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Abstract

This paper develops a tractable heterogeneous-agent New Keynesian model with overlapping generations, labour market frictions, and a participation margin that allows households to permanently exit labour and financial markets. The paper evaluates whether fiscal redistribution can enhance efficiency under different monetary regimes. A stylized transfer shock reduces inequality, but its effects hinge on the monetary policy stance and the persistence of the shock. Dovish policies consistently deliver better labour market and efficiency outcomes—even when redistribution remains unchanged. The results highlight the efficiency costs of strict inflation targeting and a potential complementarity between redistributive fiscal policy and accommodative monetary policy.

Key Words: Heterogeneous Agents Models, Monetary Policy, Fiscal Policy, Inequality, Labour Market Frictions.
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Over the past decade, macroeconomic research has increasingly focused on the distributional consequences of monetary and fiscal policy. This shift reflects a growing recognition—by both researchers and policymakers—that inequality affects the transmission and effectiveness of stabilization policies. Central bankers such as Yellen (2016), Carney (2016), and Powell (2020) have explicitly called for more research on how monetary policy interacts with inequality, while institutions like the Bank of England have elevated heterogeneity and redistribution as core themes in their research agendas[1]. At the same time, political leaders have underscored the primacy of economic efficiency and growth. The UK Prime Minister Sir Keir Starmer has recently declared that "Growth is our number one priority". Similar rhetoric has been echoed by the Trump administration in the United States, which also adopted a growth-centric approach to fiscal and monetary policy coordination. Although framed in terms of "growth," these positions are best understood as advocating for macroeconomic policies that prioritize efficiency and employment over redistribution. Taken

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[1] See "The monetary toolkit," Bank of England Research Agenda 2024, forwarded by Governor Andrew Bailey.

together, this juxtaposition highlights a central and enduring policy tension: how to reconcile inequality-reducing measures with the objective of maximizing macroeconomic efficiency.

This paper takes that tension as its starting point. Specifically, it investigates whether fiscal interventions that reduce inequality—such as temporary increases in government transfers—can be reconciled with a growth-centric approach that emphasizes labour market performance and output stabilization. The analysis also examines how the effectiveness and welfare implications of such interventions vary across different monetary policy regimes (i.e., hawkish versus dovish stances).

To address these questions, this paper develops a tractable heterogeneous agent framework in the tradition of the Blanchard (1985)-Yaari (1965) perpetual youth model, where households face a probabilistic end to their lives and new cohorts enter the economy each period. The consumer side builds on Galí (2021) and Bonchi & Nisticò (2024), introducing an additional layer of heterogeneity: in each period, households also face a constant probability of permanently losing access to the labour and financial markets thus, becoming inactive[2]. At the start of the period, households learn their status before making consumption and saving decisions. Active households work, consume, save, and exit the economy upon death. Inactive households, by contrast, rely solely on government transfers for consumption. This builds on Bonchi & Nisticò (2024), who characterize inactive households as "rule-of-thumbers" or "hand-to-mouth" (HtM) agents. By excluding them from the labour market, the model generates a parametrised "participation margin", consistent with empirical evidence. This is relevant because constrained consumers—those at the bottom of the wealth distribution—are both more reliant on transfers and more likely to exit the labour market due to structural economic changes.

Building on this foundation, the paper extends the FLANK[3] framework of Galí (2021) and Angeletos et al. (2024*a*,*b*) to study the distributional effects of monetary and fiscal policy and their interaction with labour market frictions, in a heterogeneous agent economy with a realistic amount of public debt. As in Angeletos et al. (2024*a*,*b*), the model includes finite lives and government debt, which break Ricardian equivalence. This causes households to discount the future differently from their time preference and exhibit larger short-run marginal propensities to consume (MPC). Here, MPC heterogeneity is also introduced through the coexistence of active and inactive agents, capturing a broader range of behaviour and enhancing the model's relevance for more complex HANK environments.

Nominal rigidities are incorporated following Blanchard & Galí (2007, 2010), with both price and wage stickiness included, as both are key features of real economies. The monetary authority follows a simple interest rate rule, while the fiscal authority uses lump-sum taxes levied only on active households to finance government debt service and transfers to unemployed and inactive agents. Fiscal adjustments also follow a simple rule, adjusting taxes when the debt-to-GDP ratio deviates from its steady-state target. However, recent trends—especially in the U.S.—suggest a more passive fiscal stance, with debt rollovers favoured over tax hikes (see Auerbach & Yagan 2025). Accordingly, this paper focuses on scenarios where fiscal

[2]The model assumes a small but persistent probability that active households transition into permanent inactivity. This can be interpreted as capturing long-term exits from the labour market due to disability, retirement, or discouragement. Motivated by Krueger 2017, the model parameter governing inactivity is calibrated to match a steady-state stock of inactive households of about 35% of the total population while allowing for significant heterogeneity in consumption behaviour.**??** explains the calibration process.

[3]The term FLANK was first suggested by Beaudry et al. 2025.

authorities respond less than one-to-one to debt deviations. Because taxation is lump-sum and labour supply is inelastic, redistribution does not introduce efficiency losses, isolating the impact of taxation on the wealth distribution from incentive and insurance effects (see Aiyagari & McGrattan 1998). Still, policy adjustments inevitably redistribute wealth and consumption, generating trade-offs.

Labour market frictions are introduced via a standard Search and Matching (SAM) framework, à la Mortensen & Pissarides (1999), enabling frictional unemployment and richer dynamics that better track those in quantitative HANK economies[4]. Wages are determined through Nash bargaining between individual workers and firms. The participation margin modifies the well-known surplus-sharing rule.

To preserve tractability and analytical clarity, the model abstracts from aggregate risk and instead studies the perfect foresight equilibrium path following a one-time, unanticipated, and autocorrelated aggregate shock—an MIT shock in the spirit of Boppart et al. (2018). This modelling choice is consistent with standard practice in both the HANK literature (e.g., Auclert 2019; Achdou et al. 2022; Le Grand & Ragot 2023) and in perpetual youth settings (e.g., Leith et al. 2019; Acharya et al. 2023; Karaferis et al. 2024). The shock is interpreted as a temporary increase in transfers to inactive households and serves as a stylized fiscal expansion (i.e. government spending shock).

Furthermore, by assuming logarithmic preferences and omitting aggregate uncertainty, the model admits closed-form solutions for all per capita variables and preserves the property of near-linear aggregation. This analytical tractability is essential for isolating the dynamic effects of fiscal and monetary policy in a heterogeneous-agent setting. While the inclusion of aggregate risk would allow for the study of precautionary behaviour, volatility, and richer asset pricing implications, it would significantly complicate the analysis. In particular, in the presence of aggregate risk, closed-form aggregation is only possible under strong assumptions—specifically, the inclusion of recursive preferences with the coefficient of relative risk aversion equals the inverse of the inter-temporal elasticity of substitution (as in log utility). Departures from this knife-edge case, or the introduction of aggregate uncertainty, would require fully numerical methods of the type developed by Krusell & Smith (1998) or Maliar et al. (2010), and would obscure the central mechanisms of interest.

Consistent with recent HANK findings (e.g., Auclert et al. 2024), this study shows that following the shock, deviating from strict inflation targeting results in higher equilibrium paths across all (per capita) variables associated with economic efficiency and labour market outcomes—even when transfer shock fails to stimulate the macroeconomy.

The paper quantifies the dynamic responses to this fiscal shock and computes the aggregate welfare along the equilibrium path under alternative monetary policy regimes. While the main body of the paper discusses the welfare results in detail, the full derivation of the social welfare function and formal assumptions are provided in the Supplemental Appendix (A.2). To derive this closed-form expression for the micro-founded welfare metric, the analysis introduces a cohort-specific transfer scheme that eliminates inter-generational inequality among active households. Cross-sectional inequality—arising from the participation margin between active and inactive households—remains central to the analysis.

