Fiscal Dominance Risk According to HANK*

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Abstract

This paper studies the positive and normative implications of fiscal dominance risk—the anticipated possibility of a transition to a fiscal-dominant regime—within a heterogeneous-agent framework. I develop a HANK model featuring stochastic transitions to fiscal dominance and compare its dynamics with those of a representative-agent benchmark following a deficit-financed lump-sum transfer. In both models, fiscal dominance risk raises inflation persistently through an expectation channel. In HANK, it also distinctively increases the natural rate of interest, with important implications for output dynamics. For optimal policy, accommodating part of the fiscal deficit by reducing the nominal rate is the dominant prescription regardless of household heterogeneity, though the long-run implications for the optimal real rate differs across HANK and RANK.

Keywords: Monetary-Fiscal Coordination, Regime Uncertainty, HANK

JEL Classification Numbers: E31, E61, E63

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1 Introduction

The U.S. government's fiscal response to the COVID-19 pandemic and the Great Recession has left a deep and persistent imprint on its fiscal position. Between 2005 and 2025, federal debt held by the public rose from approximately 35% to nearly 100% of GDP. Looking ahead, the Congressional Budget Office projects the debt-to-GDP ratio will reach 156% by 2055, driven by growing interest outlays and persistent primary deficits (CBO, 2025). This deteriorating fiscal trajectory, combined with heightened political pressure on the Federal Reserve, has renewed concerns about fiscal dominance—the situation in which monetary policy is constrained by fiscal considerations. These concerns have been voiced prominently by policymakers, including former Treasury Secretary and Fed Chair Janet Yellen, who remarked at the AEA annual meeting:

> Should we be concerned about the potential for fiscal dominance? In my opinion, the answer is "yes."
>
> — Janet Yellen (2026)

This paper studies the positive and normative implications of fiscal dominance *risk*—the anticipated possibility that fiscal dominance will materialize—within a Heterogeneous Agent New Keynesian (HANK) framework. I develop a HANK model with stochastic regime transitions and compare its dynamics against a representative-agent (RANK) benchmark following a deficit-financed fiscal transfer. In both HANK and RANK, the expectation of future fiscal dominance raises current inflation and triggers monetary tightening, which in turn increases the debt service costs and exacerbates inflation expectation.[1] The key difference is that in HANK, the resulted persistently high level of government debt also raises the natural rate of interest endogenously, with important consequences for output dynamics. I analytically characterize this natural rate channel in a simplified environment and examine its quantitative importance in the calibrated HANK model. On the normative side, I show that optimal monetary policy under fiscal dominance risk accommodates fiscal deficits by reducing the nominal rate, largely regardless of household heterogeneity, though the long-run path of the real rate differs across models.

Addressing the role of household heterogeneity in the presence of fiscal dominance risk is important for two reasons. First, recent advances in the HANK literature show that monetary-fiscal interactions differ fundamentally from those in RANK. Equilibrium selection under an active-fiscal, passive-monetary policy regime is not required (Angeletos et al., 2024b; Kaplan, 2025c), and the Taylor principle is neither necessary nor sufficient for local determinacy (Rachel and Ravn, 2025; Auclert et al., 2025a).[2] These results suggest that insights derived from representative-agent

[1] Bigio et al. (2025) call this phenomenon "sticky inflation" and study its positive and normative implications in a RANK framework, following a long literature on monetary-fiscal regime uncertainty in New Keynesian models (e.g. Davig and Leeper 2007; Bianchi and Ilut 2017; Bianchi and Melosi 2019, among many others.) To my best knowledge, this is the first paper extending these analyses to a HANK framework.

[2] For a comprehensive overview, see Kaplan (2025a).

frameworks may not generalize to heterogeneous-agent economies with incomplete markets and non-Ricardian households. Second, HANK models have become the dominant tool for evaluating fiscal stabilization policies—precisely the policies that have contributed to rising public debt in the United States and other advanced economies. Incorporating fiscal dominance risk into HANK therefore provides a coherent framework for jointly assessing the effectiveness of deficit-financed fiscal policies and the appropriate monetary policy response when fiscal sustainability is uncertain—arguably the world we are heading to.

To this end, I extend an otherwise standard HANK model by incorporating stochastic regime transitions à la Bigio et al. (2025). The economy starts in a monetary-led regime, in which the Taylor principle is satisfied and all government debt is backed by future surpluses, and faces a constant per-period risk of transitioning to a fiscal-dominant regime, in which government debt is unfunded and the central bank holds the nominal interest rate constant. I assume the economy reverts to the monetary-led regime only once government debt has been fully stabilized—a structure that allows the model to be solved using sequence-space methods (Auclert et al., 2021; Lin and Peruffo, 2024). As a technical contribution, I show how to represent the linearized equilibrium system of the regime-switching model using only conventional sequence-space Jacobians from the regime-certain counterpart. The technique extends naturally to any model with a similar stochastic structure, such as models with rare disaster risk (Barro, 2009; Caramp and Silva, 2025).

Because the full HANK model requires a numerical solution, I begin by studying the corresponding RANK model to develop analytical intuition for the expectation channel through which fiscal dominance risk operates. In RANK, Ricardian Equivalence ensures that deficit-financed stimulus transfers have no direct effect on output or inflation. Fiscal dominance risk nevertheless creates an expectation channel: since the government debt is financed by high inflation in the fiscal-dominant regime, the mere possibility of a regime change raises inflation expectations in the monetary-led regime. The central bank reacts to the higher inflation by tightening monetary policy, which raises the government's interest burden and amplifies the debt level. The higher debt level, in turn, raises expected inflation further, creating a debt-inflation spiral reminiscent of the "stepping on a rake" phenomenon highlighted by Sims (2011). Consequently, both inflation and debt level remain persistently high while output is constantly depressed.

In HANK, the same expectation channel is present, but an additional force emerges—the endogenous movement of the natural rate of interest, defined as the equilibrium real interest rate consistent with a zero output gap. If the natural rate rises along with the real interest rate, then the contractionary effect of monetary tightening is neutralized, leaving output unaffected by fiscal dominance risk.

To understand the drivers of the natural rate, I develop a Two-Agent Bond-in-Utility (TABU) model as a tractable approximation of HANK.[3] Through the TABU model, I analytically identify

[3]Another tractable approximation of HANK is the perpetual youth, overlapping generation model (Angeletos et al., 2024a; Rachel and Ravn, 2025; Dupraz and Rogantini Picco, 2025). The TABU model is particularly appealing, as I show in Appendix A.4 that the interest rate Jacobian of consumption in TABU emulates those in HANK, extending Auclert et al. (2024)'s result

three channels through which fiscal dominance risk raises the natural rate. The first is the *asset supply effect*: because asset demand is inelastic due to precautionary saving motives, a persistently high level of government debt resulting from the debt-inflation requires a higher return to clear the asset market, pushing up the natural rate. The second is the *redistribution effect*: under fiscal dominance, the explicit labor income tax is replaced by an implicit inflation tax, redistributing resources toward high-MPC households, raising expected aggregate demand and therefore the natural rate. This channel is stronger when the average MPC is high. The third is the *intertemporal substitution effect*: fiscal dominance risk lowers the expected real rate, which requires a higher natural rate to close the output gap in the monetary-led regime; this channel also exists in RANK. Taken together, these three forces imply that the natural rate rises by more following a deficit-financed stimulus whenever fiscal dominance risk is present.

I calibrate the regime-switching HANK model to the United States and contrast its dynamics with RANK following a lump-sum transfer equal to the size of the CARES Act stimulus payment. Consistent with the expectation channel, fiscal dominance risk generates persistently elevated inflation in both models. The output dynamics, however, diverge markedly. In RANK, the higher real interest rate persistently depresses output below its steady-state level. In HANK, this contractionary effect is counteracted by the three mechanisms described above, and the output expansion from the fiscal transfer is largely preserved. Quantitatively, the natural rate remains approximately 0.5 percentage points above its steady-state level fifteen years after the one-time stimulus—a magnitude broadly consistent with the post-pandemic movement in the 10-year TIPS yield and empirical estimates of the natural rate (Benigno et al., 2024; Del Negro et al., 2026).

I examine two dimensions of robustness. First, when the slope of the Phillips curve is steep—consistent with estimates for the post-COVID period—fiscal dominance risk dampens rather than amplifies the output expansion in HANK, because the stronger inflation response triggers a monetary tightening aggressive enough to offset the demand stimulus. The resulting dynamics—output back at steady state within five years but inflation persistently elevated by about 1 percentage point—resemble the post-COVID macroeconomic experience. In RANK, by contrast, the slope of the Phillips curve has virtually no effect on the output and inflation dynamics, because the cumulative inflation response under fiscal dominance is pinned down by the initial debt level regardless of the slope. Second, I show that in both models, a faster monetary reaction to inflation generates a *larger* inflation response under fiscal dominance risk because it front-loads the interest burden of the government and accelerates debt accumulation. This result has a direct policy implication: a more patient but equally resolute monetary reaction may be preferable when fiscal dominance risk is material.

I further study the policy implications by extending the methodology of McKay and Wolf (2023) to characterize optimal monetary policy under fiscal dominance risk in both HANK and RANK. The central bank anticipates the possibility of fiscal dominance and chooses a path of nominal rates

on the intertemporal MPC. See also Kaplan (2025b) for an application of TABU to determinacy analysis in the presence of non-Ricardian households.

under full commitment, conditional on remaining in the monetary-led regime. The key finding is that when inflation stabilization is the primary objective, optimal monetary policy accommodates part of the fiscal deficit by *reducing* the nominal rate, and this prescription is largely invariant to household heterogeneity. Intuitively, lowering the interest rate reduces the government's interest burden immediately after the transfer, preventing debt accumulation and thereby dampening the expectation channel of fiscal dominance risk.

When output stabilization is also a concern, however, HANK and RANK diverge. In RANK, the optimal policy is always to cut rates to accommodate the deficit, because all real effects of the transfer are channeled through the expectation mechanism and a rate cut neutralizes them. In HANK, the direct aggregate-demand effect of the transfer limits the scope for an initial rate cut: raising the nominal rate to offset the demand stimulus is also optimal, despite the resulting debt accumulation. As a consequence, government debt remains persistently elevated under HANK optimal policy when output stabilization matters, keeping the natural rate high. Optimal policy must then implement a persistently higher real-rate path to stabilize output—a distinctly HANK phenomenon reflecting the feedback loop between debt dynamics and the endogenous natural rate.

Related literature This paper contributes to the long literature on monetary-fiscal interaction (see Leeper and Leith 2016 for a recent review). The "unpleasant monetarist arithmetic" of Sargent and Wallace (1981) first highlights the importance of fiscal backing for the central bank's ability to control inflation. Leeper (1991) characterizes equilibrium determinacy under different monetary-fiscal policy mixes and shows that both a monetary-led regime and a fiscal-dominant regime can be individually determinate. Davig and Leeper (2007) extends the analysis to a regime-switching model and derives a generalized Taylor principle for determinacy. In a series of influential papers (Bianchi and Melosi, 2017; Bianchi and Ilut, 2017; Bianchi and Melosi, 2019), the authors develop and estimate a RANK model with regime switching to understand the aggregate dynamics of the U.S. economy in the postwar period and the Great Recession. The most related paper in this literature is Bigio et al. (2025), who study the positive and normative implications of inflationary financing in a regime-switching RANK model. This paper complements that line of research by begin the first to extend the regime-switching analysis to HANK models, thereby demonstrating how the presence of non-Ricardian households leads to qualitative and quantitative differences.

The focus on heterogeneous households relate this paper to the growing literature on monetary-fiscal interaction in heterogeneous-agent economies. Hagedorn (2016) shows that in economies with non-Ricardian households, the price level is determined by demand, sidestepping the need for the Fiscal Theory of the Price Level. Angeletos et al. (2024b) shows that, in a stylized HANK model, the inflation response under fiscal dominance is equivalent to the FTPL prediction. Kwicklis (2025) studies the inflation-output tradeoff in HANK under fiscal dominance. Kaplan et al. (2023) examines the inflation consequences of permanent deficits in heterogeneous-agent economies. This paper contributes to this literature by revealing and characterizing a novel channel through which fiscal dominance *risk* operates in HANK—the endogenous movement of the natural rate of interest.

Lastly, this paper contributes to the recent discussion on the drivers of the post-COVID rise in the natural rate (Benigno et al., 2024; Del Negro et al., 2026). Through the lens of a quantitative structural model, Rachel (2025) shows that heightened inflation risk can well contribute to the post-COVID rise. On the other hand, Campos et al. (2025) shows that a debt-financed fiscal expansion significantly raises the natural rate in HANK. Complementing this line of research, this paper shows that fiscal dominance risk can lead to a significant rise in both inflation risk and the natural rate.

The remainder of the paper is organized as follows. Section 2 describes the modeling framework. Section 3 characterizes the effects of fiscal dominance risk in tractable models to build intuition. Section 4 presents the quantitative results in the calibrated HANK model. Section 5 studies optimal monetary policy under fiscal dominance risk. Section 6 concludes.

2 Model

This section describes the HANK model used to analyze the aggregate consequences of the anticipated risk of fiscal dominance. The core household block follows the canonical HANK setup with sticky wages and an active-monetary, passive-fiscal policy regime (Auclert et al., 2025b). I extend this framework to incorporate the risk of a policy-regime change, following the approach of Bigio et al. (2025).

2.1 Environment

Time is discrete and infinite, $t = 0, 1, \ldots$.

Households The economy is populated by a unit measure of infinitely-lived, ex-ante identical households. Each household faces idiosyncratic, uninsurable risk to its labor productivity z_{it}, which follows a first-order Markov process with normalized mean $\mathbb{E}[z_{it}] = 1$. Financial markets are incomplete: households can save in a risk-free nominal asset with gross return R_t^n, subject to a borrowing limit $\underline{a}$. Preferences are CRRA over consumption c_{it} and separable isoelastic over hours worked h_{it}.

To isolate the fiscal dominance risk channel from the direct inflationary effect of distortionary taxation, I assume that households pay lump-sum taxes T_{it} that replicate, in equilibrium, the after-tax income distribution implied by the progressive labor income tax system of Heathcote et al. (2017). That is, in equilibrium,

$$T_{it} = y_{it} - (1 - \tau_t) y_{it}^{1-\xi} \tag{1}$$

where y_{it} is labor income and τ_t is the aggregate labor tax rate. This assumption is standard in the FTPL literature: it ensures that lump-sum transfers have no effect on output or inflation in RANK,

so that any output response in the HANK model reflects purely the non-Ricardian nature of its households.

The household's Bellman equation is:

$$
\begin{aligned}
V_t(a_{it}, z_{it}) = \max_{c_{it}, a_{it+1}} \frac{c_{it}^{1-\sigma}}{1-\sigma} - \varphi \frac{h_{it}^{1+\phi}}{1+\phi} + \beta \mathbb{E}_t \left[V_{t+1}(a_{it+1}, z_{it+1}) | z_{it} \right] \\
c_{it} + \frac{a_{it+1}}{R_t^n} = y_{it} - T_{it} + \mathcal{T}_t + \frac{a_{it}}{\Pi_t} \\
y_{it} = w_t h_{it} z_{it} \\
a_{it+1} \geq \underline{a}
\end{aligned}
\tag{2}
$$

where Π_t is the gross inflation rate, $\mathcal{T}_t$ is a uniform lump-sum transfer from the government, and w_t is the real wage. Following Auclert et al. (2025b), hours worked h_{it} are set by labor unions to satisfy aggregate labor demand, rather than chosen directly by households.

Labor unions The union block follows Auclert et al. (2023) and Erceg et al. (2000). A continuum of monopolistically competitive unions sets nominal wages to maximize the stand-in household's utility subject to quadratic adjustment costs. Hours are allocated uniformly across households, so $h_{it} = h_t$ for all i.

Optimal wage setting yields the following wage New Keynesian Phillips curve:

$$
\log \Pi_t^w = \xi^w \left(\varphi h_t^{1+\phi} - C_{it}^{-\sigma} w_t h_t \right) + \beta \, \mathbb{E}_t \log \Pi_{t+1}^w \tag{3}
$$

where Π_t^w is the gross wage-inflation rate and ξ^w is the wage stickiness parameter. The uniform labor allocation ensures that consumption inequality does not enter as a wedge in the aggregate labor supply condition, facilitating a clean comparison with RANK.

