending volatility. The fiscal redistribution mechanism enables the calibrated model to generate sizable bond risk premia with moderate risk aversion. In short, we demonstrate that redistribution from bondholders to taxpayers in unfunded fiscal expansions raises the government's funding costs through a bond risk premium channel.

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Online Appendix

Fiscal Redistribution Risk in Treasury Markets

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Appendix Table of Contents

Appendix A Analytical Framework – Finite IES

We focus on the limiting case with infinite IES ($\psi \to \infty$) in the analytical framework, for tractability and intuition. This section illustrates that our key results carry through to the finite IES case. Figure A.1 displays the impulse responses to a fiscal shock with $\psi = 2$, which is the same value used in our quantitative model. The responses are similar to the infinite IES case plotted in Figure 1.

The main difference in the finite IES case is that the government spending shock has a small impact on the real pricing kernel in the monetary LAMP case because the contemporaneous consumption redistribution in this specification affects the pricing kernel through the realized consumption growth term of the pricing kernel (which is not present in the infinite IES case). Asset holder's consumption declines in response to a surprise fiscal expansion, thereby increasing the real pricing kernel. This leads to a small bond risk premium in the monetary LAMP case, which also affects the real debt dynamics.

When $\psi > 1$ and $\gamma > 1$, the realized consumption redistribution effects reinforce the wealth redistribution effects on the real pricing kernel in the fiscal LAMP case. Importantly, the wealth redistribution effects on the pricing kernel highlighted in Section 2 are considerably larger than those of contemporaneous consumption redistribution in most parameterizations, including the parameterization featured in our quantitative model with $\psi = 2$ and $\gamma = 10$. Consequently, we view our infinite IES specification as a tractable case that isolates the key redistributive effect (i.e., wealth redistribution) that is quantitatively relevant for asset prices and bond risk premia.