Under this setup, Section 3.5 computes the welfare consequences of the transfer shock across different

[4] See Debortoli & Galí 2018, Cantore et al. 2022, and Komatsu 2023, for detailed discussion

monetary regimes. The key finding is that welfare losses are significantly lower under dovish monetary policy—particularly when transfers fail to stimulate real activity—highlighting the efficiency costs associated with aggressive inflation stabilization in heterogeneous-agent economies. For completeness, the Supplemental Appendix also presents dynamic responses to a TFP shock, confirming the robustness of these results beyond the baseline fiscal intervention. The approach taken here retains micro-foundational rigour while offering a transparent benchmark for understanding the distributional and efficiency trade-offs that arise from fiscal and monetary interactions—even in the absence of aggregate shocks.

The remainder of the paper is structured as follows: Section 1 reviews the related literature. Section 2 presents the model, calibration, and solution method. Section 3 discusses the analytical and numerical results. Section 4 concludes.

1 Related Literature

First, it advances the macro-labour literature by exploring the interaction between frictional labour markets and policy frameworks. A substantial body of research has examined how monetary policy affects labour market dynamics, including seminal works by Hall (2003), Faia (2008), Christoffel et al. (2009), Blanchard & Galí (2010), Dennis & Kirsanova (2021), Komatsu (2023), and Cantore et al. (2022), among others. While most studies in this area focus on monetary policy, notable exceptions such as Cantore et al. (2014) and Lama & Medina (2019) analyse the impact of fiscal policy on unemployment and job creation. These contributions underscore how introducing search and matching (SAM) frictions in the labour market alters the transmission mechanisms of monetary and fiscal policies in response to aggregate shocks.

Second, the paper also contributes to the Overlapping Generations (OLG) literature built on the Blanchard (1985)-Yaari (1965) perpetual youth framework. This strand examines policy questions in settings that introduce heterogeneity while retaining analytical tractability. Foundational work includes Leith & Wren-Lewis (2000), Kirsanova et al. (2007), Leith & Von Thadden (2008), Rigon & Zanetti (2018), and Leith et al. (2019), who demonstrated that incorporating Non-Ricardian agents alters well-established results from the representative agent literature. More recent studies extend these models by incorporating uninsurable idiosyncratic income risk and/or heterogeneity in marginal propensities to consume (MPC), offering a richer framework that better aligns with empirical dynamics observed in large-scale HANK models.

Prominent examples include the "Finite-Lifespan Agent New Keynesian" (FLANK) framework of Galí (2021), Bonchi & Nisticò (2024), and Angeletos et al. (2024*a*,*b*) as well as the "OLG-HANK" models of Acharya et al. (2023) and Karaferis et al. (2024)-leverage finite lifespans to break Ricardian equivalence, generating higher short-run MPCs. This feature makes these environments particularly useful for deriving policy insights in heterogeneous agent environments. Moreover, these OLG frameworks are also closely related to the seminal work of Nistico (2016), which introduces heterogeneity through stochastic transitions in and out of financial markets. This mechanism generates disparities between savers and HtM consumers, similar to Bilbiie (2008), but also within the saver population itself. By highlighting financial wealth fluctuations as a driver of consumption dynamics, these models reveal policy trade-offs between output stabilization, inflation targeting, and inequality. Notably, they suggest that strict inflation targeting may be suboptimal in heterogeneous agent settings. However, to preserve analytical tractability, many studies in this strand adopt simplifying assumptions, such as degenerate wealth distributions or preferences that facilitate simple aggregation. As a result, these models primarily focus on qualitative differences between heterogeneous agent frameworks and their representative agent counterparts.

Third, the paper contributes to the emerging literature integrating labour market (SAM) frictions into Two-Agent New Keynesian (TANK) and tractable heterogeneous agent New Keynesian (THANK) models to better track the dynamics observed in richer HANK models. Early contributions, including Ravn & Sterk (2017) and Debortoli & Galí (2018), who explore how precautionary saving motives and uninsurable labour income risk influence monetary policy transmission and labour market fluctuations. More recent work by Dolado et al. (2021), Cantore et al. (2022), and Komatsu (2023) incorporates SAM frictions into TANK models, enhancing the analysis of monetary policy transmission and its impact on inequality.

This paper synthesizes insights from these three strands by extending the framework of Galí (2021) to develop a "Two-Agent FLANK" model augmented with SAM frictions in the labour market. This approach enables a detailed exploration of the complex interplay between policy choices, inequality, and labour market frictions in response to one-time unanticipated aggregate shocks.

2 The model

The general framework presented below describes a New Keynesian economy augmented with an overlapping generations structure, following the Blanchard (1985)-Yaari (1965) (BY, henceforth) approach, and Search and Matching frictions in the labour market, in the Diamond-Mortensen-Pissarides tradition. The consumer side is modelled after Galí (2021) and Bonchi & Nisticò (2024), with a constant population size normalized to one. Each individual[5] faces a constant survival probability, γ, and a new cohort of size $(1-\gamma)$ enters the economy in each period. All active individuals participate in the labour and financial markets, but face a constant probability $(1-f)$ of transitioning to inactive status, where they permanently lose market access and rely solely on government transfers. At the beginning of each period all households—including those belonging to newly born cohorts— first discover their status (active or inactive) before making consumption and saving decisions. This creates a coexistence of active and inactive households in each period, with constant population shares of ξ and $(1-\xi)$, respectively. Dividends are equally distributed across active individuals but they are not internalised. Following Acharya et al. (2023) and Karaferis et al. (2024), active households smooth consumption using actuarial bonds, which are exchanged for government bonds through frictionless financial firms.

The model incorporates both price rigidity in the tradition of Rotemberg (1982) and wage rigidity following Hall (2003) and Blanchard & Galí (2007, 2010). The frictional labour market is modelled after Faia (2008) and Dennis & Kirsanova (2021), allowing for equilibrium unemployment. Fiscal policy raises revenue through lump-sum taxes on active households to service government debt, finance unemployment

[5]The terms 'individual', 'agent', consumer', and 'household' are all used interchangeably. The reason for this is that the model assumes a perfect insurance setup among individuals of the same cohort who also share the same idiosyncratic status (i.e. active or inactive). As such, this system gives us the advantage of examining collective behaviour within each cohort, rather than delving into the intricacies of individual behaviours.

benefits, and provide transfers to inactive households. Both monetary and fiscal authorities follow simple rules governing the tax and interest rate dynamics.

2.1 Households

2.1.1 The Active Household Type

At any time t, an active or unrestricted[6] individual who belongs to the cohort born at time $s \leq t$ derives utility from real private consumption $c^u_{s|t}$. The paper index agents by $s \in [0,1]$ to refer to the cohort that they belong. Intuitively, s, marks the age of the cohort. The active household s 's optimisation problem is:

$$\max_{\left\{c^u_{s|t}\right\}_{t=0}^{\infty}} \sum_{t=s}^{\infty} (\beta\gamma)^{t-s} u\left(c^u_{s|t}\right)$$

where, the period felicity takes the form

$$u\left(c^u_{s|t}\right) = \log\left(c^u_{s|t}\right)$$

Subject to time t budget constraint

$$P_t c^u_{s|t} + \tilde{P}^M_t \mathscr{A}^M_{s|t+1} + \tilde{P}^S_t \mathscr{A}^S_{s|t+1} = \begin{pmatrix} P_t n_t w_t h^u_{s|t} + P_t (1-n_t) \frac{b}{\xi} + P_t \frac{d_t}{\xi} - P_t \frac{T_t}{\xi} \\ + \left(1+\rho \tilde{P}^M_t\right) \cdot f \cdot \mathscr{A}^M_{s|t} + f \cdot \mathscr{A}^S_{s|t} \end{pmatrix}$$