Production The goods market is perfectly competitive with a linear production technology:

$$
Y_t = N_t := \int h_{it} z_{it} \, di = h_t \tag{4}
$$

Profit maximization implies a constant real wage, $w_t = 1$, and price inflation equals wage inflation, $\Pi_t = \Pi_t^w$.

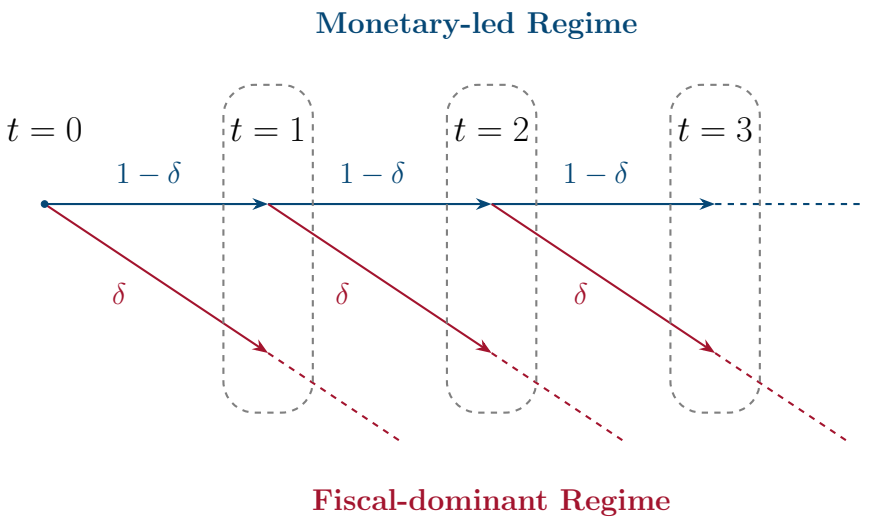
Government The government collects labor taxes T_t and issues nominal debt B_{t+1} to finance exogenous expenditure $G_t = G_{ss}$ (constant) and uniform lump-sum transfers $\mathcal{T}_t$:

$$
B_{t+1} = R_t^n \left(\frac{B_t}{\Pi_t} + G_t + \mathcal{T}_t - T_t \right) \tag{5}
$$

The choice of tax revenue, instrumented by the labor tax rate, depends on the prevailing fiscal policy regime.

Fiscal and monetary policy Following Bigio et al. (2025), the economy starts in a *monetary-led* regime and transitions stochastically to a *fiscal-dominant* regime with a constant per-period probability $\delta \in (0, 1)$. Once the economy enters the fiscal-dominant regime, it reverts to the monetary-led regime only when government debt returns to its steady-state level. Figure 1 illustrates this regime-switching process.

Figure 1: Stochastic Regime Transition



The two regimes are characterized as follows.

- *Monetary-led regime.* This is the familiar active-monetary, passive-fiscal policy mix, in which the central bank satisfies the Taylor principle and the government stabilizes debt by adjusting the tax rate (Leeper, 1991; Bianchi and Melosi, 2017). The central bank sets the nominal interest rate according to an inertial Taylor rule:

$$\left(\frac{R_t^n}{R_{ss}}\right) = \left(\frac{R_{t-1}^n}{R_{ss}}\right)^{\rho_R} \left(\frac{\Pi_t}{\Pi_{ss}}\right)^{(1-\rho_R)\phi_\pi} \tag{6}$$

  with $\phi_\pi > 1$. The government follows the fiscal rule

$$T_t = T_{ss} + (1 - \rho_B)\left(\frac{B_t}{\Pi_t} - B_{ss}\right) \tag{7}$$

  implemented through adjustments in the labor tax rate τ_t. The condition $\rho_B R_{ss} < 1$ ensures passive fiscal behavior: tax revenue rises sufficiently with the debt level to guarantee long-run solvency (Leeper, 1991).

- *Fiscal-dominant regime.* In this regime, monetary policy becomes passive and the price level adjusts to stabilize government debt—the Fiscal Theory of the Price Level (Cochrane, 2023; Woodford, 1995). The central bank fixes the nominal rate at its steady-state level,

$$R_t^n = R_{ss}, \tag{8}$$

and the government holds tax revenue at its steady-state level,

$$T_t = T_{ss}, \tag{9}$$

regardless of the debt level (equivalent to $\rho_B = 1$ in equation (7)). Under this coordination, inflation rises to reduce the real value of outstanding debt and restore solvency.

2.2 Equilibrium in the sequence space

The object of interest is the trajectory of the economy following a one-time, unanticipated uniform lump-sum transfer at time 0, which I refer to as a *fiscal stimulus*. Given the regime-switching structure in Figure 1, an equilibrium consists of a collection of contingency paths indexed by the realization time of fiscal dominance.

Notation Let X_t denote a generic variable at time t under the monetary-led regime, and $X_{\tau,t}$ the corresponding variable at time $\tau + t$ conditional on the fiscal-dominant regime beginning at time τ. Write $X \equiv (X_0, X_1, \dots)$ and $X^\tau \equiv (X_{\tau,0}, X_{\tau,1}, \dots)$ for the associated sequences.

Equilibrium Given an exogenous path of fiscal stimulus $\mathcal{T}$, a *rational expectations equilibrium* consists of contingency paths of household policy functions $\{c, a, (c^\tau, a^\tau)_\tau\}$, value functions $\{V, (V^\tau)_\tau\}$, prices $\{R^n, \Pi, \Pi^w, w, (R^{n,\tau}, \Pi^\tau, \Pi^{w,\tau}, w^\tau)_\tau\}$, fiscal instruments $\{B, \tau, (B^\tau, \tau^\tau)_\tau\}$, aggregates $\{Y, C, A, T, (Y^\tau, C^\tau, A^\tau, T^\tau)_\tau\}$, household distribution $\{\mathbf{D}, (\mathbf{D}^\tau)_\tau\}$, and a consistent sequence of price beliefs such that:

1. Given the sequence of value functions, prices, and policy functions, the household Bellman equation holds.
2. Given the sequence of price beliefs, all agents optimize.
3. The evolution of the distribution is consistent with optimal policy functions.
4. Beliefs over prices and aggregates are rational.
5. Monetary and fiscal policy follows the prescribed rules in each regime.
6. All markets clear.

Although the fiscal stimulus is deterministic and known to all agents, the timing of any regime transition is uncertain. Households and firms are fully aware of fiscal dominance risk and incorporate it into their decisions. The analysis in the rest of the paper focuses on the equilibrium path under the monetary-led regime, where fiscal dominance risk is present but has not yet been realized.

The equilibrium system under the monetary-led regime takes the following sequence-space form:

$$
\begin{aligned}
Y &= \mathbf{C}\left(Y - T, R^n, \Pi, \left\{Y^{\tau} - T^{\tau}, R^{n,\tau}, \Pi^{\tau}\right\}_{\tau}; \mathcal{T}, \mathbf{D}_0\right) + G && \text{(Monetary-led regime)} \\
\Pi &= \mathbf{\Pi}\left(Y, \left\{\Pi_{\tau,0}\right\}_{\tau}\right) \\
R^n &= \mathbf{R}(\Pi) \\
T &= \mathbf{T}(B, \Pi) \\
B &= \mathbf{B}(R^n, \Pi; \mathcal{T}, B_0)
\end{aligned}
$$

where $\mathbf{C}$ is the aggregate consumption function induced by problem (2), $\mathbf{\Pi}$ is the generalized Phillips curve (3), $(\mathbf{R}, \mathbf{T})$ represent the policy rules (6)–(7) in sequence space, and $\mathbf{B}$ is the government budget constraint (5).

Because households and firms are forward-looking, the equilibrium paths under the fiscal-dominant regime feed back into consumption-saving decisions and firm pricing. Note that only inflation in the first period of fiscal dominance, $\{\Pi_{\tau,0}\}_{\tau}$, enters the generalized Phillips curve because firms' intertemporal pricing decisions are optimal. Nevertheless, the entire contingency path of after-tax income, nominal rates, and inflation under fiscal dominance matters for household decisions.[4]

For each $\tau \geq 1$, the equilibrium under fiscal dominance satisfies:

$$
\begin{aligned}
Y^{\tau} &= \mathbf{C}^{\mathbf{F}}\left(Y^{\tau} - T^{\tau}, R^{n,\tau}, \Pi^{\tau}; \mathbf{D}_{\tau}\right) + G && \text{(Fiscal-dominant regime)} \\
\Pi^{\tau} &= \mathbf{\Pi}^{\mathbf{F}}\left(Y^{\tau}\right) \\
R^{n,\tau} &= R^n_{ss} \cdot \mathbf{1} \\
T^{\tau} &= T_{ss} \cdot \mathbf{1} \\
B &= \mathbf{B}(R^{n,\tau}, \Pi^{\tau}; B_{\tau})
\end{aligned}
$$

where $\mathbf{1} := (1, 1, \dots)$ and $\mathbf{C}^{\mathbf{F}}$, $\mathbf{\Pi}^{\mathbf{F}}$ denote the consumption function and Phillips curve under fiscal dominance. Note that only the realized equilibrium path enters these objects, because there is no further regime uncertainty once fiscal dominance begins.

The two systems are linked through the household wealth distribution $\mathbf{D}$ and the level of government debt B. In the monetary-led regime, expectations of future fiscal-dominant equilibria feed back into current household decisions and firm pricing, shaping the evolution of both the

[4] A sufficient statistic for household decisions is the value function in the first period of fiscal dominance, $\{V_{\tau,0}\}_{\tau}$. Nonetheless, this object is infinite-dimensional in the state space. In Section 5.2, I discuss how the current sequence-space formulation admits an numerical algorithm for computing the first-order solution.

distribution and government debt in equilibrium. When the economy switches to the fiscal-dominant regime, the prevailing distribution and debt level serve as initial conditions that fully determine the subsequent equilibrium path. The rational expectations equilibrium is characterized as the fixed point of this joint mapping.

3 Analytical Results from Tractable Models

Because the HANK model in Section 2 is not analytically tractable, I first study two simplified environments to build intuition before turning to the full numerical solution in Section 4.1.

3.1 Expectation channel: insights from RANK

Consider the representative-agent limit of the HANK model, obtained by relaxing the borrowing constraint ($\underline{a} \to -\infty$) and eliminating idiosyncratic productivity risk ($z_{it} = 1$ for all i, t). This RANK limit retains the production block and the policy-regime structure of the HANK model, but with a frictionless household block that admits standard log-linearization. For ease of notation and tractability, I assume that $\rho_R = G_{ss} = 0$ throughout this section.

Monetary-led regime Let $\hat{x}_t$ denote the log deviation of a variable from its steady-state value under the monetary-led regime, and $\hat{x}_t^F$ the corresponding deviation when the economy transitions to the fiscal-dominant regime at time t. Log-linearizing the model around the deterministic steady state yields:

$$\hat{y}_t = -\sigma^{-1}\left\{\hat{r}_t^n - [(1-\delta)\hat{\pi}_{t+1} + \delta\hat{\pi}_{t+1}^F]\right\} + (1-\delta)\hat{y}_{t+1} + \delta\hat{y}_{t+1}^F \tag{10}$$

$$\hat{\pi}_t = \kappa\hat{y}_t + \beta[(1-\delta)\hat{\pi}_{t+1} + \delta\hat{\pi}_{t+1}^F] \tag{11}$$

$$\hat{r}_t^n = \phi_\pi\hat{\pi}_t \tag{12}$$

$$\hat{b}_{t+1} = \hat{r}_t^n + \rho_B R_{ss}(\hat{b}_t - \hat{\pi}_t) + \epsilon_t^{\mathcal{T}} \tag{13}$$

where $\kappa := \xi^w(\phi + \sigma)$ is the reduced-form slope and $\epsilon_t^{\mathcal{T}}$ is the fiscal stimulus shock. The first three equations are the standard New Keynesian IS curve, Phillips curve, and Taylor rule, modified so that all expectation terms account for the possibility of a regime change next period. The fourth equation, combining the fiscal rule with the government budget constraint, describes debt dynamics. By assumption, $\rho_B R_{ss} < 1$, so debt is stable in the absence of the expectation terms $\hat{\pi}_{t+1}^F$ and $\hat{y}_{t+1}^F$. Tracking debt is necessary because these expectations depend on the debt level at the time of any regime transition, as shown next.

Fiscal-dominant regime Let $\hat{x}_{\tau,t}$ denote the log deviation at time $\tau+t$ given that fiscal dominance begins at time τ. The log-linearized system is:

$$\hat{y}_{\tau,t} = \sigma^{-1}\hat{\pi}_{\tau,t+1} + \hat{y}_{\tau,t+1} \tag{14}$$

$$\hat{\pi}_{\tau,t} = \kappa\hat{y}_{\tau,t} + \beta\hat{\pi}_{\tau,t+1} \tag{15}$$

$$\hat{r}^n_{\tau,t} = 0 \tag{16}$$

$$\hat{b}_{\tau,t+1} = R_{ss}(\hat{b}_{\tau,t} - \hat{\pi}_{\tau,t}) \tag{17}$$

$$\hat{b}_{\tau,0} = \hat{b}_\tau \tag{18}$$

Once the economy is in the fiscal-dominant regime, there is no further regime uncertainty. The central bank holds the nominal rate at its steady-state level ($\hat{r}^n_{\tau,t} = 0$) and the government does not adjust tax revenue ($\rho_B = 1$). Consequently, the real value of government debt is explosive unless inflation rises to stabilize it—the logic of the Fiscal Theory of the Price Level (Cochrane, 2023; Woodford, 1995).

Solving this system forward yields a key analytical result:

Lemma 1. *The output and inflation dynamics under the fiscal-dominant regime satisfy*

$$\hat{\pi}_{\tau,t} = (1 - \beta\gamma)\hat{b}_{\tau,t} \tag{19}$$

$$\hat{y}_{\tau,t} = \sigma^{-1}\frac{\gamma}{1-\gamma}\hat{\pi}_{\tau,t} \tag{20}$$

where γ is the unique root of $\beta\gamma^2 - (1 + \beta + \kappa\sigma^{-1})\gamma + 1 = 0$ in $(0, 1)$.

Under fiscal dominance, inflation is proportional to the prevailing debt level, consistent with the FTPL. Output co-moves positively with inflation because the central bank's passivity prevents the real rate from rising, so higher inflation reduces the real interest rate and stimulates demand. Critically, both the inflation and output responses when the economy enters fiscal dominance are determined entirely by the initial debt level $\hat{b}_{\tau,0} = \hat{b}_\tau$. This result is the key link between regime uncertainty and the current macroeconomic environment: even in the monetary-led regime with passive fiscal policy, the debt level shapes output and inflation expectations through the looming possibility of fiscal dominance.

Four-equation model Substituting Lemma 1 into the monetary-led equilibrium system (using $\hat{\pi}^F_t = \hat{\pi}_{t,0}$ and $\hat{y}^F_t = \hat{y}_{t,0}$) yields:

Proposition 1. *The equilibrium system under the monetary-led regime can be written as*

$$\hat{y}_t = -\sigma^{-1}\left[\hat{r}_t^n - (1-\delta)\hat{\pi}_{t+1}\right] + (1-\delta)\hat{y}_{t+1} + \delta\sigma^{-1}\frac{1-\beta\gamma}{1-\gamma}\hat{b}_{t+1} \tag{21}$$

$$\hat{\pi}_t = \kappa\hat{y}_t + \beta(1-\delta)\hat{\pi}_{t+1} + \beta\delta(1-\beta\gamma)\hat{b}_{t+1} \tag{22}$$

$$\hat{r}_t^n = \phi_\pi\hat{\pi}_t \tag{23}$$

$$\hat{b}_{t+1} = \hat{r}_t^n + \rho_B R_{ss}(\hat{b}_t - \hat{\pi}_t) + \epsilon_t^{\mathcal{T}} \tag{24}$$

with initial condition $\hat{b}_0 = 0$.

This system resembles the four-equation New Keynesian model of Bigio et al. (2025). Compared to the textbook model, the debt level now enters both the IS curve (21) and the Phillips curve (22) through the anticipated regime transition. The mechanism has two reinforcing components.