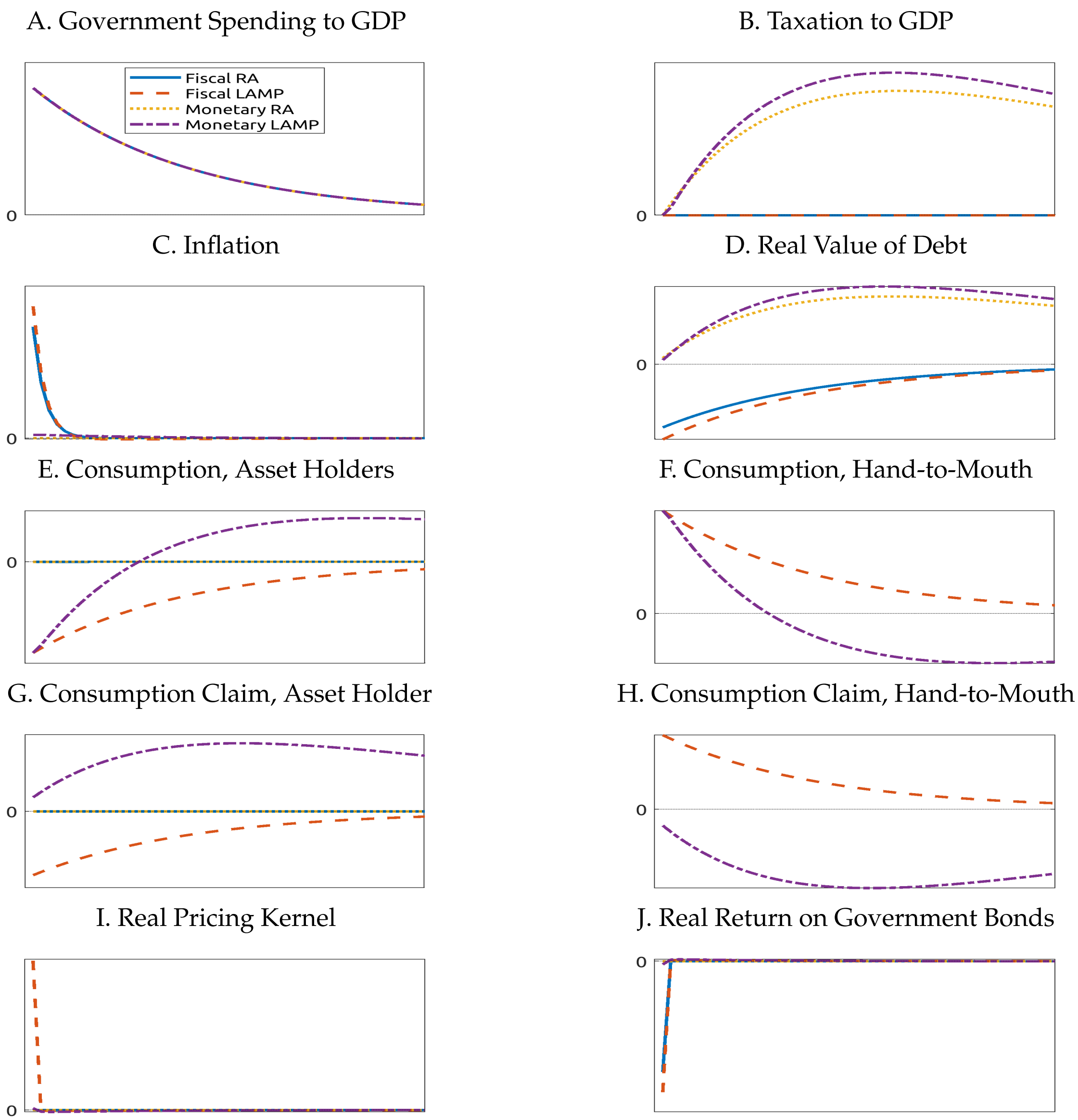

Fig. A.1. This figure displays the impulse responses to a positive government spending shock ($\epsilon_t > 0$) for the analytical model with IES of 2. Note that the responses are very similar to the infinite IES case plotted in Figure 1. The main difference here is that there are small movements in the real pricing kernel for the RA cases. We use the same parameter values to generate these IRFs as detailed in Figure 1 with the exception of the IES.

Appendix B Quantitative Model – System of Equations

- Agent's lifetime utility:

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

for $j = A, H$ where $u\left(C_{jt}, L_{jt}\right) = \frac{C_{jt}^{1-1/\psi}}{1-1/\psi} + \chi_0 \frac{\left(\bar{L}-L_{jt}\right)^{1-\chi}}{1-\chi}$.

- Preference shock:

$$x_{\varrho,t} = \rho_\varrho x_{\varrho,t-1} + \sigma_\varrho \varepsilon_{\varrho,t}$$

where $x_{\varrho,t} \equiv \log(\varrho_{t+1}/\varrho_t)$.

- Asset holder's intratemporal condition (labor supply):

$$\widetilde{W}_t = -\frac{u_{Lt}^A}{u_{Ct}^A}$$

where $u_{Ct}^A = C_{At}^{-1/\psi}$ and $u_{Lt}^A = -\chi_0(\bar{L} - L_{At})^{-\chi}$.

- Asset holder's nominal government bond Euler equation:

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

where $u_{Ct}^A = C_{At}^{-1/\psi}$.

- Real pricing kernel:

$$M_{t+1} = \beta \frac{\varrho_{t+1}}{\varrho_t} \frac{u_{Ct+1}^A}{u_{Ct}^A} \left(\frac{U_{At+1}}{\left(\mathbb{E}_t[U_{At+1}^{1-\gamma}]\right)^{\frac{1}{1-\gamma}}}\right)^{\frac{1}{\psi}-\gamma}$$

- Asset holder's budget constraint:

$$C_{At} = D_{At} + \widetilde{W}_t L_{At} + \frac{R_{gt}}{\Pi_t} Q_{t-1} \widetilde{B}_{At-1} - Q_t \widetilde{B}_{At} + T_{At}$$