where, $c^u_{s|t}$ is the period t consumption level of an active consumer who belongs to cohort s. $\tilde{P}^M_t$ and $\mathscr{A}^M_{s|t}$ are the price and the quantity of long-term actuarial bonds, respectively. Similarly, $\tilde{P}^S_t$ and $\mathscr{A}^S_{s|t}$ stands for the price and quantity of short-term actuarial bonds. Newly born individuals enter the market with zero bond holdings, $\mathscr{A}^M_{s|s} = \mathscr{A}^S_{s|s} = 0$. In the benchmark case, there is no fiscal transfer to newborns and/or wealth tax on existing households to ensure *ex ante* equality across all households as in Acharya et al. (2023) or Angeletos et al. (2024*a*,*b*). The paper omits this simplification to allow for the presence of both inter-generational wealth inequality as well as cross-sectional consumption/income inequality. All prices are taken as given by the households. As in Galí (2021), the aggregate labour supply is exogenous[7] and uniformly allocated across all cohorts. As such, the exogenous labour supply of any individual household is normalised to unity ($h^u_{s|t} = 1, \forall t, s$). Next, n_t, refers to the real employment rate. Every cohort has the same fraction of employed and unemployed households. As such, the paper does not include any cohort-specific index in the employment rate ($n^s_t \equiv n_t$). The aggregate dividends, d_t, are also uniformly distributed across all active cohorts but consumers do not internalise them. Consistent with the macro-labour literature, the paper assumes that for each generation, s, there is perfect insurance within type with respect to the idiosyncratic employment shock. This assumption is based on the premise that each household consists of multiple members who may not all (simultaneously) share the same employment status. Household members pool

[6]The paper uses, u, as a superscript to denote the variables associated with the unrestricted household.

[7]The assumption of exogenous labour supply resolves the well- known of problem of the PY frameworks that the individual labour supply is downward sloping. With, individuals who belong to older generations may exhibit negative labour supply. This issue only occurs when households make endogenous labour/leisure decisions and leisure is considered a normal good (see Ascari & Rankin 2007).

their resources together to ensure that each member consumes an equal amount. The unemployment benefit or replacement rate, b, is parametrised to correspond with the empirical evidence (see Shimer 2005). Finally, T_t stands for the period t level of the lump-sum tax, levied only on active households.

As in Leith et al. (2019) and Karaferis et al. (2024), before recasting the individual household s's budget constraint in real terms, the paper needs to introduce a measure of real assets of cohort s

$$\mathscr{W}^{u}_{s|t} = \frac{\left(1+\rho \tilde{P}^{M}_{t}\right) a^{M}_{s|t} + a^{S}_{s|t}}{(1+\pi_t)}$$

Where, $a^{i}_{s|t}$ is the ratio of the number of each type of assets to the price level given as

$$a^{i}_{s|t} = \frac{\mathscr{A}^{(i)}_{s|t}}{P_{t-1}}, i \in \{M, S\}$$

Intuitively, this measure of real assets of cohort s, $\mathscr{W}^{u}_{s|t}$, is the portfolio of real actuarial/private bonds held by an individual household belonging to cohort s. Then, the period t budget constraint in real terms takes the form

$$c^{u}_{s|t} + \frac{\gamma \cdot f}{R_t} \mathscr{W}^{u}_{s|t+1} = y^{u}_{s|t} + f \cdot \mathscr{W}^{u}_{s|t} \tag{1}$$

With the household s's net real non- financial income being denoted as

$$y^{u}_{s|t} = \frac{w_t n_t \xi}{\xi} + \frac{d_t}{\xi} + (1-n_t)\frac{b}{\xi} - \frac{T_t}{\xi} \tag{2}$$

As discussed above, solving the profit maximisation of the financial intermediaries yields the *ex-ante* real interest rate R_t ,

$$\frac{\gamma \cdot f}{R_t} = \tilde{P}^{S}_{t}(1+\pi_{t+1}). \tag{3}$$

and the price of the long-term actuarial bonds as

$$\tilde{P}^{M}_{t} \frac{R_t}{\gamma \cdot f} = \frac{\left(1+\rho \tilde{P}^{M}_{t+1}\right)}{(1+\pi_{t+1})} \tag{4}$$

With both asset prices being taken as given by any active individual. Now, solving the individual household s's optimisation problem yields the individual consumption Euler equation of a representative active agent who belongs to generation s

$$\Lambda^{u}_{s|t} = (\beta R_t) \Lambda^{u}_{s|t+1}$$

where,

$$\Lambda^{u}_{s|t} = \left(c^{u}_{s|t}\right)^{-1} \tag{5}$$

Thus, allowing us to rewrite the individual Euler equation in the more familiar form as:

$$\left(c^u_{s|t}\right)^{-1} = \beta R_t \left(c^u_{s|t+1}\right)^{-1} \tag{6}$$

Combining the individual household budget constraint, together with the individual Euler equation, and the no-arbitrage condition, yields the individual household s's consumption function

$$c_{s|t} = (1-\beta\gamma)\left(\gamma \cdot f \cdot \mathscr{W}_{s|t} + \zeta_{s|t}\right) \tag{7}$$

where, $\zeta_{s|t}$ represents generation s's human wealth, given as the discounted value of labour income and profits, where the effective discount factor accounts for the probability of survival, γ, as well the probability of becoming inactive, $(1-f)$:

$$\begin{aligned}
\zeta_{s|t} &\equiv y_{s|t} + \sum_{k=1}^{\infty} (\gamma \cdot f)^k \prod_{l=0}^{k-1} \left(\frac{1}{R_{t+l}}\right) y_{s|t+k} \\
&= y_{s|t} + \left(\frac{\gamma \cdot f}{R_t}\right) \zeta_{s|t+1}
\end{aligned} \tag{8}$$

2.1.2 The Inactive Household Type

Similarly, at any time t, there also exist inactive individuals or Rule-of-Thumbers[8] who belongs to the generation born at time $s \leq t$. All constrained individuals are identical and hence, any inactive household s derives utility from real private consumption $c^r_{s|t}$.

Although necessary due to their homogeneity, they are also indexed by cohort-specific index $s \in [0,1]$. Thus, the optimisation problem of a representative inactive household who belongs to cohort $s \leq t$ is:

$$\max_{\left\{c^r_{s|t}\right\}_{t=0}^{\infty}} \sum_{t=s}^{\infty} (\beta\gamma)^{t-s} u\left(c^r_{s|t}\right)$$

where, the period felicity takes the form

$$u\left(c^r_{s|t}\right) = \log\left(c^r_{s|t}\right)$$

Subject to the time t real budget constraint

$$c^r_{s|t} = \left(\frac{T^r_t}{1-\xi}\right) \tag{9}$$

As shown by the period t budget constraint, this "Keynesian" household type consumes only out of exogenous wealth transfers. These transfers are made in lump-sum fashion and since "rule-of-thumbers" do not have access to either the labour market or to any saving/borrowing vehicles, there is no consumption, income or wealth dispersion among inactive individuals.

[8] The paper uses, r, as a superscript to denote the variables associated with the Rule-of-Thumbers.