First, a higher debt level raises current output via consumption smoothing: households anticipate an income boom in the fiscal-dominant regime and bring it forward. Second, a higher debt level raises current inflation because it increases expected inflation once fiscal dominance arrives. The central bank, still in the monetary-led regime, reacts by raising the real rate, which dampens output. Whether the net effect on output is positive or negative depends on the strength of the monetary policy response.

A further consequence of monetary tightening is the increase in government interest expenditure, visible in equation (24). This creates a *debt-inflation spiral*: elevated debt raises expected inflation, prompting a monetary tightening that raises the interest burden, which in turn exacerbates the debt level and expectations of fiscal dominance. When fiscal dominance risk is sufficiently high, this loop can render a bounded equilibrium nonexistent:

Proposition 2. *When* $\beta \to 1$*, a unique bounded equilibrium exists if and only if*

$$(\phi_\pi - 1)\Phi(\delta) > -\gamma(1-\rho_B)\delta^2 \tag{25}$$

where $\Phi(\delta) := \frac{\kappa}{\sigma}(1-\rho_B-\delta) - (1-\gamma)\delta^2$ *is decreasing in* δ *over* $[0,1]$.

This condition generalizes the Taylor principle: when $\delta = 0$, it collapses to the standard requirement $\phi_\pi > 1$. For sufficiently high δ, however, $\Phi(\delta) < 0$ and the condition imposes an *upper* bound on the Taylor coefficient:

$$\phi_\pi < 1 - \frac{\gamma(1-\rho_B)\delta^2}{\Phi(\delta)} \tag{26}$$

A unique bounded equilibrium therefore ceases to exist when monetary policy is too hawkish. The intuition is that an aggressive monetary reaction exacerbates the debt-inflation spiral and destabilizes inflation dynamics. In this regime, paradoxically, a unique bounded equilibrium always exists when the Taylor principle is *violated*.

Summary Even within the monetary-led regime, fiscal dominance risk creates a channel through which government debt influences output and inflation. This channel operates through the expectation of a future regime change, raising current inflation and output through the forward-looking behavior of firms and households. The central bank's endogenous response to elevated inflation raises the interest burden of the government, amplifying the initial debt accumulation and potentially generating a prolonged period of high inflation and low output—or even a failure of equilibrium existence—following a deficit-financed fiscal stimulus.

3.2 HANK versus RANK: insights from TABU

The RANK analysis clarifies that fiscal dominance risk operates through expectations and through the interaction between monetary policy and government debt. Both of these forces are equally present in HANK. On the one hand, as shown by Angeletos et al. (2024b), fiscal dominance generates substantial increases in both inflation and output in HANK as well as in RANK. On the other hand, the supply side and the policy rules are identical across the two frameworks, so the debt-inflation spiral is entirely independent of the household block.

The key distinction is that households in HANK are non-Ricardian. A deficit-financed lump-sum transfer directly stimulates aggregate demand, partially offsetting the contractionary impact of monetary tightening required to counter the inflationary pressures from fiscal dominance risk. Moreover, the persistently elevated government debt produced by the debt-inflation spiral raises the natural rate of interest endogenously. Neither of these mechanisms operates in RANK.

To obtain analytical insight into these HANK-specific mechanisms, I study a Two-Agent Bond-in-Utility (TABU) model that serves as a tractable approximation of the full HANK model. The economy is populated by two types of households, identical in their labor income and tax liabilities but differing in consumption behavior. A fraction $\lambda \in [0,1]$ consists of hand-to-mouth households, who consume their entire disposable income each period:

$$C_t^H = w_t N_t - T_t + \mathcal{T}_t + T_{ss}^H \tag{27}$$

where T_{ss}^H is the steady-state redistributive transfer to this type. These households represent the borrowing-constrained agents in HANK, who have a marginal propensity to consume (MPC) of one.

The remaining share $1-\lambda$ are unconstrained, forward-looking households who intertemporally smooth consumption and hold bonds that enter their utility:

$$U(C^U, B) := \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{(C_t^U)^{1-\sigma}}{1-\sigma} + \varphi^b \frac{(B_t^U/\Pi_t)^{1-\eta}}{1-\eta} \right] \tag{28}$$

with $\eta, \varphi^b > 0$.[5] The bond-in-utility term captures the precautionary saving motive of unconstrained households in HANK: saving is intrinsically valuable because it reduces exposure to idiosyncratic

[5] I omit labor disutility for brevity.

risk, and this marginal benefit diminishes with wealth (since $\eta > 0$). The first-order condition for the unconstrained type is:

$$(C_t^U)^{-\sigma} = \beta\, \mathbb{E}_t \left\{ \frac{R_t^n}{\Pi_{t+1}} \left[(C_{t+1}^U)^{-\sigma} + \varphi^b \left(\frac{B_{t+1}^U}{\Pi_{t+1}} \right)^{-\eta} \right] \right\} \tag{29}$$

Unlike the standard Euler equation, the marginal return on saving here depends directly on bond holdings and is decreasing in them, capturing the diminishing precautionary value of additional wealth. As shown in Appendix A.4, this class of model approximates well the intertemporal MPC (iMPC) profile of the one-asset HANK model, and the consumption Jacobian with respect to interest rates in TABU similarly resembles its HANK counterpart.

Log-linearizing the TABU model yields the following system for the monetary-led regime:[6]

$$\hat{c}_t^U = -\sigma^{-1}[\hat{r}_t^n - \mathbb{E}_t\, \tilde{\pi}_{t+1} - (1-\alpha)\eta(\hat{b}_{t+1} - \mathbb{E}_t\, \tilde{\pi}_{t+1})] + \alpha\, \mathbb{E}_t\, \tilde{c}_{t+1}^U \tag{30}$$

$$\hat{y}_t = (1-g)\hat{c}_t^U - \frac{\lambda}{1-\lambda}(\hat{T}_t - \epsilon_t^{\mathcal{T}}) \tag{31}$$

$$\hat{\pi}_t = \kappa \hat{y}_t + \beta\, \mathbb{E}_t\, \tilde{\pi}_{t+1} \tag{32}$$

$$\hat{r}_t^n = \phi_\pi \hat{\pi}_t \tag{33}$$

$$\hat{b}_{t+1} = \hat{r}_t^n + R_{ss}\rho_B(\hat{b}_t - \hat{\pi}_t) + \epsilon_t^{\mathcal{T}} \tag{34}$$

$$\hat{T}_t = (1-\rho_B)B_{ss}\left(\hat{b}_t - \hat{\pi}_t\right) \tag{35}$$

where $\alpha = \beta R_{ss} \in (0,1)$ and $\mathbb{E}_t\, \tilde{x}_{t+1} = (1-\delta)\hat{x}_{t+1} + \delta \hat{x}_{t+1}^F$ for any x accounts for fiscal dominance risk. Note that like in HANK, the government debt matters for the aggregate dynamics even under the conventional monetary-led regime, underscoring the prevalence of monetary-fiscal interactions in non-Ricardian models. In the following, I illustrate three important differences between TABU and RANK.

Natural rate of interest First, the natural rate of interest is endogenous. Following Acharya and Benhabib (2024) and McKay and Wieland (2021), I define the natural rate as the equilibrium real rate consistent with a zero output gap in the monetary-led regime. In our setup, this also corresponds to the equilibrium real rate under flexible price. [7] Proposition 3 characterizes the natural rate in TABU.

Proposition 3. *Up to first order, the log-deviation of the natural rate of interest in TABU under*

[6] See Appendix A.4 for the derivation.

[7] An alternative definition would require the output gap to be closed in both regimes. Since monetary policy is passive under fiscal dominance, this alternative would not correspond to an interest rate path implementable by the central bank in response to fiscal dominance risk, so I use the monetary-led definition throughout.

the monetary-led regime satisfies

$$r_t^* = \xi_b(\hat{b}_{t+1} - \mathbb{E}_t\,\hat{\pi}_{t+1}) + \frac{\lambda\sigma}{1-\lambda}\left[-\hat{T}_t + \xi_\pi(\hat{\pi}^F_{t+1} - \hat{\pi}_{t+1})\right] + \xi_y \hat{y}^F_{t+1} \tag{36}$$

where $\xi_b = \alpha\frac{\lambda\sigma}{1-\lambda}(1-\delta)(1-\rho_B)B_{ss} + (1-\alpha)\eta$, $\xi_\pi = \alpha\delta(1-\delta)(1-\rho_B)B_{ss}$, *and* $\xi_y = \alpha\delta\sigma$.

This expression corresponds to the equilibrium condition in the government debt market and identifies three distinct forces.

The first term—the *asset supply effect*—captures the upward pressure on the natural rate when government debt increases. Because households in TABU (and HANK) have an inelastic demand for government bonds, a higher supply of debt requires a higher return to be absorbed (Aiyagari, 1994; Kaplan et al., 2023; Campos et al., 2025). This channel is entirely absent in RANK, where household demand for government debt is infinitely elastic.

The second term—the *redistribution effect*—is present only when there are hand-to-mouth households ($\lambda > 0$). Lower taxes today raise the natural rate because hand-to-mouth households immediately spend their increased disposable income, boosting aggregate demand. In addition, fiscal dominance replaces explicit tax liabilities with implicit inflation taxation, redistributing income toward the hand-to-mouth type and raising aggregate demand expectations. The expected aggregate demand is larger when the average MPC is higher, making this channel more potent in economies with a large share of hand-to-mouth households.

The third term—the *expected income effect*—captures how fiscal dominance risk raises expected income and hence the current natural rate through consumption smoothing. Under fiscal dominance, aggregate demand expands due to the lower real rates, which in turn raises the current aggregate demand. Consumption smoothing then implies a higher natural rate today. This channel is present in both HANK and RANK.

Intertemporal substitution Second, the intertemporal substitution channel is attenuated. Iterating equation (30) forward and combining with the resource constraint (31):

$$\hat{y}_t = -\sigma^{-1}\,\mathbb{E}_t \sum_{j=0}^{\infty} \alpha^j [\hat{r}^n_{t+j} - \hat{\pi}_{t+j+1} - (1-\alpha)\eta(\hat{b}_{t+j+1} - \hat{\pi}_{t+j+1})] - \frac{\lambda}{1-\lambda}\hat{T}_t \tag{37}$$

Since $\alpha \in (0,1)$, the sensitivity of output to the real rate declines exponentially with the horizon of the rate change.[8] A persistent monetary tightening driven by fiscal dominance risk therefore generates a smaller output contraction in TABU than in RANK.

Aggregate demand stimulus Third, lump-sum transfers directly stimulate output, violating Ricardian equivalence. This is most visible in the last term of equation (37): the hand-to-mouth type

[8] This dampening is also present in models with cognitive discounting (Gabaix, 2020) and incomplete information (Angeletos and Huo, 2021).

immediately spends the transfer, raising aggregate demand. Due to the bond-in-utility preference, unconstrained households are also non-Ricardian, though their response is smoothed over time by the Euler equation (29). Overall, a deficit-financed transfer stimulates output, partially or fully offsetting the contractionary impact of the monetary tightening induced by fiscal dominance risk.

Summary In TABU and HANK, a deficit-financed fiscal stimulus directly raises output and the natural rate. Fiscal dominance risk operates through the same expectation channel as in RANK, creating a debt-inflation spiral between government debt and monetary tightening. However, the contractionary effect of monetary tightening is substantially weaker in HANK: it is dampened by attenuated intertemporal substitution, offset by the direct income effect of the fiscal transfer, and mitigated by the endogenously higher natural rate induced by elevated government debt. Consequently, output may return to steady state despite persistent inflation and elevated nominal interest rates—a combination impossible in RANK.

4 Quantitative Results

The tractable models in Section 3 identify the key mechanisms through which fiscal dominance risk shapes aggregate dynamics in HANK. This section corroborates these insights by solving the full HANK model with fiscal dominance risk numerically and analyzing the output and inflation dynamics following a deficit-financed uniform transfer. Throughout, I compare the HANK model against the RANK benchmark to quantify the role of household heterogeneity.

4.1 Quantification

Calibration Table 1 summarizes the baseline calibration. One period corresponds to one quarter. The calibration strategy follows the HANK literature closely.

The coefficient of relative risk aversion is set to $\sigma = 2$ and the inverse Frisch elasticity to $\phi = 1$; the labor disutility parameter φ normalizes steady-state output to $Y_{ss} = 1$. Households face a zero borrowing constraint $\underline{a} = 0$. The annual steady-state real rate is $r = 1\%$; the discount factor β is calibrated to match the share of U.S. government debt held by domestic private investors, $B_{ss}/Y_{ss} = 2.2$ (approximately 55% of annual GDP), following Hall and Sargent (2025).

Idiosyncratic productivity follows a log AR(1) process, $\log z_{it+1} = \rho_z \log z_{it} + \sigma_z \epsilon_{it+1}$, with estimates $\rho_z = 0.98$ and $\sigma_z = 0.12$ taken from Storesletten et al. (2004) as in Bayer et al. (2024).

The slope of the Phillips curve is set to $\kappa = 0.0138$, from the empirical estimates of Hazell et al. (2022), which implies a relatively flat NKPC. As several recent studies argue that the NKPC has steepened during the post-COVID period (Cerrato and Gitti, 2022; Harding et al., 2023), I examine the sensitivity of the results to a steeper slope in Section 4.3.

The monetary policy rule uses conventional values: inertia parameter $\rho_R = 0.80$ and inflation coefficient $\phi_\pi = 1.5$. The sensitivity of results to alternative monetary policy rules is discussed in

Section 4.4.

The fiscal rule parameter is set to $\rho_B = 0.974$, following Angeletos et al. (2024a), which implies a half-life of excess debt of approximately 6.5 years in the absence of inflation and nominal rate variation. This is consistent with recent U.S. fiscal policy (Auerbach and Yagan, 2025) and DSGE estimates (Bianchi et al., 2023; Bayer et al., 2024). Labor tax progressivity is set to $\xi = 0.181$ from Heathcote et al. (2017), and the proportional tax rate τ satisfies the government budget constraint at steady state, given $G_{ss} = 0.20$ and $B_{ss} = 2.2$.

Finally, the per-quarter probability of transition to fiscal dominance is set to $\delta = 1\%$, corresponding to an expected duration of the monetary-led regime of 25 years. The regime-switching DSGE estimates of Bianchi and Melosi (2017) imply $\delta = 0.8\%$ for the postwar period 1955–2013. Given that fiscal dominance risk has plausibly increased during the post-COVID period, the chosen value of δ should be regarded as a conservative benchmark.

Solution method Given the size of the fiscal stimulus, I solve the model using the nonlinear sequence-space method developed by Lin and Peruffo (2024). The key observation is that once the economy transitions to the fiscal-dominant regime, it follows a deterministic path that can be solved efficiently using the sequence-space Jacobian method of Auclert et al. (2021). Given these deterministic contingency paths indexed by the transition time, I solve the monetary-led regime nonlinearly by iterating on expectations using a modified quasi-Newton algorithm. See Appendix B.1 for details. Section 5.2 further discusses the linearized solution, which is essential for the normative analysis.

4.2 Aggregate responses to lump-sum transfers

I focus on the economy's path under the monetary-led regime following a one-time lump-sum transfer shock at time 0, set to 20% of the steady-state quarterly output—approximately the size of the first-round COVID stimulus transfer in 2020.