- Hand-to-mouth agent's intratemporal condition:

$$C_{Ht}^{-1/\psi}\widetilde{W}_t = \chi_0\left(\bar{L} - L_{Ht}\right)^{-\chi}$$

- Hand-to-mouth agent's budget constraint:

$$C_{Ht} = \widetilde{W}_t L_{Ht} + T_{Ht}$$

- Aggregate production:

$$Y_t = X_t = A_t L_t$$

- Productivity:

$$a_t = \rho_a a_{t-1} + \sigma_a \varepsilon_{at}$$

  where $a_t = \log(A_t)$.

- Aggregate firm payouts:

$$D_t = Y_t - \widetilde{W}_t L_t - \frac{\phi_R}{2}\left(\frac{\Pi_t}{\Pi^\star} - 1\right)^2 Y_t$$

- New Keynesian Phillips curve:

$$0 \quad = \quad (1-\nu) + \nu\frac{\widetilde{W}_t}{Z_t} - \phi_R\left(\frac{\Pi_t}{\Pi^\star} - 1\right)\frac{\Pi_t}{\Pi^\star} + \mathbb{E}_t\left[M_{t+1}\phi_R\left(\frac{\Pi_{t+1}}{\Pi^\star} - 1\right)\frac{\Pi_{t+1}Y_{t+1}/Y_t}{\Pi^\star}\right]$$

- Asset Holder's Euler equation for shadow one-period nominal bonds:

$$1 = \mathbb{E}_t\left[\exp(m_{t+1} - \pi_{t+1} + i_t)\right]$$

  where $m_{t+1} \equiv \log(M_{t+1})$, $\pi_{t+1} \equiv \log(\Pi_{t+1})$, and i_t is the log nominal short rate set by the central bank.

- Log interest rate rule:

$$i_t = i^\star + \rho_\pi\left(\pi_t - \pi^\star\right) + \epsilon_{it}$$

- Monetary policy shock:

$$\epsilon_{it} = \varphi_i \epsilon_{it-1} + \sigma_i e_{it}$$

- Return to real surpluses:

$$R_{st} = \frac{\widetilde{\mathcal{B}}_t + s_t}{\widetilde{\mathcal{B}}_{t-1}}$$

where $s_t = \tau_t - g_t$ and $\widetilde{\mathcal{B}} \equiv Q_t B_t / P_t$ is the real value of public debt.

- Nominal return on government bonds:

$$R_{gt} = \frac{1 + \delta Q_t}{Q_{t-1}}$$

- Government budget equation:

$$\frac{R_{gt}}{\Pi_t} = R_{st}$$

- Government spending shock:

$$\widehat{g}_t = (1 - \rho_g) g^\star + \rho_g \widehat{g}_{t-1} + \sigma_g \epsilon_{gt}$$

- Tax rule:

$$\widehat{\tau}_t = \tau^\star + \delta_b (\widehat{b}_t - b_t^\star)$$

where b_t is the log real value of debt.

- Labor market clearing:

$$L_t = L_{At} + L_{Ht}$$

- Bond market clearing:

$$\zeta Q_t \widetilde{B}_{At} = \widetilde{\mathcal{B}}_t$$

- Equity market clearing:

$$D_t = \zeta D_{At}$$

- Transfers to asset holders:

$$\frac{T_{At}}{Y_t} = \frac{g_t \eta_g \zeta^G}{\zeta} - \frac{\tau_t \zeta^T}{\zeta}$$

- Transfers to hand-to-mouth agents:

$$\frac{T_{ht}}{Y_t} = \frac{g_t \eta_g (1-\zeta^G)}{1-\zeta} - \frac{\tau_t (1-\zeta^T)}{1-\zeta}$$

- Final goods clearing:

$$Y_t = C_t + \frac{\phi_R}{2}\left(\frac{\Pi_t}{\Pi^\star} - 1\right)^2 Y_t + Y_t g_t (1-\eta_g)$$