2.2 Financial Intermediaries

As in Acharya et al. (2023) and Karaferis et al. (2024), financial intermediaries operate in a perfectly competitive market. They are just an aggregation device in the sense, that financial firms make no profit and their only purpose is to trade actuarial bonds (households private assets) for government bonds with the same maturity. By definition, the real profit of intermediaries is the difference between total bonds and total amount of actuarial bonds in the economy in $t+1$,

$$\Pi = \left(1+\rho P^M_{t+1}\right) b^M_{t+1} + b^S_{t+1} - \left(1+\rho \tilde{P}^M_{t+1}\right) f \cdot \gamma a^L_{t+1} - f \cdot \gamma a^S_{t+1}, \tag{10}$$

where b^J_{t+1} are total government bonds and $f \cdot \gamma a^J_{t+1}$ are total actuarial bonds at time $t+1$, i.e. $f \cdot \gamma a^J_{t+1} = (1-\gamma)\sum_{s=-\infty}^{t+1} (f \cdot \gamma)^{t+1-s} a^J_{s|t+1}$. The intermediaries maximize (10) subject to the constraint,

$$-\tilde{P}^M_t a^M_{t+1} - \tilde{P}^S_t a^S_{t+1} + P^M_t b^M_{t+1} + P^S_t b^S_{t+1} \leqslant 0. \tag{11}$$

and the optimization yields

$$\frac{1}{\tilde{P}^S_t} = \frac{\left(1+\rho \tilde{P}^M_{t+1}\right)}{\tilde{P}^M_t}, \tag{12}$$

$$\tilde{P}^S_t = f \cdot \gamma \cdot P^S_t, \tag{13}$$

$$\frac{1}{P^S_t} = \frac{\left(1+\rho P^M_{t+1}\right)}{P^M_t}, \tag{14}$$

Notice that the intermediaries' profits are zero and the *ex ante* returns on short and long-bonds are equalized. However, as discussed in Karaferis et al. (2024), one should be careful to note that this does not imply that the *ex post* real interest rates will be equalized in the presence of one-off shocks to the perfect foresight equilibrium path.

The short-term nominal interest rate is denoted as,

$$\frac{1}{1+i_t} = P^S_t, \tag{15}$$

and the real interest rate is,

$$R_t = \frac{\gamma \cdot f}{\tilde{P}^S_t\left(1+\pi_{t+1}\right)} = \frac{1}{P^S_t\left(1+\pi_{t+1}\right)} = \frac{1+i_t}{1+\pi_{t+1}}. \tag{16}$$

2.3 Government

The government issues nominal long-term and short-term bonds, for which the maturity matches that of the actuarial bonds used by households. The government budget constraint in nominal terms takes the form

$$P^M_t \mathscr{B}^M_{t+1} + P^S_t \mathscr{B}^S_{t+1} = \left(1+\rho P^M_t\right) \mathscr{B}^M_t + \mathscr{B}^S_t + P_t b\left(1-n_t\right) + P_t T^r_t - P_t T_t$$

where P_t^M is price of long-term bonds, and P_t^S is price of short-term bonds. Tax revenue is collected using lump-sum taxes, $P_t T_t$. Taxes follow a simple rule specified below (see eq.(58)). The total unemployment subsidy paid by the government across unemployed households is $P_t b(1-n_t)$. While, the total wealth transfer paid to non-participating households in each period, t, is denoted by T_t^r. The government budget constraint can be re-written in real terms as,

$$(1+\pi_{t+1}) P_t^S B_{t+1} = B_t + b(1-n_t) + T_t^r - T_t \tag{17}$$

where, B_t is a measure of the real value of the government's portfolio

$$B_t = \frac{\left(\left(1+\rho P_t^M\right) b_t^M + b_t^S\right)}{(1+\pi_t)} \tag{18}$$

and

$$b_t^J = \frac{\mathscr{B}_t^J}{P_{t-1}}, J \in \{M, S\}$$

For simplicity, the paper assumes that short-term government bonds are in zero net supply $\left(b_t^S = 0, \forall t\right)$ whilst, due to the inclusion of the tax rule, the equilibrium supply of long-term government bonds is given exogenously to correspond with the average annualised debt-to-GDP ratio observed in the data $\left(b^M = b^{M*}\right)$.

2.4 Aggregation and Market Clearing

Aggregate (per capita) variables are calculated as the weighted sum of individual variables across all cohorts for each type, adjusted by the proportion of that type in the overall population.

$$x_t = (1-\gamma) \sum_{s=-\infty}^{t} (f \cdot \gamma)^{t-s} x_{s|t}^u + \gamma(1-f) \sum_{s=-\infty}^{t} (f \cdot \gamma)^{t-s} x_{s|t}^r \tag{19}$$

$$= \xi \cdot x_t^u + (1-\xi) \cdot x_t^r \tag{20}$$

Aggregation within each type proceeds as follows:

1. **For Active Households:**

$$\xi \cdot x_t^u = (1-\gamma) \sum_{s=-\infty}^{t} (f \cdot \gamma)^{t-s} x_{s|t}^u \tag{21}$$

This represents the contribution from individuals starting from cohort s up current time t, accounting for both the survival probability γ and the likelihood of remaining active f. The term $(1-\gamma)$ accounts for newly born cohorts each period, while $(f \cdot \gamma)^{t-s}$ weights the contribution based on the time cohorts have been active.

2. **For Inactive Households:**

$$(1-\xi) \cdot x_t^r = \gamma(1-f) \sum_{s=-\infty}^{t} (f \cdot \gamma)^{t-s} x_{s|t}^r \tag{22}$$

Inactive households include individuals who have transitioned from being active. The probability of being inactive by time t is captured by $\gamma(1-f)$, while each inactive cohort is weighted by $(f\cdot\gamma)^{t-s}$, reflecting the survival up to time t.

As such, aggregate (per capita) consumption is defined as

$$c_t = \xi \cdot c_t^u + (1-\xi)\cdot c_t^r \tag{23}$$

Similarly, the aggregate labour supply is

$$h_t = (1-\gamma)\sum_{s=-\infty}^{t}(f\cdot\gamma)^{t-s}h_{s|t}^{u} + \gamma(1-f)\sum_{s=-\infty}^{t}(f\cdot\gamma)^{t-s}h_{s|t}^{u}$$

For active households, the individual labour supply is exogenously fixed to unity $\left(h_{s|t}^{u}=1,\forall t\right)$ whilst inactive households do not have access to the labour market $\left(h_{s|t}^{u^r}=0,\forall t\right)$. However, for the labour market to clear, the aggregate labour supply must equal the aggregate labour demand, hence

$$h_t = \int_0^1 h_t(j)\,dj = \xi \tag{24}$$

Combining eq.(9) and eq.(2) and applying the aggregation rule (see eq.(19)) delivers the aggregate non-financial income as:

$$\begin{aligned} y_t &= w_t n_t \xi + d_t + (1-n_t)\,b + T_t^r \\ &= \xi\cdot y_t^u + (1-\xi)\cdot y_t^r \end{aligned}$$

Now, since actuarial bonds, $J=\{S,M\}$ are only held by the active household type and hence, the expression for the aggregate actuarial bonds is given as:

$$f\cdot\gamma\cdot a_t^J := (1-\gamma)\sum_{s=-\infty}^{t}(f\cdot\gamma)^{t-s}a_{s|t}^{J}$$

Furthermore, in order to derive the aggregate budget constraint for the active household type, one needs to first compute $(1-\gamma)\sum_{s=-\infty}^{t}(f\cdot\gamma)^{t-s}a_{s|t+1}^{J}$. Which takes the form

$$a_{t+1}^J = (1-\gamma)\sum_{s=-\infty}^{t}(f\cdot\gamma)^{t-s}a_{s|t+1}^{J}$$

Since newly born generations enter the market with zero assets $\left(a_{t+1|t+1}^{J}=0\right)$.