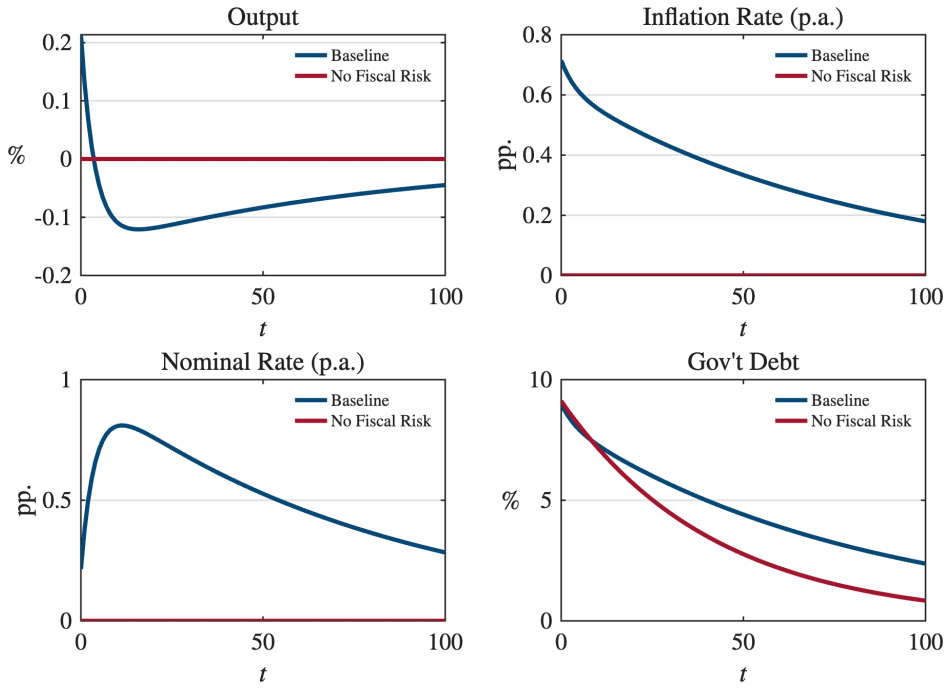
RANK Figure 2 shows the paths of output, inflation, the nominal rate, and government debt in the RANK model. Blue lines represent the baseline calibration with fiscal dominance risk; red lines represent the paths when $\delta = 0$. Without fiscal dominance risk, the model reduces to a standard New Keynesian model in which a lump-sum transfer raises government debt without affecting output or inflation—Ricardian equivalence holds exactly.

With fiscal dominance risk, both output and inflation respond to the transfer even though the economy remains in the monetary-led regime. Inflation rises persistently following the one-time transfer, while output increases initially and then falls below steady state for a prolonged period. The non-monotonic output response reflects the inertial monetary policy rule, which limits the initial rate rise. The subsequent persistence of inflation and the output contraction is an endogenous outcome of the interaction between monetary policy and government debt: higher inflation raises

Table 1: Baseline Calibration

Parameter	Interpretation	Value	Source/Target
Households			
σ	CRRA coeff.	2	Standard
ϕ	Inverse Frisch elas.	1	Standard
r	Real rate (p.a.)	0.01	Standard
$\underline{a}$	Borrowing limit	0	Standard
β	Discount factor	0.98	$B_{ss}/Y_{ss} = 2.2$
ρ_z	Autocorr. z	0.98	Storesletten et al. (2004)
σ_z	Std. z	0.12	Storesletten et al. (2004)
Nominal Rigidities			
κ	Slope of NKPC	0.0138	Hazell et al. (2022)
Monetary and Fiscal Policy			
ρ_R	Taylor rule (inertia)	0.80	Baseline
ϕ_π	Taylor rule (inflation)	1.5	Baseline
ρ_B	Fiscal rule	0.974	Angeletos et al. (2024a)
ξ	Labor tax progressivity	0.181	Heathcote et al. (2017)
G_{ss}/Y_{ss}	Gov't spending	0.20	Standard
B_{ss}/Y_{ss}	Gov't debt	2.2	Hall and Sargent (2025)
Fiscal dominance risk			
δ	Prob. of fiscal dominance	0.01	Baseline

Figure 2: Impulse Response to Stimulus Transfer in RANK with Fiscal Dominance Risk

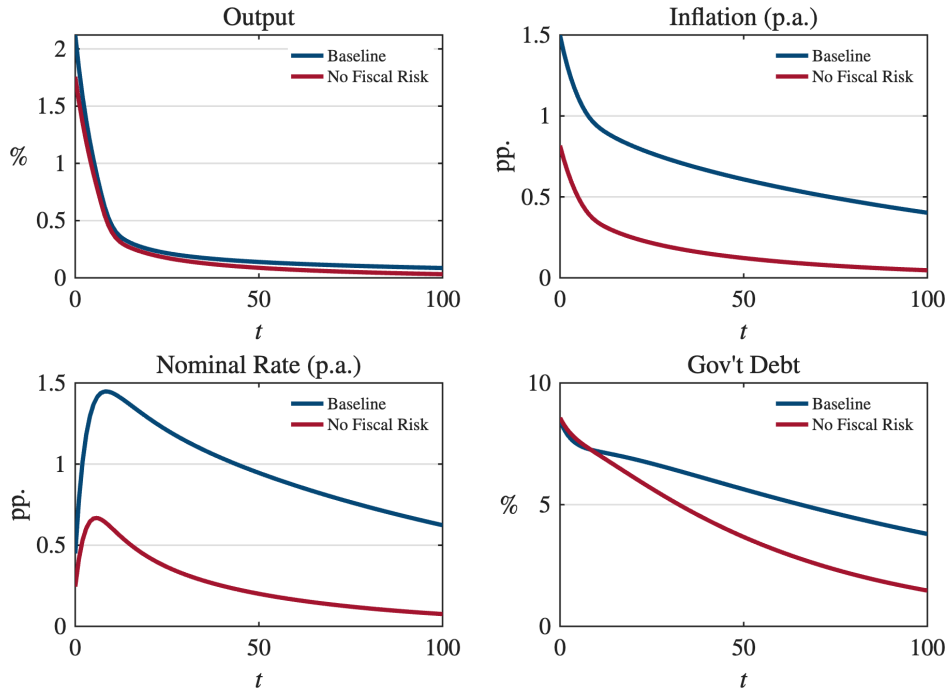


the real rate, which slows debt decumulation and keeps expected inflation elevated through the fiscal dominance risk channel. The more persistent debt response visible in Figure 2 confirms this mechanism.

HANK Figure 3 shows the analogous impulse responses in the HANK model. Because households are non-Ricardian with high MPCs, the transfer significantly raises output and inflation even without fiscal dominance risk. Fiscal dominance risk amplifies the inflation response through the expectation channel, prompting a stronger monetary tightening that keeps government debt persistently elevated. However, unlike in RANK, the higher and more sustained real rate does not produce a prolonged output contraction. Instead, the output response is somewhat larger than in the case without fiscal dominance risk. The inflation amplification from fiscal dominance risk is stronger in HANK than in RANK: the annualized inflation rate is approximately 0.4 percentage points higher than the no-risk counterfactual after 25 years in HANK, compared to 0.2 percentage points in RANK.

The divergence between HANK and RANK can be understood through the natural rate of interest. Figure 4 shows the natural rate and the real rate gap in the HANK model. The natural rate is computed by holding output at steady state during the monetary-led regime. Consistent with the theory, the natural rate rises in response to deficit-financed stimulus regardless of the fiscal dominance risk. With fiscal dominance risk, however, the increase is larger and far more persistent: after 25 years, the natural rate remains approximately 0.4 percentage points above its steady-state value, while it returns to steady state almost completely in the absence of fiscal dominance risk.

Figure 3: Impulse Response to Stimulus Transfer in HANK with Fiscal Dominance Risk



Although the real rate also rises more under fiscal dominance risk, the increase is smaller than the rise in the natural rate, as shown in the right panel of Figure 4. This widening of the real rate gap accounts for the stronger and more sustained output expansion in HANK.

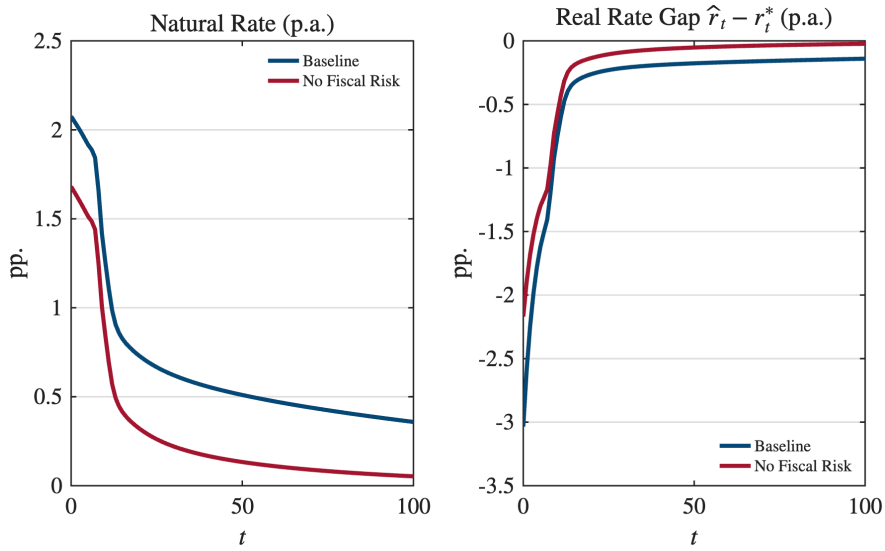
Taken together, these results confirm the qualitative predictions of the TABU model in Section 3.2. The quantitative magnitudes are also noteworthy: a natural rate persistently 0.4 percentage points above steady state fifteen years after a one-time stimulus is broadly consistent with the post-pandemic behavior of the 10-year TIPS yield and empirical estimates of the natural rate (Benigno et al., 2024).

4.3 Slope of the NKPC

The slope of the NKPC is a crucial determinant of the equilibrium effects of aggregate demand stimulus in New Keynesian models, and there is empirical evidence that the NKPC steepened markedly during the post-COVID period (Cerrato and Gitti, 2022; Harding et al., 2023). To assess the sensitivity of the results to this parameter, I consider the steeper slope $\kappa = 0.0414$, three times the baseline value, following Cerrato and Gitti (2022).

Figure 5 shows the output and inflation dynamics in both RANK and HANK under the flat and steep NKPC. In RANK, the slope of the NKPC has virtually no effect on the output and inflation responses, except in the very short run. The reason is that in RANK, all output and inflation responses to the transfer are driven by the expectation channel of fiscal dominance risk. By the

Figure 4: Natural Rate in HANK with Fiscal Dominance Risk



NOTE. The real rate gap in the right panel is defined as the difference between the expected real rate $\hat{r}_t := \hat{r}_t^n - \mathbb{E}_t \tilde{\pi}_{t+1}$ and the natural rate r_t^*.

logic of the FTPL, cumulative inflation under fiscal dominance is pinned down by the initial level of government debt:

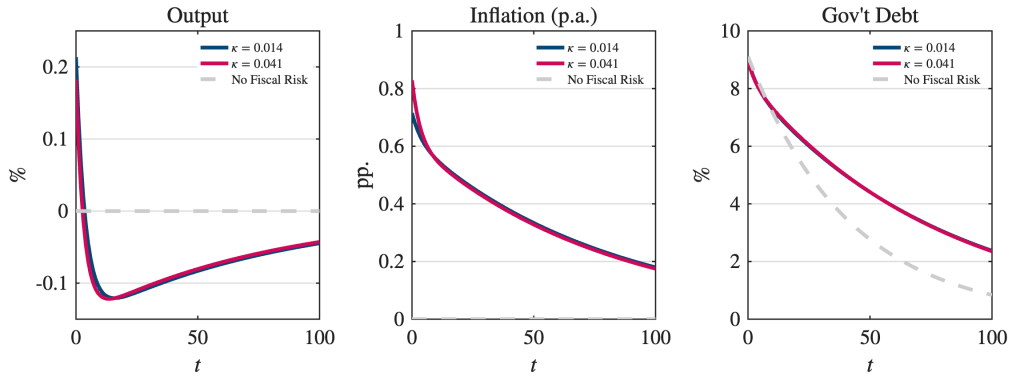
$$\sum_{j=0}^{\infty} \beta^j \hat{\pi}_{\tau,t+j} = \hat{b}_{\tau,t}. \tag{38}$$

Since the cumulative inflation is independent of the slope of the NKPC, and the initial output response in fiscal dominance is approximately $\hat{y}_{\tau,t} \approx \sigma^{-1}\gamma\hat{b}_{\tau,t}$ (with γ only weakly dependent on κ), the effects of fiscal dominance risk on the monetary-led regime dynamics are essentially invariant to the slope of the NKPC.

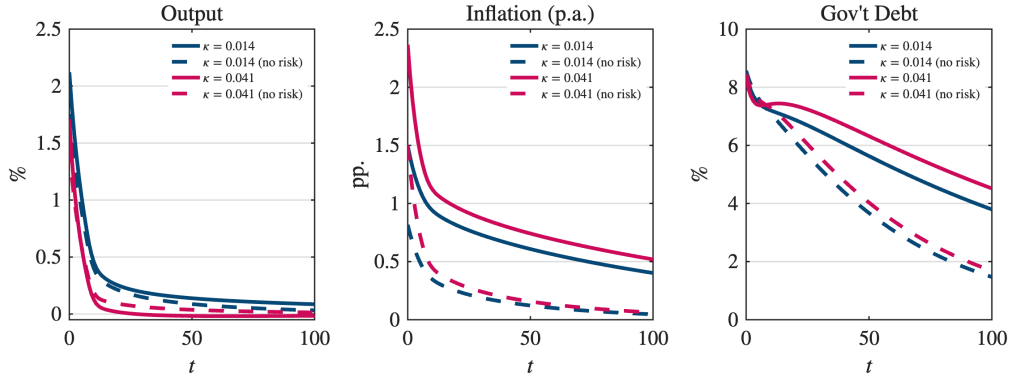
In HANK, by contrast, a steeper NKPC substantially dampens the long-run output response while generating a stronger inflation response. This difference is not driven by the direct fiscal stimulus effect—the dashed lines without fiscal dominance risk in Figure 6b are close to each other at long horizons. Rather, with a steep NKPC, the stronger inflation response to the transfer prompts a more aggressive monetary tightening, which raises the interest burden of the government and amplifies the debt level. The higher debt directly stimulates aggregate demand through the income channel, but simultaneously generates a sharply elevated inflation rate and real interest rate that more than offsets the output stimulus. When the NKPC is steep, this offsetting effect dominates, and the net impact of fiscal dominance risk on output is negative in the long run.

The resulting dynamics under a steep NKPC with fiscal dominance risk are revealing: output essentially returns to steady state within five years of the fiscal stimulus, while inflation remains roughly 1 percentage point above target and declines very slowly. This pattern is reminiscent of the

Figure 5: Output and Inflation Dynamics and the Slope of the NKPC



(a) RANK



(b) HANK

post-COVID macroeconomic experience and underscores the quantitative importance of accounting for NKPC slope changes when assessing the inflationary consequences of deficit-financed transfers.

4.4 Alternative monetary policy rules

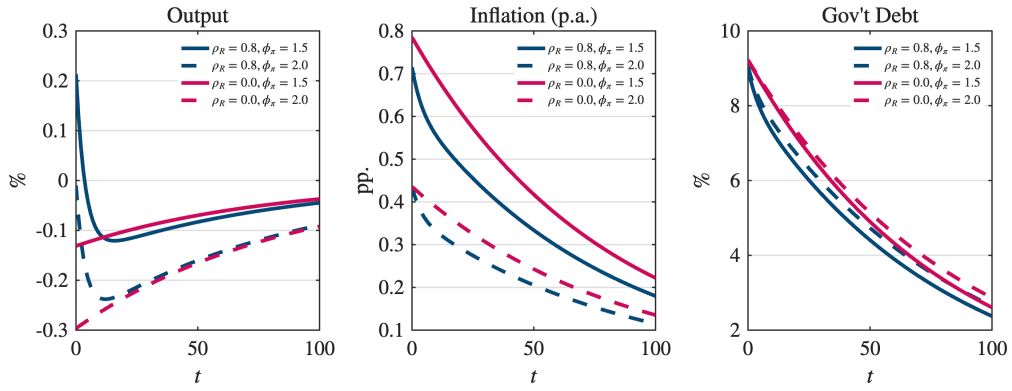
As the RANK analysis makes clear, the monetary policy reaction to inflation is central to the transmission of fiscal dominance risk: it determines the size of the debt-inflation spiral and hence the persistence of debt, inflation, and output dynamics. I now examine how varying the speed and strength of the monetary reaction affects these dynamics.

The log-linearized Taylor rule is:

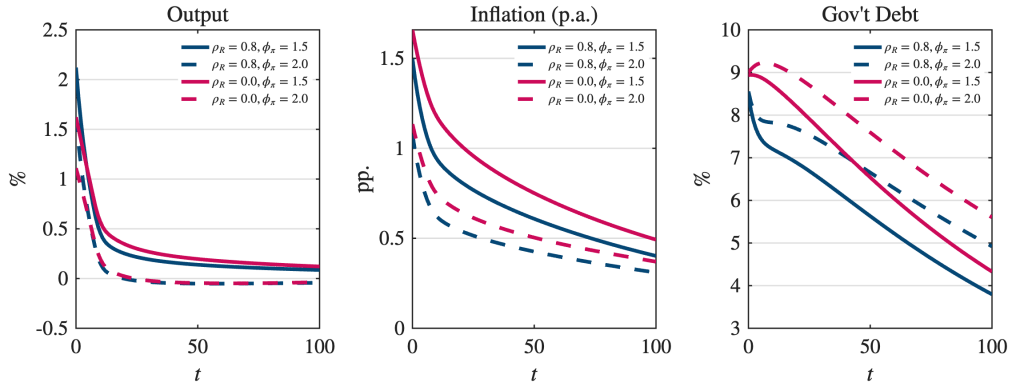
$$\hat{r}_t^n = \rho_R \hat{r}_{t-1}^n + (1 - \rho_R)\phi_\pi \hat{\pi}_t \tag{39}$$

I consider different values of (ρ_R, ϕ_π). The inertia parameter ρ_R governs the speed of the monetary reaction to inflation, while ϕ_π governs its strength. The normalization $(1 - \rho_R)\phi_\pi$ ensures that the overall responsiveness to inflation is comparable across values of ρ_R.

Figure 6: Aggregate Dynamics under Different Monetary Policy Rules



(a) RANK



(b) HANK

NOTE. All paths are computed under the monetary-led regime with fiscal dominance risk $\delta = 1\%$.

Figure 6 shows the output, inflation, and government debt dynamics in both models under different monetary policy rules. Blue (red) lines denote the slow (fast) reaction $\rho_R = 0.8$ ($\rho_R = 0.0$); solid (dashed) lines denote low (high) inflation responsiveness $\phi_\pi = 1.5$ ($\phi_\pi = 2.0$).

The most striking finding is that a faster monetary reaction (lower ρ_R) generates a *larger* inflation response, despite the higher nominal rate. The mechanism is intuitive: by raising interest rates earlier, a fast-reacting central bank front-loads the interest burden of the government, causing debt to accumulate more rapidly and thereby amplifying the expectation channel of fiscal dominance risk. This result implies that, in the presence of fiscal dominance risk, a more patient monetary response—slower but equally strong—may produce less inflation in equilibrium. The result is qualitatively identical in HANK and RANK, confirming that the debt-inflation spiral is independent of household heterogeneity.

Regarding the strength of the monetary reaction, both models display the conventional pattern: a higher ϕ_π reduces both output and inflation. In HANK, the dynamics under a more hawkish rule

resemble those under a steeper NKPC (Figure 6b)—output returns rapidly to steady state while inflation remains elevated for an extended period. The common thread is a less elastic aggregate supply in both cases, which limits the equilibrium output response to aggregate demand expansion.

5 Optimal Monetary Policy

The preceding section documents how fiscal dominance risk shapes aggregate dynamics under a standard Taylor rule. I now turn to the normative question: what is the *optimal* monetary policy response when fiscal dominance risk is present and the central bank has full commitment power in the monetary-led regime?

5.1 Optimal policy under commitment

Following the New Keynesian tradition, I posit that the central bank minimizes a dual-mandate quadratic loss function:

$$\mathcal{L} = \frac{1}{2}\,\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left(\alpha_y \tilde{y}_t^2 + \alpha_\pi \tilde{\pi}_t^2\right) \tag{40}$$

where $\tilde{y}_t$ and $\tilde{\pi}_t$ are log deviations of output and inflation from steady state, and the expectation is taken over the fiscal dominance risk. This specification has two motivations. First, because the HANK steady state is inefficient due to incomplete markets, a utilitarian welfare criterion necessarily incorporates distributional concerns that have no counterpart in RANK. The quadratic loss function isolates the inflation and output stabilization motives common to both models, facilitating a clean comparison. Second, this objective approximates the Fed's dual mandate and is widely used in the literature.

Using the notation for contingency paths, the objective can be written as:

$$\mathcal{L}\Big(\hat{y}, \hat{\pi}, \{\hat{y}^\tau, \hat{\pi}^\tau\}_\tau\Big) = \underbrace{\sum_{t=0}^{\infty} [\beta(1-\delta)]^t \left(\hat{y}_t^2 + \alpha \hat{\pi}_t^2\right)}_{\text{Monetary-led regime}} + \underbrace{\beta\delta \sum_{\tau=1}^{\infty} [\beta(1-\delta)]^{\tau-1} \left(\sum_{j=0}^{\infty} \beta^j \left(\hat{y}_{\tau,j}^2 + \alpha \hat{\pi}_{\tau,j}^2\right)\right)}_{\text{Fiscal-dominant regime}} \tag{41}$$

The first term is the discounted expected loss in the monetary-led regime; the second is the expected loss across all possible fiscal-dominant episodes, weighted by the probability $\delta(1-\delta)^{\tau-1}$ of transitioning at time τ.

To be consistent with the notion of fiscal dominance, I assume the central bank is constrained to follow the prescribed constant-rate rule $R^n_{\tau,j} = R_{ss}$ in the fiscal-dominant regime. In the monetary-led regime, the central bank chooses any interest rate path with full commitment. Each chosen path implies a rational expectations equilibrium consistent with both regime systems, which serve as feasibility constraints.

Given the quadratic loss, it suffices to work with the linearized equilibrium constraints. Following McKay and Wolf (2023), these constraints can be compactly written as:

$$\mathcal{H}_x \hat{x} + \sum_{\tau=1}^{\infty} \mathcal{H}_x^{\tau} \hat{x}^{\tau} + \mathcal{H}_r \hat{r}^n + \mathcal{H}_{\mathcal{T}} \epsilon^{\mathcal{T}} = 0 \tag{42}$$

where $x := (y, \pi)$ and $\left(\mathcal{H}_x, \{\mathcal{H}_x^{\tau}\}_{\tau}, \mathcal{H}_r, \mathcal{H}_{\mathcal{T}}\right)$ are conformable linear operators derived from the equilibrium system. Inverting this system yields the implementability constraints:

$$\hat{x} = \mathcal{G}_r \, \hat{r}^n + \mathcal{G}_{\epsilon} \, \epsilon^{\mathcal{T}} \tag{43}$$

$$\hat{x}^{\tau} = \mathcal{G}_r^{\tau} \, \hat{r}^n + \mathcal{G}_{\epsilon}^{\tau} \, \epsilon^{\mathcal{T}} \quad \forall \tau \geq 1 \tag{44}$$

where $\left(\mathcal{G}_r, \mathcal{G}_{\epsilon}, \{\mathcal{G}_r^{\tau}, \mathcal{G}_{\epsilon}^{\tau}\}_{\tau}\right)$ are the conditional impulse responses of $x = (y, \pi)$ to monetary policy shocks and the fiscal stimulus.[9]

Letting $\Omega_0 := \text{diag}(\alpha_y, \alpha_\pi) \otimes \text{diag}(1, \beta(1-\delta), \dots)$ and $\Omega_1 := \text{diag}(\alpha_y, \alpha_\pi) \otimes \text{diag}(1, \beta, \dots)$, the full LQ problem is:

$$\begin{aligned} \min_{\hat{x}, \{\hat{x}^{\tau}\}_{\tau}, \hat{r}^n} \quad & \frac{1}{2} \left[\hat{x}' \Omega_0 \hat{x} + \beta\delta \sum_{\tau=1}^{\infty} [\beta(1-\delta)]^{\tau-1} \left(\hat{x}^{\tau\prime} \Omega_1 \hat{x}^{\tau} \right) \right] \\ s.t. \quad & \hat{x} = \mathcal{G}_r \, \hat{r}^n + \mathcal{G}_{\epsilon} \, \epsilon^{\mathcal{T}} \\ & \hat{x}^{\tau} = \mathcal{G}_r^{\tau} \, \hat{r}^n + \mathcal{G}_{\epsilon}^{\tau} \, \epsilon^{\mathcal{T}} \quad \forall \tau \end{aligned} \tag{45}$$

The first-order optimality condition is:

$$\mathcal{G}_r' \, \Omega_0 \hat{x} + \beta\delta \sum_{\tau=1}^{\infty} [\beta(1-\delta)]^{\tau-1} \left(\mathcal{G}_r^{\tau\prime} \, \Omega_1 \hat{x}^{\tau} \right) = 0 \tag{46}$$

When $\delta = 0$, the second term vanishes and the condition collapses to the standard target criterion of New Keynesian models.[10] In this special case, because the Phillips curve depends only on output, the optimal policy fully offsets the aggregate-demand effect of the fiscal stimulus.

When $\delta > 0$, the central bank is constrained in the fiscal-dominant regime and must account for the expected loss there—captured by the second term in equation (46). The tradeoffs in the two regimes point in opposite directions: in the monetary-led regime, raising the interest rate contracts demand and reduces inflation, while the same policy also raises the government's debt burden, exacerbating inflation and output volatility in the fiscal-dominant regime. Optimal policy balances these competing effects.

[9] Given an intended interest rate path $\hat{r}^{n*}$ and consistent inflation path $\hat{\pi}^*$, the equilibrium can be implemented by $\hat{r}^n = \hat{r}^{n*} + \phi_\pi(\hat{\pi} - \hat{\pi}^*)$ with $\phi_\pi > 1$ (Cochrane, 2011). In practice, I implement this by optimizing over the pseudo-shock z in the Taylor rule $\hat{r}^n = \phi_\pi \hat{\pi} + z$.

[10] See Dávila and Schaab (2023) and McKay and Wolf (2023) for a detailed treatment of optimal monetary policy in HANK.

Substituting the implementability constraints yields the closed-form optimal policy:

$$\hat{r}^n = -\left[\mathcal{G}_r' \,\Omega_0\, \mathcal{G}_r + \beta\delta \sum_{\tau=1}^{\infty} [\beta(1-\delta)]^{\tau-1} \left(\mathcal{G}_r^{\tau\prime}\, \Omega_1\, \mathcal{G}_r^{\tau}\right)\right]^{\dagger} \left[\mathcal{G}_r' \,\Omega_0\, \mathcal{G}_\epsilon + \beta\delta \sum_{\tau=1}^{\infty} [\beta(1-\delta)]^{\tau-1} \left(\mathcal{G}_r^{\tau\prime}\, \Omega_1\, \mathcal{G}_\epsilon^{\tau}\right)\right] \epsilon^{\mathcal{T}} \tag{47}$$

where $[\cdot]^{\dagger}$ denotes the pseudo-inverse. This formula applies to both the HANK and RANK models; the only difference between the two lies in the implied impulse responses $\left(\mathcal{G}_r, \mathcal{G}_\epsilon, \{\mathcal{G}_r^{\tau}, \mathcal{G}_\epsilon^{\tau}\}_{\tau}\right)$.

5.2 Computational method

Applying formula (47) requires computing the impulse responses $\left(\mathcal{G}_r, \mathcal{G}_\epsilon, \{\mathcal{G}_r^{\tau}, \mathcal{G}_\epsilon^{\tau}\}_{\tau}\right)$. A simple approach is numerical differentiation—perturbing the model by a small shock and computing the response using the nonlinear algorithm from Section 4.1—but this is computationally expensive and unnecessarily introduces approximation error.

A faster and more accurate approach exploits the linearized equilibrium systems of the two regimes directly. The challenge is to linearize the monetary-led regime, whose equilibrium involves time-varying expectations of all output and inflation contingency paths. In Appendix B.2, I show how to characterize this linearized system using only conventional sequence-space Jacobians derived from the model without regime uncertainty. The key insight is to leverage certainty equivalence to represent expectations of each contingency path as a sequence of unanticipated shocks. With the linearized systems in hand, the impulse responses can be computed by iterating the same algorithm as before. This approach requires only multiplication of low-dimensional matrices and is therefore fast.

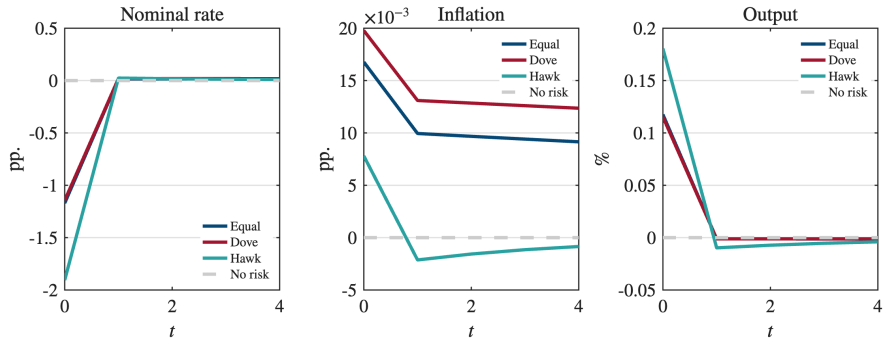
5.3 Results

I evaluate optimal policy responses to a one-time stimulus shock of 1% of steady-state output at $t = 0$ in the calibrated HANK and RANK models. This smaller shock size (relative to the 20% used in Section 4.2) ensures that the linear-quadratic approximation underlying the optimal policy characterization is accurate. To illustrate the inflation-output stabilization tradeoff, I consider three weighting schemes (α_y, α_π): (i) equal weighting $(\alpha_y = 1, \alpha_\pi = 1)$; (ii) output-focused or "dovish" weighting $(\alpha_y = 1, \alpha_\pi = 0)$; and (iii) inflation-focused or "hawkish" weighting $(\alpha_y = 0, \alpha_\pi = 1)$.

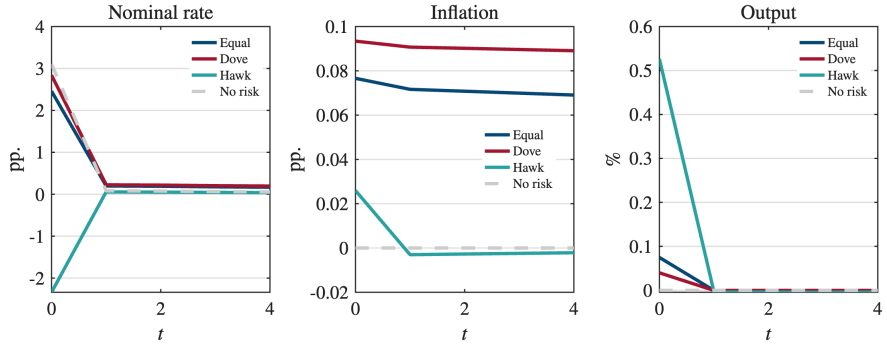
Figure 7 shows the optimal policy rate and the implied inflation and output responses.

RANK In RANK, the optimal policy is to cut the nominal rate substantially on impact, regardless of the weighting scheme. The magnitude of the cut is largest under the hawkish objective. The intuition follows directly from the positive analysis: in RANK, the real effects of the stimulus are driven entirely by the expectation of fiscal dominance, whose potency depends on the level of debt. By reducing the nominal rate immediately after the stimulus, the central bank lowers the real rate,

Figure 7: Optimal Monetary Policy



(a) RANK



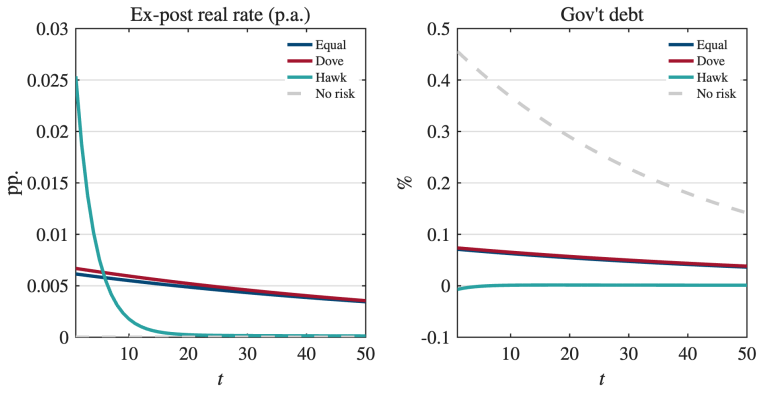
(b) HANK

prevents debt from accumulating, and thereby neutralizes the fiscal dominance risk channel. The rate cut itself stimulates demand, so the central bank promises a slightly higher nominal rate in subsequent periods to smooth the demand effects. The result is that both inflation and output are largely stabilized after the first period.