It also follows that,

$$f\cdot\gamma\cdot\mathscr{W}_t^u = (1-\gamma)\sum_{s=-\infty}^{t}(f\cdot\gamma)^{t-s}\mathscr{W}_{s|t}^u$$

$$\mathscr{W}_{t+1}^u = (1-\gamma)\sum_{s=-\infty}^{t}(f\cdot\gamma)^{t-s}\mathscr{W}_{s|t+1}^u$$

And, for the asset market to clear, it follows that the real value of the government portfolio (see eq.(18)) equals the real value of the private portfolio

$$B_t = f\cdot\gamma\cdot\mathscr{W}_t \tag{25}$$

Furthermore, the aggregate household budget constraint is derived by combining the budget constraint of each household type and applying the aggregation rule (see eq.(19)).

$$c_t + \frac{f\cdot\gamma}{R_t}\mathscr{W}_{t+1}^u = y_t + f\cdot\gamma\mathscr{W}_t^u - T_t \tag{26}$$

and, using the asset market clearing condition, I can re- write eq.(26)) as

$$c_t + \frac{1}{R_t}B_{t+1} = y_t + B_t - T_t \tag{27}$$

Now, combing eq.(27) with the government budget constrain eq.(17) yields the product market equilibrium condition. That is

$$c_t = \xi w_t n_t + d_t$$

As shown below in the firms' block, aggregate dividends (45) are given as

$$d_t = \left(1-\frac{\Phi}{2}\pi_t^2\right)Y_t - \xi w_t n_t - \kappa v_t$$

So, the aggregate resource constraint takes the familiar form

$$c_t = \left(1-\frac{\Phi}{2}\pi_t^2\right)Y_t - \kappa v_t \tag{28}$$

Finally, the aggregate consumption Euler Equation for the active population is given as

$$c_t^u = \frac{1}{\beta R_t}\left(c_{t+1}^u + \frac{(1-f\cdot\gamma)}{f\cdot\gamma}\frac{(1-\beta\gamma)}{\xi}B_{t+1}\right) \tag{29}$$

where, the aggregate consumption function of the active types takes the form

$$\xi\cdot c_t^u = (1-\beta\gamma)(f\cdot\gamma\cdot\mathscr{W}_t + \xi\cdot\zeta_t) \tag{30}$$

while, the aggregate human wealth $(\xi\cdot\zeta_t)$ of the active consumers is

$$\xi \cdot \zeta_t = \xi \cdot y_t^u + \left(\frac{f \cdot \gamma}{R_t}\right) \zeta_{t+1} \tag{31}$$

2.5 The Cross-Sectional Consumption Inequality Index

Following Debortoli & Galí (2018) and Komatsu (2023), the paper defines a simple measure for capturing the cross-sectional consumption inequality (S_t) as

$$S_t = 1 - \frac{c_t^r}{c_t^u} \tag{32}$$

With S_t capturing how the average consumption of inactive households relates to the average consumption of active households, ignoring their respective shares in the total population. If $S_t = 0$ it means that exogenous wealth transfer paid to inactive households is high enough to eliminate the cross-sectional inequality. In this case, the model still features non-trivial inequality but only among active generations. Whereas, if the probability of becoming inactive approaches zero then, the model collapses to the standard perpetual youth environment as described in Kirsanova et al. (2007), Rigon & Zanetti (2018) and Leith et al. (2019).

2.6 The Production Sector

There is a continuum of monopolistic competitive firms $j \in [0,1]$ with each firm producing a differentiated good j. Firms meet workers on a decentralised matching market. The labour relations are determined according to the standard Mortensen & Pissarides (1999) framework. Workers are hired from the unemployment pool whilst the searching process for a firm involves a fixed cost (κ). This means that there is free entry and any firm who is willing to pay this fixed cost can post vacancies. Workers' wages are determined through a Nash bargaining process which takes place on an individual basis. All active individuals have the same (exogenous) labour supply and thus, there is a single market wage regardless of the workers' cohort.

2.6.1 Search & Matching Frictions in the Labour Market

The description of the frictional labour market closely follows Dennis & Kirsanova (2021). The number of workers employed by firm j, with $j \in [0,1]$, is denoted by $n_t(j)$. At the end of each period, the number of workers employed by a specific firm (j) is determined by the number of retained employees from the previous period, adjusted for exogenous separations and new hires. The search for a worker involves a fixed cost, κ, and the probability of finding a worker depends on a **matching function** $(m(\bar{m}_t, u_t, v_t) \equiv m_t)$ that transforms unemployed agents (u_t) and vacancies (v_t) into matches:

$$m_t = \bar{m}_t (v_t)^{1-\omega} (u_t)^{\omega} \tag{33}$$

where, the **matching elasticity** with respect to unemployment is denoted by $\omega \in (0,1)$ and $\bar{m}_t$ is the matching efficiency. The matching efficiency takes the form:

$$\bar{m}_t = \bar{m} \cdot \exp\left(2 \cdot \mu \cdot \left(Y_t - Y_{t-1}\right)\right) \tag{34}$$

where, $\bar{m}$ refers to the standard (exogenous) equilibrium matching efficiency. However, as in Komatsu (2023), the expression includes a cyclical component, $\exp\left(2 \cdot \mu \cdot \left(Y_t - Y_{t-1}\right)\right)$. This component is included since many empirical studies have found that the matching efficiency tends to be quite pro-cyclical[9]. Labour market tightness (ϑ_t), is defined as the ratio of vacancies (v_t) to unemployment (u_t).

$$\vartheta_t = \frac{v_t}{u_t} \tag{35}$$

The variable ϑ_t is crucial as it reflects the health and efficiency of the labour market. Specifically, it determines two key probabilities: the job-filling rate ($q(\vartheta_t) \equiv q_t$), indicating the likelihood of a firm's vacancy being filled, and the job-finding rate ($p(\vartheta_t) \equiv p_t$), representing the probability that an unemployed worker will secure a job. These probabilities are defined as follows:

$$q(\vartheta_t) = \bar{m}_t (\vartheta_t)^{-\omega} \tag{36}$$

$$p(\vartheta_t) = \vartheta_t \cdot q(\vartheta_t) \tag{37}$$

Firms base their decisions on these rates, posting vacancies until the expected payoff from hiring equals the marginal costs. As such, the aggregate employment in the economy evolves over time as:

$$n_t = (1-\rho)\, n_{t-1} + q\left(\vartheta_t\right) \cdot v_t \tag{38}$$

While, the unemployment rate adjusts according to

$$u_t = 1 - (1-\rho)\, n_{t-1} \tag{39}$$

The transition dynamics in the labour market depends mainly on the **exogenous job separation rate** (ρ). As specified above, the labour market is homogeneous, as all active households have the same skills and supply the same hours regardless of their cohort. As a result, there is no need for cohort specific indexing and thus, $n_{s|t} \equiv n_t$ and $u_{s|t} \equiv u_t$. These relationships capture the dynamics of hiring, separations, and matching efficiency, which together define the evolution of employment and unemployment in the model.

2.6.2 Firms

If the search process is successful then, the monopolistic firm operates following the production function

$$Y_t\left(j\right) = z_t \cdot n_t\left(j\right) \cdot h_t\left(j\right) \tag{40}$$

where, z_t is the aggregate level of productivity and $n_t\left(j\right) \cdot h_t\left(j\right)$ denotes the labour demand of firm j.

[9] See Elsby et al. 2015 for a recent discussion on the relevant literature.

With $n_t(j)$ being the number of the workers and $h_t(j)$ being the working hours demanded by firm j. Firms face quadratic adjustment costs $R(\cdot)=\frac{\Phi}{2}Y_t\left(\frac{P_t(j)}{P_{t-1}(j)}-1\right)^2$ every time they wish to adjust their prices, as proposed by Rotemberg (1982).

Each intermediate firm j solves the following optimization problem:

$$\max_{\{P_t(j),n_t(j),v_t(j)\}}\Pi_t(j)=\sum_{t=0}^{\infty}(\beta)^t\frac{\Lambda^u_{s|t}}{\Lambda^u_0}\left(\left(\frac{P_t(j)}{P_t}Y_t(j)-w_tn_t(j)h_t(j)\right)-\frac{\Phi}{2}\left(\frac{P_t(j)}{P_{t-1}(j)}-1\right)^2Y_t-\kappa v_t(j)\right)$$

where, $\Lambda^u_{s|t}$ the firms' discount factor comes from the solution of household s's optimisation problem (see eq.(5))).

Subject to

1. The monopolistic demand for its product,

$$Y_t(j)=Y_t\left(\frac{P_t(j)}{P_t}\right)^{-\varepsilon_t} \tag{41}$$

   Where, ε_t is the elasticity of substitution between intermediate varieties.