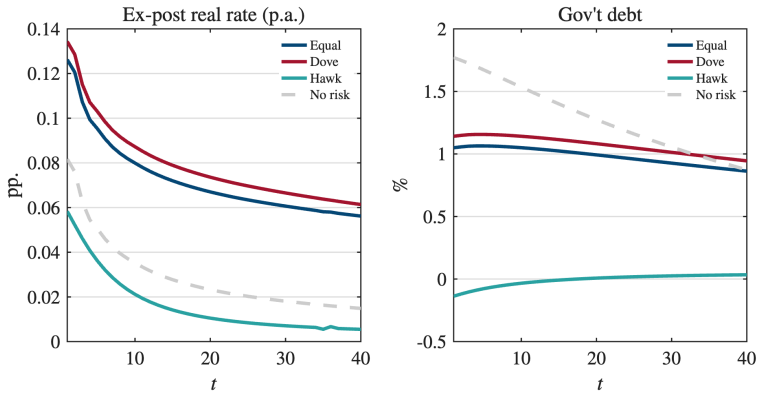
HANK In HANK, the fiscal stimulus has real effects even in the absence of fiscal dominance risk, because households are non-Ricardian. Without fiscal dominance risk, the optimal policy fully offsets the aggregate-demand effect of the transfer; this is feasible because interest rate policy and transfer policy are aggregate equivalents in HANK (Wolf, 2025), and the policy is optimal under any weighting scheme.

With fiscal dominance risk, the optimal response depends on the weighting scheme. When the central bank places equal weight on output and inflation stabilization, or cares only about output, the optimal policy is to raise the nominal rate on impact—though by less than the optimal response under no fiscal dominance risk. When inflation stabilization is the sole objective, the optimal policy is instead to cut the nominal rate, for the same reason as in RANK: reducing the interest rate early limits the accumulation of government debt and thus dampens the expectation channel of fiscal

Figure 8: Real Rate and Government Debt under Optimal Policy



(a) RANK



(b) HANK

dominance.

Long-run real rate The key difference between HANK and RANK emerges in the long-run behavior of the optimal real rate. Figure 8 shows the optimal real rate path alongside the government debt path in both models after the initial period.

In RANK, the initial rate cut substantially offsets the government deficit, so only a modest increase in the long-term real rate is needed to stabilize output. Under the hawkish objective, government debt is nearly fully stabilized and the real rate converges quickly to steady state.

In HANK, when output stabilization is a concern, the direct aggregate-demand effect of the stimulus limits the scope for an initial rate cut relative to the no-risk benchmark. Consequently, government debt remains persistently elevated, keeping the natural rate high through the mechanisms discussed in Section 3.2. To stabilize output in this environment, the real rate must run persistently above steady state as well, as Figure 9b shows. The higher real rate also feeds back into the debt dynamics, eventually pushing debt above the no-risk benchmark and reinforcing the elevation of the

natural rate. This interaction between debt dynamics and the natural rate is a distinctly HANK phenomenon.

Summary Regardless of household heterogeneity, optimal monetary policy tends to accommodate a share of the fiscal deficit by reducing the nominal interest rate (relative to the no-risk benchmark), thereby dampening the expectation channel of fiscal dominance risk. The accommodation is larger when inflation stabilization is the primary objective. In HANK, when output stabilization also matters, the direct demand effect of the fiscal stimulus constrains the extent of accommodation, leaving debt persistently elevated and requiring a higher long-run real rate to stabilize output. Only when inflation stabilization is the sole objective does optimal monetary policy in HANK converge to the RANK prescription of aggressive debt stabilization.

6 Concluding Remarks

This paper develops a HANK model with stochastic regime transitions to study how the anticipated risk of fiscal dominance shapes aggregate dynamics and optimal monetary policy in heterogeneous-agent economies.

The central finding is that the macroeconomic consequences of fiscal dominance risk differ markedly across representative- and heterogeneous-agent environments, even though the expectation channel through which regime uncertainty feeds back into prices and interest rates is common to both. In RANK, a deficit-financed fiscal stimulus triggers higher inflation expectations under fiscal dominance risk, prompting a monetary tightening that persistently depresses output. In HANK, the same expectation channel is present, but three counteracting forces prevent output from contracting. First, non-Ricardian households directly spend the transfer, generating an income effect that RANK abstracts from. Second, the persistently elevated supply of government debt raises the natural rate of interest endogenously through the asset supply effect, narrowing the gap between the real rate and the natural rate. Third, the expectation of high output under fiscal dominance raises current aggregate demand through the intertemporal substitution effect, further elevating the natural rate. These three forces together imply that HANK economies can sustain persistent inflation alongside a stable or even expanding output—a combination absent in RANK.

On the normative side, when inflation stabilization is the primary policy objective, optimal monetary policy calls for accommodating part of the fiscal deficit by reducing the nominal interest rate, and this prescription is largely invariant to household heterogeneity. When output stabilization is also a concern, however, the optimal policy response in HANK diverges sharply from RANK: the direct aggregate-demand effect of the deficit-financed transfer limits the scope for an initial rate cut, leaving government debt persistently elevated and the natural rate persistently high. Optimal policy must then implement a correspondingly higher real-rate path to stabilize output over the medium term. The interaction between debt dynamics and the natural rate is a distinctly HANK phenomenon with no analogue in representative-agent frameworks.

Methodologically, I show how to embed stochastic regime transitions into the sequence-space solution framework, representing the linearized equilibrium of the regime-switching model using conventional sequence-space Jacobians from the regime-certain counterpart. This technique extends naturally to other environments with similar stochastic structure.

Taken together, these results underscore that the threat of fiscal dominance is not merely an abstract determinacy concern: even when the economy remains in the monetary-led regime with the Taylor principle fully satisfied, fiscal dominance risk generates persistent real and nominal distortions whose character depends fundamentally on the distribution of wealth and the marginal propensity to consume across households. Accurately assessing the aggregate consequences of fiscal sustainability risks therefore requires models that take household heterogeneity seriously.

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Appendix A Mathematical Derivation

A.1 Proof of Lemma 1

For ease of notation, in the following, I drop the subscript τ and write $\hat{x}_t$ instead of $\hat{x}_{\tau,t}$. As is well known, the fiscal-dominant regime satisfies the determinacy condition, so there exists a unique bounded equilibrium. Conjecture that in equilibrium $\pi_{t+1} = \gamma\pi_t$ for some $\gamma \in \mathbb{R}$. Iterate forward the Euler equation:

$$\begin{aligned}\hat{y}_t &= \sigma^{-1}\sum_{j=1}^{\infty}\hat{\pi}_{t+j} \\ &= \sigma^{-1}\sum_{j=1}^{\infty}\gamma^j\hat{\pi}_t \\ &= \sigma^{-1}\frac{\gamma}{1-\gamma}\hat{\pi}_t\end{aligned}$$

From the NKPC, we have

$$\begin{aligned}\hat{\pi}_t &= \kappa\hat{y}_t + \beta\gamma\hat{\pi}_t \\ &= \frac{\kappa}{1-\beta\gamma}\hat{y}_t\end{aligned}$$

Combine the two equations and we have

$$\begin{aligned}\frac{\kappa}{1-\beta\gamma} &= \sigma\frac{1-\gamma}{\gamma} \\ \beta\gamma^2 - (1+\beta+\kappa\sigma^{-1})\gamma + 1 &= 0\end{aligned}$$

Let $\lambda := 1+\beta+\kappa\sigma^{-1}$. Note that $\lambda^2 - 4\beta > (1+\beta)^2 - 4\beta = (1-\beta)^2 \geq 0$. Thus, there are two real roots which are given by

$$\gamma = \frac{\lambda \pm \sqrt{\lambda^2 - 4\beta}}{2\beta}$$

Note that

$$\gamma_1 := \frac{\lambda + \sqrt{\lambda^2 - 4\beta}}{2\beta} > \frac{1+\beta}{2\beta} > 1$$

and

$$\gamma_2 := \frac{\lambda - \sqrt{\lambda^2 - 4\beta}}{2\beta} > 0$$

Furthermore, we have $\gamma_2 < 1$ if and only if

$$\begin{aligned}\frac{\lambda - \sqrt{\lambda^2 - 4\beta}}{2\beta} &< 1 \\ \lambda^2 - 4\beta\lambda + 4\beta^2 &< \lambda^2 - 4\beta \\ 1 + \beta &< \lambda\end{aligned}$$

Clearly, the last inequality holds. Therefore, there exists $\gamma = \gamma_2 \in (0, 1)$ that is consistent with a bounded equilibrium. Finally, we can iterate forward the debt equation:

$$\begin{aligned}\hat{b}_t &= \sum_{j=0}^{\infty} R_{ss}^{-j} \hat{\pi}_{t+j} \\ &= \sum_{j=0}^{\infty} (\beta\gamma)^{-j} \hat{\pi}_t \\ &= \frac{1}{1 - \beta\gamma} \hat{\pi}_t\end{aligned}$$

where we have used the fact that $R_{ss} = 1/\beta$. Rearranging the equation yields the desired result.

A.2 Proof of Proposition 2

Given $\beta = 1 = R_{ss}$, we can recast the equilibrium system in the state-space form $A\,\mathbb{E}_t\,\mathbf{z}_{t+1} = B\mathbf{z}_t$, where $\mathbf{z}_t = (\hat{\pi}_t, \hat{y}_t, \hat{b}_t)'$ and the system matrices are:

$$A = \begin{bmatrix} 1-\delta & 0 & \delta(1-\gamma) \\ \frac{1-\delta}{\tilde{\sigma}} & 1-\delta & \frac{\delta}{\tilde{\sigma}} \\ 0 & 0 & 1 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & -\kappa & 0 \\ \frac{\phi_\pi}{\tilde{\sigma}} & 1 & 0 \\ \phi_\pi - \rho_B & 0 & \rho_B \end{bmatrix}$$

The system features one predetermined variable ($\hat{b}_t$) and two jump variables ($\hat{\pi}_t, \hat{y}_t$). By the Blanchard-Kahn condition, the system is determinate if and only if the characteristic equation, $\det(\lambda A - B) = 0$, has exactly two roots outside the unit circle.

Since the system is determinate at $\delta = 0$ (where $\det(A - B) > 0$), by continuity the condition for uniqueness is $\det(A - B) > 0$. We compute the determinant of $A - B$:

$$\begin{aligned}\det(A - B) &= \det \begin{bmatrix} -\delta & \kappa & \delta(1-\gamma) \\ -\frac{\phi_\pi - (1-\delta)}{\tilde{\sigma}} & -\delta & -\frac{\delta}{\tilde{\sigma}} \\ \rho_B - \phi_\pi & 0 & 1 - \rho_B \end{bmatrix} \\ &= (\phi_\pi - 1)\left[\frac{\kappa}{\tilde{\sigma}}(1 - \rho_B - \delta) - (1-\gamma)\delta^2\right] + \gamma(1-\rho_B)\delta^2\end{aligned}$$

Substituting the definition of $\Phi(\delta)$, the condition $\det(A-B)>0$ becomes:

$$(\phi_\pi - 1)\Phi(\delta) > -\gamma(1-\rho_B)\delta^2$$

A.3 Proof of Proposition 3

Under flexible wage, the union's (log-linearized) first-order condition becomes

$$-\sigma \hat{c}_t = \phi \hat{n}_t$$

In equilibrium, $\hat{c}_t = \hat{n}_t = \hat{y}_t$. Thus, the natural rate is such that $\hat{y}_t = 0$ in the monetary-led regime. By definition, the natural rate satisfies the following system

$$\begin{aligned}
\hat{c}_t^U &= -\sigma^{-1}[r_t^* - (1-\alpha)\eta(\hat{b}_{t+1} - \mathbb{E}_t\,\hat{\pi}_{t+1})] + \alpha\,\mathbb{E}_t\,\hat{c}_{t+1}^U \\
\hat{y}_t &= (1-g)\hat{c}_t^U - \frac{\lambda}{1-\lambda}\hat{T}_t \\
\hat{y}_t &= 0
\end{aligned}$$

Combine to obtain

$$\frac{\lambda}{(1-g)(1-\lambda)}\hat{T}_t = -\sigma^{-1}[r_t^* - (1-\alpha)\eta(\hat{b}_{t+1} - \mathbb{E}_t\,\hat{\pi}_{t+1})] + \alpha\left[(1-\delta)\frac{\lambda}{(1-g)(1-\lambda)}\hat{T}_{t+1} + \frac{\delta}{1-g}\hat{y}_{t+1}^F\right]$$

where we have used the fact that under the fiscal-dominant regime $\hat{c}_t^{U,F} = \frac{1}{1-g}\hat{y}_t^F$. Let $\bar{\sigma} = \frac{\lambda\sigma}{(1-\lambda)(1-g)}$ and rearrange the above equation

$$r_t^* = -\bar{\sigma}\hat{T}_t + \alpha(1-\delta)\bar{\sigma}\hat{T}_{t+1} + \alpha\delta\bar{\sigma}\hat{y}_{t+1}^F + (1-\alpha)\eta(\hat{b}_{t+1} - \mathbb{E}_t\,\hat{\pi}_{t+1})$$

By the fiscal rule, we have

$$\begin{aligned}
\hat{T}_{t+1} &= (1-\rho_B)B_{ss}(\hat{b}_{t+1} - \hat{\pi}_{t+1}) \\
&= (1-\rho_B)B_{ss}(\hat{b}_{t+1} - \mathbb{E}_t\,\hat{\pi}_{t+1} + \mathbb{E}_t\,\hat{\pi}_{t+1} - \hat{\pi}_{t+1}) \\
&= (1-\rho_B)B_{ss}\left[\hat{b}_{t+1} - \mathbb{E}_t\,\hat{\pi}_{t+1} + \delta(\hat{\pi}_{t+1}^F - \hat{\pi}_{t+1})\right]
\end{aligned}$$

where $\hat{\pi}_{t+1}$ ($\hat{\pi}_{t+1}^F$) is the inflation rate at time $t+1$ under the monetary-led (fiscal-dominant) regime. Substitute back and we have

$$r_t^* = \xi_b(\hat{b}_{t+1} - \mathbb{E}_t\,\hat{\pi}_{t+1}) + \frac{\lambda\bar{\sigma}}{1-\lambda}\left[-\hat{T}_t + \xi_\pi(\hat{\pi}_{t+1}^F - \hat{\pi}_{t+1})\right] + \xi_y\hat{y}_{t+1}^F$$

where $\xi_b = \alpha\frac{\lambda\bar{\sigma}}{1-\lambda}(1-\delta)(1-\rho_B)B_{ss} + (1-\alpha)\eta > 0$, $\xi_\pi = \alpha\delta(1-\delta)(1-\rho_B)B_{ss} > 0$, and $\xi_y = \alpha\delta\bar{\sigma} > 0$.

A.4 Two-Agent Bond-in-Utility (TABU) Model

Here I provide more details on the TABU model.

A.4.1 Setup

The model is identical to the RANK model in Section 3.1 except for the household block. The economy is populated by two types of households: a hand-to-mouth type with population share $\lambda \in (0,1)$ and an unconstrained type with population share $1-\lambda$. As in the HANK and RANK model, I assume a benevolent labor union that demands labor uniformly from the two types so that they earn the same labor income. The taxes they paid are also the same, except in the steady-state where a redistributive transfer is implemented to equalize the consumption of the two types.

The hand-to-mouth type is constrained to consume all of his disposable income every period:

$$C_t^H = w_t N_t - T_t + \mathcal{T}_t + T_{ss}^H \tag{A.1}$$

where w_t is real wage, N_t is labor supplied, T_t is lump-sum tax, $\mathcal{T}_t$ is exogenous lump-sum transfer, and T_{ss}^H is steady-state redistributive transfer to the hand-to-mouth type.

The unconstrained type has complete access to the government debt market and solves the following maximization problem

$$\begin{aligned} \max_{\{C_t^U, B_{t+1}^U\}_{t=0}^{\infty}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{(C_t^U)^{1-\sigma}}{1-\sigma} + \varphi^b \frac{(B_t^U/\Pi_t)^{1-\eta}}{1-\eta} \right] \\ s.t. \quad C_t^U + \frac{B_{t+1}^U}{R_t^n} = w_t N_t - T_t + \mathcal{T}_t - T_{ss}^U + \frac{B_t^U}{\Pi_t} \end{aligned} \tag{A.2}$$

where T_{ss}^U is steady-state redistributive tax on the unconstrained type. Note that households derive utility from the real value of the government debt, as is natural. Take first-order conditions for the unconstrained type:

$$(C_t^U)^{-\sigma} = \beta \, \mathbb{E}_t \left\{ \frac{R_t^n}{\Pi_{t+1}} \left[(C_{t+1}^U)^{-\sigma} + \varphi^b \left(\frac{B_{t+1}^U}{\Pi_{t+1}} \right)^{-\eta} \right] \right\} \tag{A.3}$$

The FOC together with the budget constraint characterizes the consumption policy of the unconstrained type.

We can solve for the steady-state redistributive tax explicitly. Using the government budget constraint, we have

$$T_{ss} = B_{ss}(1 - R^{-1}) + g$$

where $g = G/Y$ is the steady-state government spending-to-GDP ratio. Let $C_{ss} = C_{ss}^H = C_{ss}^U$.

Market clearing implies

$$w_{ss}N_{ss} = Y_{ss} = C_{ss} + G_{ss}$$

By normalization, $Y_{ss} = 1$ so $C_{ss}^H = 1 - g$. Substitute back into the hand-to-mouth type's budget constraint (A.1):

$$T_{ss}^H = T_{ss} - g = B_{ss}(1 - R^{-1})$$

Resource constraint further implies

$$\begin{aligned}\lambda T_{ss}^H &= (1-\lambda)T_{ss}^U \\ T_{ss}^U &= \frac{\lambda}{1-\lambda}B_{ss}(1-R^{-1})\end{aligned}$$

A.4.2 Log-linearization

In the following, $\hat{x}_t$ denote the log-linearized transform of variable X_t, and $\hat{X}_t$ denote the linearized transform. Log-linearizing the unconstrained type's FOC (A.3):

$$-\sigma\hat{c}_t^U = \hat{r}_t^n - \mathbb{E}_t\,\hat{\pi}_t + \frac{\beta R_{ss}}{C_{ss}^{-\sigma}}\,\mathbb{E}_t\left[-\sigma C_{ss}^{-\sigma}\,\hat{c}_{t+1}^U - \varphi^b\eta(B_{ss}^U)^{-\eta}(\hat{b}_{t+1}^U - \hat{\pi}_{t+1})\right]$$

Note that the steady state of equation (A.3) reads

$$C_{ss}^{-\sigma} = \beta R_{ss}\left(C_{ss}^{-\sigma} + \varphi^b(B_{ss}^U)^{-\eta}\right)$$

Let $\alpha = \beta R_{ss}$. Rearrange

$$\varphi^b(B_{ss}^U)^{-\eta} = \frac{1-\alpha}{\alpha}C_{ss}^{-\sigma}$$

Asset market clearing implies $(1-\lambda)B_{t+1}^U = B_{t+1}$. Thus,

$$\hat{b}_{t+1}^U = \hat{b}_{t+1}$$

Combine everything together and we have

$$\hat{c}_t^U = -\sigma^{-1}[\hat{r}_t^n - \mathbb{E}_t\,\hat{\pi}_{t+1} - (1-\alpha)\eta(\hat{b}_{t+1} - \mathbb{E}_t\,\hat{\pi}_{t+1})] + \alpha\,\mathbb{E}_t\,\hat{c}_{t+1}^U$$

Substitute the equilibrium condition $Y_t = w_t N_t$ into the hand-to-mouth type's budget constraint (A.1) and linearize it:

$$\hat{C}_t^H = \hat{y}_t - \hat{T}_t$$

Market clearing implies

$$\hat{y}_t = (1-\lambda)(1-g)\hat{c}_t^U + \lambda \hat{C}_t^H$$

Combine and rearrange

$$\hat{y}_t = (1-g)\hat{c}_t^U - \frac{\lambda}{1-\lambda}\hat{T}_t$$

The rest of the log-linearized system is the same as the RANK model. We conclude that the full

$$\begin{aligned}
\hat{c}_t^U &= -\sigma^{-1}[\hat{r}_t^n - \mathbb{E}_t\,\tilde{\pi}_{t+1} - (1-\alpha)\eta(\hat{b}_{t+1} - \mathbb{E}_t\,\tilde{\pi}_{t+1})] + \alpha\,\mathbb{E}_t\,\tilde{c}_{t+1}^U \\
\hat{y}_t &= (1-g)\hat{c}_t^U - \frac{\lambda}{1-\lambda}(\hat{T}_t - \epsilon_t^{\mathcal{T}}) \\
\hat{\pi}_t &= \kappa \hat{y}_t + \beta\,\mathbb{E}_t\,\tilde{\pi}_{t+1} \\
\hat{r}_t^n &= \phi_\pi \hat{\pi}_t \\
\hat{b}_{t+1} &= \hat{r}_t^n + R_{ss}\rho_B(\hat{b}_t - \hat{\pi}_t) + \epsilon_t^{\mathcal{T}} \\
\hat{T}_t &= (1-\rho_B)B_{ss}\left(\hat{b}_t - \hat{\pi}_t\right)
\end{aligned}$$

A.4.3 Fiscal-dominant regime

In the following, I characterize the fiscal-dominant regime. Normalize $t = 0$ to be the time the economy transitions to the fiscal-dominant regime. The full system is now given by

$$\begin{aligned}
\hat{c}_t^U &= -\sigma^{-1}[-\hat{\pi}_{t+1} - (1-\alpha)\eta(\hat{b}_{t+1} - \hat{\pi}_{t+1})] + \alpha\hat{c}_{t+1}^U \\
\hat{y}_t &= (1-g)\hat{c}_t^U \\
\hat{\pi}_t &= \kappa\hat{y}_t + \beta\hat{\pi}_{t+1} \\
\hat{b}_{t+1} &= R_{ss}(\hat{b}_t - \hat{\pi}_t)
\end{aligned}$$

where we have substituted out the policy rules $\hat{r}_t^n = \hat{T}_t = 0$. Equivalently, we have

$$\begin{aligned}
\hat{y}_t &= -\bar{\sigma}^{-1}[-\hat{\pi}_{t+1} - (1-\alpha)\eta(\hat{b}_{t+1} - \hat{\pi}_{t+1})] + \alpha\hat{y}_{t+1} \\
\hat{\pi}_t &= \kappa\hat{y}_t + \beta\hat{\pi}_{t+1} \\
\hat{b}_{t+1} &= R_{ss}(\hat{b}_t - \hat{\pi}_t)
\end{aligned}$$

where $\bar{\sigma} = \frac{\sigma}{1-g}$. Guess that $\hat{\pi}_{t+1} = \gamma\hat{\pi}_t$ for some $\gamma \in (0,1)$. Iterate forward the government debt equation:

$$\hat{b}_t - \hat{\pi}_t = \sum_{j=1}^{\infty} R_{ss}^{-j}\hat{\pi}_{t+j} = \sum_{j=1}^{\infty}\left(\frac{\gamma}{R_{ss}}\right)^j \hat{\pi}_t = \frac{\gamma}{R_{ss}-\gamma}\hat{\pi}_t$$

Substitute back to the IS curve

$$\begin{aligned}\hat{y}_t &= -\bar{\sigma}^{-1}\left[-\hat{\pi}_{t+1} - (1-\alpha)\eta\frac{\gamma}{R_{ss}-\gamma}\hat{\pi}_{t+1}\right] + \alpha\hat{y}_{t+1} \\ &= \bar{\sigma}^{-1}\left[1 + (1-\alpha)\eta\frac{\gamma}{R_{ss}-\gamma}\right]\gamma\hat{\pi}_t + \alpha\hat{y}_{t+1}\end{aligned}$$

Iterate forward the equation

$$\begin{aligned}\hat{y}_t &= \bar{\sigma}^{-1}\left[1 + (1-\alpha)\eta\frac{\gamma}{R_{ss}-\gamma}\right]\gamma\sum_{j=0}^{\infty}\alpha^j\hat{\pi}_{t+j} \\ &= \bar{\sigma}^{-1}\left[1 + (1-\alpha)\eta\frac{\gamma}{R_{ss}-\gamma}\right]\gamma\sum_{j=0}^{\infty}(\alpha\gamma)^j\hat{\pi}_t \\ &= \bar{\sigma}^{-1}\left[1 + (1-\alpha)\eta\frac{\gamma}{R_{ss}-\gamma}\right]\frac{\gamma}{1-\alpha\gamma}\hat{\pi}_t\end{aligned}$$

On the other hand, by the NKPC, we have

$$\begin{aligned}\hat{\pi}_t &= \kappa\hat{y}_t + \beta\gamma\hat{\pi}_t \\ \hat{y}_t &= \frac{1-\beta\gamma}{\kappa}\hat{\pi}_t\end{aligned}$$

Therefore, γ must satisfy

$$\bar{\sigma}^{-1}\left[1 + (1-\alpha)\eta\frac{\gamma}{R_{ss}-\gamma}\right]\frac{\gamma}{1-\alpha\gamma} = \frac{1-\beta\gamma}{\kappa} \tag{A.4}$$

Rearrange

$$(\alpha\beta)\gamma^3 + [\kappa\bar{\sigma}^{-1}((1-\alpha)\eta - 1) - (\alpha\beta R_{ss} + \alpha + \beta)]\gamma^2 + [\kappa\bar{\sigma}^{-1}R_{ss} + (\alpha+\beta)R_{ss} + 1]\gamma - R_{ss} = 0$$

Next, I show that $\gamma \in (0,1)$ exists and is unique. Let $f(\gamma)$ be the polynomial function on the LHS. Clearly, $f(0) = -R_{ss} < 0$. We have

$$\begin{aligned}f(1) &= \alpha\beta + [\kappa\bar{\sigma}^{-1}((1-\alpha)\eta - 1) - (\alpha\beta R_{ss} + \alpha + \beta)] + [\kappa\bar{\sigma}^{-1}R_{ss} + (\alpha+\beta)R_{ss} + 1] - R_{ss} \\ &= \kappa\bar{\sigma}^{-1}[(1-\alpha)\eta + R_{ss} - 1] + \alpha\beta - (\alpha+\beta) + 1 - R_{ss}[\alpha\beta - (\alpha+\beta) + 1] \\ &= \kappa\bar{\sigma}^{-1}[(1-\alpha)\eta + R_{ss} - 1] - (1-\alpha)(1-\beta)(R_{ss}-1)\end{aligned}$$

When $R_{ss} = 1$, $f(1) > 0$. Under typical calibration, $R_{ss} \approx 1$ so by continuity $f(1) > 0$ should typically hold. In particular, when $R_{ss} > 1$ and $\kappa > \bar{\sigma}(1-\alpha)(1-\beta)$, we have $f(1) > 0$. From now on, I maintain the assumption $f(1) > 0$. By the Intermediate Value Theorem, $\gamma \in (0,1)$ exists.

To prove uniqueness, go back to the original equation (A.4). Note that the LHS is strictly increasing in γ on $(0,1)$ and the RHS is strictly decreasing in γ. Therefore, there is at most one

solution on $(0,1)$. We conclude that $\gamma \in (0,1)$ exists and is unique.

Given γ and initial condition $\hat{b}_0$, it is easy to derive the full solution:

$$\begin{aligned}
\hat{\pi}_0 &= (1 - R_{ss}^{-1}\gamma)\hat{b}_0 \\
\hat{\pi}_{t+1} &= \gamma \hat{\pi}_t \\
\hat{y}_t &= \frac{1-\beta\gamma}{\kappa}\hat{\pi}_t \\
\hat{b}_{t+1} &= \frac{R_{ss}}{R_{ss}-\gamma}\hat{\pi}_{t+1}
\end{aligned}$$

A.4.4 Interest Rate Jacobian

In the following, I extend the iMPC analysis of Auclert et al. (2024) to the sequence-space Jacobian with respect to interest rates. Formally, in HANK, RANK, or TABU, we can always write the aggregate consumption as a function of the sequences of after-tax income, real rate, and time-0 inflation:

$$C = C(\{Y_t - T_t, R_t\}_{t=0}^{\infty}, \Pi_0)$$

where $R_t = R_t^n/\Pi_{t+1}$ is the ex-ante real rate. The iMPC is defined as the (infinite-dimensional) Jacobian matrix $\mathcal{J}_Y^C := \left[\frac{\partial C_i}{\partial Y_j}\right]_{ij}$. Similarly, the interest rate Jacobian is defined as $\mathcal{J}_R^C := \left[\frac{\partial C_i}{\partial R_j}\right]_{ij}$.

I now characterize $\mathcal{J}_R^C$ in the TABU model. First, note that the consumption function of the unconstrained type is implicitly defined by the following system

$$\begin{aligned}
(C_t^U)^{-\sigma} &= \beta\, \mathbb{E}_t \left\{ \frac{R_t^n}{\Pi_{t+1}} \left[(C_{t+1}^U)^{-\sigma} + \varphi^b \left(B_{t+1}^U\right)^{-\eta} \right] \right\} \\
C_t^U + \frac{B_{t+1}^U}{R_t} &= Y_t - T_t + \mathcal{T}_t - T_{ss}^U + B_t^U
\end{aligned}$$

Implicitly differentiate the system with respect to R_t

$$\begin{aligned}
\hat{c}_t^U &= -\sigma^{-1}[\hat{r}_t - (1-\alpha)\eta \hat{b}_{t+1}^U] + \alpha \hat{c}_{t+1}^U \\
\hat{b}_{t+1}^U &= \hat{r}_t - \gamma \hat{c}_t^U + R_{ss}\hat{b}_t^U
\end{aligned}$$

where $\gamma := \frac{R_{ss}C_{ss}^U}{B_{ss}^U}$. Define the geometrically-weighted summation operator:

$$\mathcal{S}^R := \begin{bmatrix} 1 & 0 & 0 & \dots \\ R_{ss} & 1 & 0 & \dots \\ R_{ss}^2 & R_{ss} & 1 & \dots \\ R_{ss}^3 & R_{ss}^2 & R_{ss} & \dots \\ \vdots & \vdots & \vdots & \ddots \end{bmatrix}$$

Let $\mathcal{F}$ be the shift-forward operator. Then we can rewrite the system in sequence-space form:

$$(\mathcal{I} - \alpha\mathcal{F})\hat{c}^U = -\sigma^{-1}\left[\hat{r} - (1-\alpha)\eta\mathcal{F}\hat{b}^U\right]$$
$$\mathcal{F}\hat{b}^U = \mathcal{S}^R(\hat{r} - \gamma\hat{c}^U)$$

Combine to get

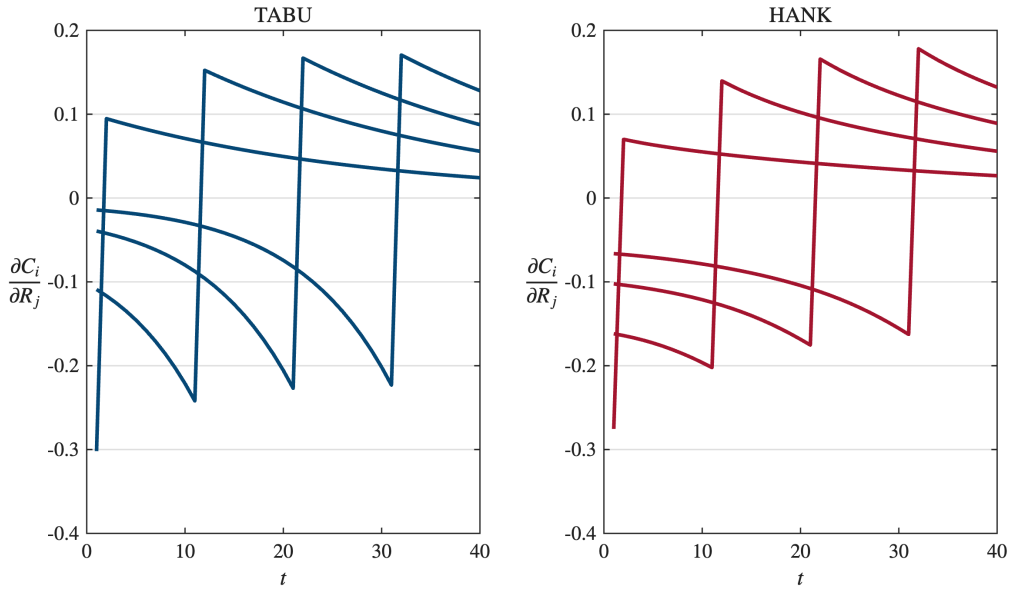
$$(\mathcal{I} - \alpha\mathcal{F})\hat{c}^U = -\sigma^{-1}\left[\hat{r} - (1-\alpha)\eta\mathcal{S}^R(\hat{r} - \gamma\hat{c}^U)\right]$$
$$\left[\mathcal{I} - \alpha\mathcal{F} + \sigma^{-1}\eta\gamma(1-\alpha)\mathcal{S}^R\right]\hat{c}^U = -\sigma^{-1}\left[\mathcal{I} - (1-\alpha)\eta\mathcal{S}^R\right]\hat{r}$$

Invert and we have

$$\mathcal{J}_R^C = -(1-\lambda)\frac{C_{ss}}{R_{ss}}\left[\sigma(\mathcal{I} - \alpha\mathcal{F}) + \eta\gamma(1-\alpha)\mathcal{S}^R\right]^{-1}\left[\mathcal{I} - (1-\alpha)\eta\mathcal{S}^R\right]$$

Figure A.1 shows the interest rate Jacobians in TABU and HANK. Each line correspond to a particular column in the Jacobian. The three parameters (α, η, λ) of the TABU model are jointly calibrated to best approximate the HANK Jacobian. We can see that the TABU model does reasonably well in replicating the Jacobian. The main difference is that the HANK model features more anticipation effects due to the presence of wealthy households.