2. The law of motions of employment of firm (j) is given by:

$$n_t(j)=(1-\rho)\cdot n_{t-1}(j)+q_t(j)\cdot v_t(j) \tag{42}$$

where, mc_t captures the marginal cost of production, κ the real cost real cost of opening a new vacancy and μ_t captures the marginal cost of filling a vacancy.

Solving the firms' optimisation problem yield:

1. The New Keynesian Phillips Curve (NKPC)

$$\Phi(1+\pi_t)\pi_tY_t=((1-\varepsilon_t)+\varepsilon_t\cdot mc_t)Y_t+\beta\Phi\left(\frac{\Lambda^u_{s|t+1}}{\Lambda^u_{s|t}}(1+\pi_{t+1})\pi_{t+1}Y_{t+1}\right) \tag{43}$$

2. The aggregate hiring condition :

$$\frac{\kappa}{q(\vartheta_t)}=(mc_t\cdot z_t-w_t)\cdot h_t+\beta(1-\rho)\left(\frac{\Lambda^u_{s|t+1}}{\Lambda^u_{s|t}}\frac{\kappa}{q(\vartheta_{t+1})}\right) \tag{44}$$

The hiring condition sets the expected cost of posting a vacancy equal to the expected benefits.

Finally, the profits of firm j, $\Pi_t(j)$ specified above, are uniformly distributed as dividends across active cohorts ($d^u_{s|t}=\frac{d_t}{\xi}$). Aggregate dividends, are given as

$$d_t = \int_0^1 \Pi_t(j)\,dj = \Pi_t$$

However, in anticipation of symmetric equilibrium, the subscript j is removed, so the aggregate dividends are

$$d_t = Y_t - \xi w_t n_t - \kappa v_t - \frac{\Phi}{2}\pi^2 Y_t \tag{45}$$

With, the aggregate output being:

$$Y_t = \xi \cdot z_t \cdot n_t \tag{46}$$

2.7 Bellman Equations and Nash Bargaining Over Wages

In each period, the real wage rate is determined through Nash bargaining between an individual worker and a firm. In period t, the value of a household with a member employed, belonging to cohort $s \leq t$, is represented by $V^E_{s|t}$. Conversely, the value of a household belonging to generation $s \leq t$, with a member unemployed is denoted by $V^U_{s|t}$.

$$V^E_{s|t} = w_t h^u_{s|t} + \beta\left(\frac{\Lambda^u_{s|t+1}}{\Lambda^u_{s|t}}\left(\rho\left(1 - p(\vartheta_{t+1})\right)V^U_{s|t+1} + \left(1 - \rho\left(1 - p(\vartheta_{t+1})\right)\right)V^E_{s|t+1}\right)\right) \tag{47}$$

Here, ρ represents the exogenous job separation rate, and $p_t = \bar{m}_t(\theta_t)^{1-\omega}$ is the probability of finding a job. As noted by Faia (2008), the first term on the right-hand side of the equation represents the real benefit of the worker's real labour income. The second term reflects the discounted benefit for a household in cohort s that is employed in period t, considering the potential change in status to unemployment in period $t+1$.

On the other hand, the value of a household in cohort s with a member unemployed, denoted $V^U_{s|t}$, is given by:

$$V^U_{s|t} = \frac{b}{\xi} + \beta\left(\frac{\Lambda^u_{s|t+1}}{\Lambda^u_{s|t}}\left(\left(1 - p(\vartheta_{t+1})\right)V^U_{s|t+1} + p(\vartheta_{t+1})V^E_{s|t+1}\right)\right) \tag{48}$$

The first term, $\frac{b}{\xi}$, represents the immediate real benefit of being unemployed. The second term reflects the discounted payoff for a household in cohort s that remains unemployed in period $t+1$, including the weighted change in value from potentially becoming employed in $t+1$.

The individual surplus of household s from the bargaining process, denoted $S^H_{s|t}$, is calculated as the difference between having an additional household member employed and having one unemployed:

$$\begin{aligned} S^H_{s|t} &= V^E_{s|t} - V^U_{s|t} \\ &= w_t h^u_{s|t} - \frac{b}{\xi} + \beta\frac{\Lambda^u_{s|t+1}}{\Lambda^u_{s|t}}\left(\left(1-\rho\right)\left(1 - p(\vartheta_{t+1})\right)S^H_{s|t+1}\right) \end{aligned} \tag{49}$$

Now turning to the firm side, due to the symmetry in the firms' problem, the study assumes the existence of a representative firm and omits the firm-specific index. The value of an unallocated vacancy, V_t^V, is zero, while the value of an allocated vacancy, V_t^J, is given by:

$$V_t^J = (mc_t \cdot z_t - w_t) \cdot \xi + (1-\rho)\beta \left(\frac{\Lambda^u_{s|t+1}}{\Lambda^u_{s|t}} V^J_{t+1} \right) \tag{50}$$

In equilibrium, the value of posting a vacancy must be zero. Thus, using the aggregate hiring condition, the value of an allocated vacancy can be expressed as:

$$\frac{\kappa}{q_t} = (mc_t \cdot z_t - w_t) \cdot \xi + (1-\rho)\beta \left(\frac{\Lambda^u_{s|t+1}}{\Lambda^u_{s|t}} \frac{\kappa}{q_{t+1}} \right) \tag{51}$$

The firm's surplus from wage bargaining is:

$$S_t^F \equiv \frac{\kappa}{q_t} = (mc_t \cdot z_t - w_t) \cdot \xi + (1-\rho)\beta \left(\frac{\Lambda^u_{s|t+1}}{\Lambda^u_{s|t}} \frac{\kappa}{q_{t+1}} \right) \tag{52}$$

The first term represents the real profits from goods produced by hiring an additional worker. The second term reflects the payoff from not needing to fill a vacancy in the next period.

The wage bargaining problem is formulated as:

$$\max_{w_t} \left(\varsigma \log\{S^H_{s|t}\} + (1-\varsigma) \log\{S_t^F\} \right) \tag{53}$$

where ς is the worker's share of the joint surplus. Solving for the real wage yields:

1. The surplus sharing rule from Nash bargaining:

$$S_t^F = \frac{1-\varsigma}{\varsigma} \cdot \xi \cdot S^H_{s|t} \tag{54}$$

As the probability of becoming inactive approaches zero, eq.(54) simplifies to the standard surplus sharing rule.

2. The real wage per worker, w_t, is a weighted average of the marginal revenue product of the worker, the cost of replacing the worker, and the worker's outside option:

$$w_t = \varsigma \cdot \left[mc_t \cdot z_t + \frac{\kappa}{\xi} \frac{1-\rho}{R_t} \vartheta_{t+1} \right] + (1-\varsigma) \cdot \frac{b}{\xi} \tag{55}$$

2.8 Wage Rigidity

As in Faia (2008), the paper follows the seminal approach of Hall (2003) and Blanchard & Galí (2007, 2010) to introduce wage rigidity in a parsimonious way. Namely, the prevailing wage rate for any period, t, is

$$w_t = \lambda \cdot w_t + (1-\lambda) \cdot w_{stst}$$

with $\lambda \in [0,1]$. That is, the current wage rate is calculated as a weighted sum of the wage that comes from the Nash bargaining between an individual worker and a firm and the steady-state wage rate. Hence, the current period, t, market wage can be re-written as:

$$w_t = \lambda \cdot \left[\varsigma \cdot \left[mc_t \cdot z_t + \frac{\kappa}{\xi} (1-\rho) \beta \left(\left(\frac{\Lambda^u_{s|t+1}}{\Lambda^u_{s|t}} \right) \vartheta_{t+1} \right) \right] + (1-\varsigma) \frac{b}{\xi} \right] + (1-\lambda) \cdot w_{stst} \tag{56}$$

2.9 Monetary Policy

Following Faia (2008) and Komatsu (2023), the paper assumes that the monetary authority follows a real interest rate reaction function of the form:

$$\log\left(\frac{R_t}{R}\right) = \phi_\pi \log\left(\frac{1+\pi_t}{1+\bar{\pi}^*}\right) + \phi_y \log\left(\frac{Y_t}{Y}\right) \tag{57}$$

In line with the literature, interest rate adjusts in response to a targeted variable deviation from the either the steady-state or the exogenous equilibrium target. Contrary to Faia (2008), this monetary rule omits both an explicit unemployment component and interest rate smoothing. Now, while it is true that including interest rate smoothing leads to higher welfare along the equilibrium path (see Schmitt-Grohé & Uribe 2007), it is often used as an apparatus to mimic optimal discretionary monetary policy and this is not the aim of this paper.

2.10 Fiscal Rule

Consistent with Leith & Von Thadden (2008) and Rigon & Zanetti (2018), the government adjusts lump-sum taxes following a simple rule[10]

$$T_t = \bar{T} + \phi_b \left(\frac{(1+\pi_{t+1}) P^S_t B_{t+1}}{4Y_t} - \frac{(1+\pi^*) P^S B^*}{4Y} \right) \tag{58}$$

where $\bar{T}$ stands for the steady-state level of taxes, and $\phi_b > 0$ captures the reaction of taxation to outstanding debt. Fiscal policy described by eq.(58) implies that the government responds only to deviations of the annualised debt-to-GDP ratio from the exogenous steady-state target.

2.11 Competitive Equilibrium

The private sector equilibrium consists of sequences of prices $(\pi_t, P^M_t, w_t, mc_t)^\infty_{t=0}$, aggregate quantities $(c_t, c^u_t, c^r_t, S_t, Y_t, B^S_t, B^M_t, n_t, \vartheta_t, q_t, p_t, v_t, u_t)^\infty_{t=0}$ and policy instruments $(R_t, T_t, T^r_t)^\infty_{t=0}$ that satisfy the household's and firm's optimality conditions, the Nash bargaining, the government's budget constraint, the monetary and fiscal policy rules, the deterministic process for government transfers, aggregate technology, matching efficiency, and elasticity of substitution between intermediate varieties. Additionally, they also satisfy the aggregate hiring condition, aggregate employment, the job-finding and job-filling rates, the labour mar-

[10]Unlike Leith & Von Thadden (2008) and Rigon & Zanetti (2018), the tax rule in this model responds to deviations of the annualised debt-to-GDP ratio from its exogenous target, rather than to deviations in the level of debt itself.

ket tightness, the asset, labour and goods market clearing conditions|the asset pricing condition, the New Keynesian Phillips curve, the Euler and consumption equations and the transversality conditions.

2.12 The Social Welfare Function

To derive a closed-form expression for the social welfare metric, it is first necessary to eliminate all inter-generational inequality among active households. The literature offers two primary approaches to address this. The first, developed by Leith et al. (2019) and grounded in the seminal work of Calvo & Obstfeld (1988), separates the inter-temporal and distributional components of welfare to facilitate aggregation. This paper adopts an alternative strategy, following Acharya et al. (2023) and Angeletos et al. (2024*a*,*b*), the study introduces a cohort-specific lump-sum tax/transfer system. This mechanism equalizes wealth across all active individuals within each period, ensuring identical consumption and saving choices. By eliminating inter-generational heterogeneity among active households, this approach simplifies the aggregation of preferences and allows the analysis to clearly focus on the trade-off between efficiency and cross-sectional equity.

The social welfare metric takes the form

$$W_0 = \sum_{t=0}^{\infty} \beta^t \left[\log(c_t^u) + (1-\xi)\cdot\log(1-S_t)\right] \tag{59}$$

The complete derivation of (59) can be found in Appendix A.2.

2.13 Calibration and Simulations

The model is calibrated at a quarterly frequency to match key features of the U.S. economy. Most parameter choices follow Dennis & Kirsanova (2021). The key parameter values are presented in Table 1.

The household discount factor is $\beta = (1.02)^{-1/4}$, consistent with an annual real interest rate of 2%. The elasticity of substitution across goods is set to $\varepsilon = 11$ (Chari et al. 2000), implying a 10% steady-state markup.

Nominal rigidities are introduced via Rotemberg adjustment costs (Rotemberg 1982). Based on empirical evidence from Klenow & Kryvtsov (2008), Nakamura & Steinsson (2008), and Klenow & Malin (2010), prices change every 10 months on average, corresponding to a Rotemberg parameter $\Phi = 60$. This is consistent with Gavin et al. (2015). Wage rigidity follows Hall (2003) and Blanchard & Galí (2007), with $\lambda = 0.6$ (Faia 2008).

The survival probability is $\gamma = 0.996$, implying a 62.5-year post-entry lifespan (starting at age 18), consistent with SSA life tables.[11] Households also face a constant probability of becoming inactive. As in Bonchi & Nisticò (2024), inactive agents permanently lose access to labour and asset markets. Motivated by Krueger (2017), the transition probability is set to $1-f = 0.216\%$, implying a steady-state active population share of $\xi = 65\%$, in line with BLS data (series LNS11300000).

[11] See www.ssa.gov.

Table 1: Calibration of the Baseline FLANK model

Description	**Parameter**	**Value**	**Source**
Household discount rate	β	$(1.02)^{-1/4}$	Data
Elasticity of substitution among goods	ε	11	Chari et al. (2000)
Price adjustment cost	Φ	59.11	Gavin et al. (2015)
Wage rigidity parameter	λ	0.6	Blanchard & Galí (2007, 2010)
Survival probability	γ	0.996	SSA data
Probability of becoming inactive	$1-f$	0.216%	See text
Active population share	ξ	65%	BLS data
Separation rate	ρ	0.12	Dennis & Kirsanova (2021)
Elasticity of the matching function	ω	0.72	Shimer (2005)
Bargaining power	ς	0.72	Shimer (2005)
Matching efficiency	$\bar{\mu}$	0.66	Dennis & Kirsanova (2021)
Replacement rate	$\frac{b}{h \cdot w}$	0.47	Nickell & Nunziata (2001), Shimer (2005)
Cost of posting a vacancy	$\frac{\kappa}{w \cdot h}$	0.2	Ljungqvist (2002)
Government transfers to inactive households	T^r	0.4819	Karabarbounis & Chodorow-Reich (2014)
Cyclicality of matching efficiency	μ	0;1	See text
Persistence of Total Productivity Shock	ρ_z	0.95	Bayer et al. (2020)
Persistence of Government Spending Shock	ρ_{tr}	0.97	See text
Steady-State Inflation target (p.a)	$\pi^\star$	0;2%	See text
Inflation reaction coefficient (Hawkish policy)	ϕ_π	1.5	Komatsu (2023), Taylor (1993)
Inflation reaction coefficient (Dovish policy)	ϕ_π	0.9	See text
Persistence of monetary policy states	π_{11}, π_{22}	1	See text
Fiscal response coefficient	ϕ_b	0.04	See text
Debt maturity (quarters)	m	20	Atlanta FED
Equilibrium Debt-to-GDP ratio (p.a.)	$\frac{P^M b^M}{4Y}$	46%	Atlanta FED, Leeper & Zhou (2021)
Alternative Debt-to-GDP ratio (p.a.)	$\frac{P^M b^M}{4Y}$	Up to 200%	See text
Persistence of Mit Shocks			
Government Spending Shock	ρ_{tr}	[0; 0.97]	Le Grand & Ragot (2023)
Total Factor Productivity	ρ_z	0.95	Bayer et al. (2020)

Labour market parameters follow Dennis & Kirsanova (2021). The separation rate is $\rho = 0.12$—a midpoint between Merz (1995) and Andolfatto (1996)—delivering a steady-state unemployment rate of 5.8%, consistent with BLS series LNS14000000. The matching elasticity is $\omega = 0.72$ (Shimer 2005), and the Hosios condition implies $\varsigma = \omega$. Matching efficiency is $\bar{\mu} = 0.66$, which yields $q \approx 0.67$ and $\theta \approx 0.97$.