Figure A.1: Interest Rate Jacobian in TABU and HANK



Appendix B Computation

B.1 Nonlinear solution

Below, I describe the algorithm for solving the rational expectation equilibrium in the regime-switching HANK model. The algorithm is proposed by Lin and Peruffo (2024) and is built upon the Sequence-Space Jacobian method of Auclert et al. (2021).

In the following, the notation x_t^τ represents the value of a variable x at time t conditional on the regime switches at time τ.

1. Choose a truncation horizon $T \gg 0$ after which the economy is sufficiently close to the steady state. In practice, I choose $T = 300$ and do not find the results change when further increasing the value.

2. As an initial guess, solve for the perfect foresight equilibrium $(\mathbf{X}_t^{PF})_{t=0}^T$ with no fiscal dominance risk using the quasi-Newton algorithm and the sequence-space Jacobians. In particular, compute the path of distributions $(\mathbf{D}_t^{PF})_{t=0}^T$ and set $F_\tau^\tau = F_\tau^{PF}$ $\forall \tau > 0$.

3. For each $\tau > 0$, given the distribution F_τ^τ at the period when the regime switches, solve for the associated transition path to the steady state $(\mathbf{X}_t^\tau)_{t=\tau}^{\tau+T}$. Note that this step can be parallelized.

4. Use the value functions $(V_\tau^\tau)_{\tau=1}^T$ solved in step 3 to iterate backward the household Bellman equation under the monetary-led regime. Compute the implied aggregate output, inflation, and savings. Check the equilibrium conditions.

5. Using the quasi-Newton algorithm and the sequence-space Jacobians, update the stochastic paths $\{(\mathbf{X}_t^\tau)_{t=0}^{\tau-1}\}_{\tau=1}^T$. Note that for all $\tau > 0$, we have

$$\mathbf{X}_t^\tau = \mathbf{X}_t^{\tau+j} \quad \forall t < \tau,\ j \geq 0$$

   In particular, compute the path of distributions $(\mathbf{D}_\tau)_{\tau=1}^T$.

6. Repeat step 3-5 until the stochastic paths $\{(\mathbf{X}_t^\tau)_{t=0}^{\tau-1}\}_{\tau=1}^T$ converge and the equilibrium conditions are satisfied.

B.2 Linear solution

A linear approximation of the rational expectation equilibrium can be computed by applying the iterative algorithm outlined in Appendix B.1 to the linearized equilibrium systems of the two regimes. Here, I analytically characterize the linearized system.

Notation Let's assume that the state space of the household has been discretized by a grid and the model is truncated at some long horizon $T \gg 0$. Define the following sequence-space objects:

$$\mathcal{C}_t^x := \left(\frac{\partial c_0}{\partial x_t}\right)' \mathbf{D}_{ss}$$
$$\mathcal{D}_t^x := \left(\frac{\partial \Lambda_0}{\partial x_t}\right)' \mathbf{D}_{ss}$$
$$\mathcal{E}_t := (\Lambda_{ss})^t c_{ss}$$

where x denotes a generic aggregate variable such as inflation and Λ denote the transition matrix such that $\mathbf{D}_{t+1} = \Lambda_t' \mathbf{D}_t$. These objects can be computed by iterating backward the Bellman equation of the household problem. Define the expectation matrix

$$\mathcal{E} := \begin{bmatrix} \mathcal{E}_0 & \mathcal{E}_1 & \dots & \mathcal{E}_{T-1} \end{bmatrix}$$

Each row of $\mathcal{E}$ represents the expected time path of consumption in the steady state for a household starting at the corresponding grid point. Following Auclert et al. (2021), define the "fake-news" matrix for a generic aggregate variable x as follows:

$$\mathcal{F}^x := \begin{bmatrix} \mathcal{C}_0^x & \mathcal{C}_1^x & \dots & \mathcal{C}_{T-1}^x \\ \mathcal{E}_0' \mathcal{D}_0^x & \mathcal{E}_0' \mathcal{D}_1^x & \dots & \mathcal{E}_0' \mathcal{D}_{T-1}^x \\ \mathcal{E}_1' \mathcal{D}_0^x & \mathcal{E}_1' \mathcal{D}_1^x & \dots & \mathcal{E}_1' \mathcal{D}_{T-1}^x \\ \vdots & \vdots & & \vdots \\ \mathcal{E}_{T-2}' \mathcal{D}_0^x & \mathcal{E}_{T-2}' \mathcal{D}_1^x & \dots & \mathcal{E}_{T-2}' \mathcal{D}_{T-1}^x \end{bmatrix}$$

This matrix encapsulates the effect of a shock $\hat{x}$ announced at time 0 on the consumption path $\hat{c}$ when the shock is reverted at time 1 ex-post. Lastly, define the T-dimensional shift matrix

$$\mathcal{S} := \begin{bmatrix} 0 & 1 & 0 & \dots & 0 \\ 0 & 0 & 1 & & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & \dots & 1 \\ 0 & 0 & 0 & \dots & 0 \end{bmatrix}$$

This matrix shifts a path forward by one period: $(a_0, a_1, \dots, a_{T-2}, a_{T-1}) \mapsto (a_1, a_2, \dots, a_{T-1}, 0)$. Note that its transpose S' instead shifts a path backward by one period: $(a_0, a_1, \dots, a_{T-2}, a_{T-1}) \mapsto (0, a_0, \dots, a_{T-3}, a_{T-2})$.

Linearized fiscal-dominant regime Given that there is no more regime uncertainty in the fiscal-dominant regime, it is straightforward to linearize the equilibrium system. The result is a

system of two equations:

$$\begin{aligned}\hat{y}^{\tau} &= \mathcal{J}_y \hat{y}^{\tau} + \mathcal{J}_\pi \hat{\pi}^{\tau} + \mathcal{E}' \hat{\mathbf{D}}_{\tau} \\ \hat{\pi}^{\tau} &= \mathcal{K} \hat{y}^{\tau}\end{aligned} \tag{B.1}$$

where $\mathcal{J}_x := \left[\frac{\partial C_i}{\partial X_j}\right]_{ij}$ is the conventional Jacobian of the aggregate consumption function with respect to $X \in \{Y, \Pi\}$ and $\mathcal{K} := \kappa(\mathcal{I} - \beta\mathcal{S})^{-1}$ is the generalized slope of the Phillips curve. The term $\mathcal{E}'\hat{\mathbf{D}}_{\tau}$ represents the first-order effect of a change in the initial distribution—namely, the distribution at time τ—on the time path of aggregate consumption. Combining the two equations in the system (B.1), we obtain a general solution of $(\hat{y}^{\tau}, \hat{\pi}^{\tau})$ as a function of $\hat{\mathbf{D}}_{\tau}$:

$$\hat{y}^{\tau} = (\mathcal{I} - \mathcal{J}_y - \mathcal{J}_\pi \mathcal{K})^{-1} \mathcal{E}' \hat{\mathbf{D}}_{\tau} \tag{B.2}$$

$$\hat{\pi}^{\tau} = \mathcal{K} (\mathcal{I} - \mathcal{J}_y - \mathcal{J}_\pi \mathcal{K})^{-1} \mathcal{E}' \hat{\mathbf{D}}_{\tau} \tag{B.3}$$

Note that the solution mapping does not vary with τ.

Linearized monetary-led regime Unlike the fiscal-dominant regime, linearizing the monetary-led regime requires computing the first-order effects of all contingency paths $\{\hat{x}^{\tau}\}_{\tau}$ on consumption and inflation in the monetary-led regime. This can be accomplished using a generalized fake-news algorithm.

To illustrate the algorithm, consider the effect of the first contingency path, $\hat{x}^1$. By certainty equivalence, from the time-0 perspective, this path is equivalent to the perfect-foresight shock $\hat{x}^{1*} := (0, \hat{x}^1_0, \ldots, \hat{x}^1_{T-2})'$ scaled by the probability of fiscal dominance δ. At time-1 of the monetary-led regime, this contingency path becomes impossible, which is equivalent to the shock being reverted. Thus, the first-order effect on aggregate consumption is exactly given by

$$\mathfrak{C}^1 = \mathcal{F}^x(\delta \cdot \hat{x}^{1*}) = \delta \cdot (\mathcal{F}^x \mathcal{S}')\hat{x}^1$$

where in the second equality we have used the fact that $\hat{x}^{1*} = S'\hat{x}^1$.

In general, a contingency path $\hat{x}^{\tau}$ is only rendered impossible after time τ. Before that, the perceived probability of this path is changing over time — in particular, the probability is $\delta(1-\delta)^{\tau-1-t}$ for time $t < \tau$. By certainty equivalence, we can regard these changes in probability as a sequence of unanticipated "fake-news" shocks that revert one period after its announcement. Formally, define the perfect-foresight shock

$$\hat{x}^{\tau *} := (\underbrace{0, \ldots, 0}_{\tau \text{ zeros}}, \hat{x}^{\tau}_0, \ldots, \hat{x}^{\tau}_{T-1-\tau})' = (S')^{\tau}\hat{x}^{\tau}.$$

At time 0, the perceived probability of this shock is $\delta(1-\delta)^{\tau-1}$, so its effect on the entire path of

aggregate consumption is given by

$$\begin{aligned}\mathfrak{C}_0^\tau &= \mathcal{F}^x(\delta(1-\delta)^{\tau-1}\cdot\hat{x}^{\tau*})\\ &= \delta\cdot[(1-\delta)^{\tau-1}\mathcal{F}^x](\mathcal{S}')^\tau\hat{x}^\tau\end{aligned}$$

At time 1, this time-0 shock is reverted, and another shock with perceived probability $\delta(1-\delta)^{\tau-2}$ hits such that the household's expectation remains rational. Similarly, its effect on the entire path of aggregate consumption is given by

$$\begin{aligned}\mathfrak{C}_1^\tau &= (\mathcal{S}'\mathcal{F}^x\mathcal{S})[(\delta(1-\delta)^{\tau-2}\cdot\hat{x}^{\tau*})]\\ &= \delta\cdot[(1-\delta)^{\tau-2}\mathcal{S}'\mathcal{F}^x\mathcal{S}](\mathcal{S}')^\tau\hat{x}^\tau\end{aligned}$$

The left-multiplication of $\mathcal{F}^x$ with $\mathcal{S}'$ shifts the effects to time-1 onward, while the right-multiplication with $\mathcal{S}$ pulls the shock one-period forward to match the perceived horizon.

Summing over all the effects up to time τ leads to the following result:

Lemma 2. *In the monetary-led regime, the consumption Jacobian with respect to a contingency path $\hat{x}^\tau$ is given by*

$$\mathfrak{J}_x^\tau = \delta\cdot\left(\sum_{t=0}^{\tau-1}(1-\delta)^{\tau-1-t}\left[(\mathcal{S}')^t\mathcal{F}^x\mathcal{S}^t\right]\right)(\mathcal{S}')^\tau \tag{B.4}$$

This generalized fake news algorithm also applies to the path along the monetary-led regime. Fix a path $\hat{x}$ and let $\Omega := \mathrm{diag}(1,(1-\delta),\ldots,(1-\delta)^{T-1})$. At time 0, this path is equivalent to the shock $\Omega\hat{x}$. From the time-t perspective, the continuation of this path is equivalent to the shock $\Omega\mathcal{S}^t\hat{x}$. Summing over all the effects leads to the following result:

Lemma 3. *In the monetary-led regime, the consumption Jacobian with respect to a path $\hat{x}$ along the monetary-led regime is given by*

$$\mathfrak{J}_x = \sum_{t=0}^{T-1}(\mathcal{S}')^t\mathcal{F}^x\Omega\mathcal{S}^t \tag{B.5}$$

where $\Omega := diag(1,(1-\delta),\ldots,(1-\delta)^{T-1})$. In particular, $\mathfrak{J}_x = \mathcal{J}_x$ when $\delta = 0$.

We next linearize the Phillips curve. Given the recursive formulation, only inflation in the first period of a contingency path, $\hat{\pi}_0^\tau$, matters. Let $\mathfrak{s}^\tau := [\mathbf{1}\{i=\tau, j=\tau\}]_{ij}$ be the selection matrices. Then the linearized Phillips curve is given by

$$\hat{\pi} = \kappa\hat{y} + \beta\left((1-\delta)\mathcal{S}\hat{\pi} + \delta\sum_{\tau=1}^{T-1}\mathfrak{s}^\tau\hat{\pi}^\tau\right)$$

To sum up, the linearized monetary-led regime is given by

$$\hat{y} = \mathfrak{J}_y(\hat{y} - \hat{T}) + \mathfrak{J}_r\hat{r}^n + \mathfrak{J}_\pi\hat{\pi} + \mathfrak{J}_\mathcal{T}\epsilon^\mathcal{T} + \sum_{\tau=1}^{T-1}(\mathfrak{J}_y^\tau\hat{y}^\tau + \mathfrak{J}_\pi^\tau\hat{\pi}^\tau) \tag{B.6}$$

$$\hat{\pi} = \kappa\hat{y} + \beta\left((1-\delta)\mathcal{S}\hat{\pi} + \delta\sum_{\tau=1}^{T-1}\mathfrak{s}^\tau\hat{\pi}^\tau\right) \tag{B.7}$$

$$\hat{r}^n = \rho_R\mathcal{S}'\hat{r}^n + (1-\rho_R)\phi_\pi\hat{\pi} \tag{B.8}$$

$$\hat{T} = (1-\rho_B)\frac{B_{ss}}{T_{ss}}(\mathcal{S}'\hat{b} - \hat{\pi}) \tag{B.9}$$

$$\hat{b} = \hat{r}^n + \rho_B R_{ss}(\mathcal{S}'\hat{b} - \hat{\pi}) + \epsilon^\mathcal{T} \tag{B.10}$$

Lastly, the linearized dynamics of the distribution $\hat{\mathbf{D}}$, which serves as inputs into the fiscal-dominant regime, can be computed recursively using the Jacobian of the transition matrix $\{\mathcal{D}^x\}_x$ and the perceived probabilities of future paths.

Iterative algorithm To solve the model, we can apply the nonlinear solution algorithm in Appendix B.1 to the linearized system (B.2)-(B.3) and (B.6)-(B.10). In practice, I use the linearized solution without fiscal dominance risk as the initial guess.