The replacement rate is set to $b/(h \cdot w) = 0.47$ (Nickell & Nunziata 2001, Shimer 2005). Vacancy posting costs are calibrated to $\kappa/(w \cdot h) = 0.2$ (Ljungqvist 2002). Transfers to inactive agents are set to 55% of pre-tax wages, targeting a Gini index of approximately 0.26 (Karabarbounis & Chodorow-Reich 2014). The benchmark sets matching efficiency cyclicality to zero ($\mu = 0$), but a pro-cyclical case ($\mu = 1$) is considered as in Elsby et al. (2015) and Hall & Schulhofer-Wohl (2018).

The persistence of exogenous processes is calibrated as follows: $\rho_z = 0.95$ and $\rho_\varepsilon = 0.9$ (productivity and substitution elasticity shocks), from Acharya et al. (2023) and Karaferis et al. (2024), using estimates in Bayer et al. (2020). Matching efficiency persistence is $\rho_\mu = 0.8$ (Dennis & Kirsanova 2021). While the benchmark persistence of the Transfers to the inactive, modelled as a government spending shock, is set $\rho_{tr} = 0.97$, reflecting institutional inertia in fiscal policy (Leith et al. 2019, Le Grand & Ragot 2023). However, as in Le Grand & Ragot (2023), the paper consider a range of values from 0.0 to 0.97 for the persistence of the government spending shock.

The monetary authority follows a simple inflation-targeting rule, excluding output stabilization (Faia 2008). The inflation coefficient is set to $\phi_\pi = 1.5$ (Taylor 1993, Komatsu 2023), satisfying the Taylor principle. For the dovish regime, $\phi_\pi = 0.9$. Policy regimes are fully persistent ($\pi_{11} = \pi_{22} = 1$), and perfectly observed by agents under perfect foresight.

The tax rule stabilizes debt via the parameter $\phi_b = 0.04$—the smallest value consistent with determinacy (Leith et al. 2019). This parameter choice reflects the growing passivity of U.S. fiscal policy, as noted by Blanchard (2019) and Auerbach & Yagan (2025). Debt maturity is set to $m = 20$ quarters (5 years), and the benchmark debt-to-GDP ratio is 46%, consistent with Leeper & Zhou (2021). Alternative calibrations consider ratios up to 200%, reflecting post-COVID fiscal conditions.

All computations in this study were conducted using the RISE© toolbox (Maih 2015). The model is first solved non-linearly for the perfect-foresight steady-state, then linearised using first-order perturbation methods to analyse its dynamics. As noted earlier, the model abstracts from aggregate risk, considering only a one-off unanticipated, autocorrelated aggregate shock to the perfect-foresight equilibrium path—commonly referred to as the MIT shock. After the initial impact, households regain perfect foresight. Due to structural similarities between the FLANK model and the nested representative-agent framework, these MIT shocks are introduced in the same fashion, following the approach of Boppart et al. (2018). This approach ensures transparency while preserving key transitional dynamics.

3 Discussion

This section synthesizes the main results of the paper, combining analytical insights and numerical experiments to examine how fiscal and monetary policies affect consumption, inequality, and macroeconomic dynamics.

The discussion begins by analysing how monetary policy influences individual consumption and inequality. In particular, monetary policy affects inter-generational inequality among active households by altering interest rates, while also shaping cross-sectional inequality between active and inactive agents. These channels are analytically tractable within the FLANK framework and highlight the interaction between heterogeneity and nominal rigidities.

The paper also shows that fiscal transfers targeted at inactive households reduce cross-sectional inequality in the short-run. While this result is intuitive given the presence of rule-of-thumb consumers, its quantitative magnitude is shaped by the overlapping generations structure and the share of the population that is active at any point in time.

To assess long-run effects, the paper compares steady-state allocations across three versions of the model: the benchmark FLANK model with stochastic inactivity, a representative agent benchmark, and a simplified FLANK model with only active agents. These comparisons, summarized in Tables 2 and 3, reveal how long-run outcomes depend on the inflation target, the debt-to-GDP ratio, and the sources of inequality.

The analysis then turns to short-run dynamics. Abstracting from aggregate risk, the study is concerned only with the perfect-foresight equilibrium path following a one-time aggregate shock. The main focus is on a government spending shock, modelled as a temporary increase in transfers to inactive households. The fiscal transfer reduces inequality across all monetary regimes, but the macroeconomic responses—including output, consumption, and employment—vary with the degree of inflation targeting and the persistence of the shock. The study also provides a discussion of the cyclical behaviour of equilibrium matching efficiency and its interaction with monetary policy. While not central to the main welfare findings, these dynamics further validate the model's labour market structure and propagation mechanisms.

Building on these dynamics, Section 3.5 computes the aggregate welfare along the transition path for different values of the monetary policy inflation coefficient, ϕ_π. The key result is that more accommodative (dovish) monetary policy regimes consistently deliver higher aggregate welfare—even though the path of inequality remains invariant across regimes. However, the complete derivation of the social welfare function, along with the underlying assumptions and formal construction,can be found in Appendix A.2.

Finally, as demonstrated in Section 3.3, the inequality-reducing effect of the fiscal transfer is robust across different monetary policy stances. Nonetheless, the associated macroeconomic adjustments—spanning output, employment, and consumption—vary systematically with the degree of monetary accommodation. These distributional and aggregate differences underscore the importance of policy interactions. For completeness, the Supplemental Appendix B.1 extends the analysis by presenting dynamic responses to a TFP shock. Results for alternative disturbances, including markup and matching efficiency shocks, are available upon request.

3.1 Policy Trade-offs and Inequality

This section analytically explores how changes in monetary and fiscal policy affect intra- and inter-generational inequality within the FLANK framework. To retain maximal tractability, the focus remains on the direct effects of policy changes, abstracting from feedback loops, to build intuition before turning to the insights of the numerical investigation. Since both monetary and fiscal authorities follow simple, rule-based policies, this setting allows for a transparent assessment of the distributional channels at play.

The model departs from Ricardian equivalence due to three key features: finite lifespans, government bonds in non-zero net supply, and the coexistence of two distinct household types (active and inactive) with different consumption behaviours. These features generate heterogeneity in the marginal propensities to consume (MPC) and highlight trade-offs in the transmission of policy.

In the absence of distortionary taxation and/or endogenous labour supply, fiscal policy redistributes resources across households through bond issuance and targeted transfers. While such redistribution does not directly affect aggregate efficiency, it can shift inequality across and within generations. The study examines these mechanisms by first focusing on monetary policy and then turning to fiscal redistribution.

3.1.1 Monetary Policy and Inequality

Monetary policy affects inequality through three well-known channels (Auclert 2019, Auclert et al. 2024): earnings heterogeneity, the Fisher channel, and interest rate exposure. Active households, who participate in labour and financial markets, experience direct effects through all three channels. In contrast, inactive households—permanently excluded from both markets—are only affected indirectly, primarily through inflation.

The earnings channel operates via changes in employment and wages. Lower real interest rates stimulate aggregate demand and reduce discount rates, encouraging hiring and raising the marginal product of labour. This boosts the non-financial income of active households, while inactive households remain unaffected due to their fixed transfers.

The interest rate exposure channel further distinguishes households by age. Older active cohorts hold more financial wealth and are therefore more sensitive to changes in bond valuations. This is result is easily observable when comparing the effect of an interest rate change on the consumption of a newly born household compared to the effect of on the consumption of any other generation. Proposition 1 formalizes this heterogeneity in sensitivity across generations:

Proposition 1. *Even among active households, a change in the real interest rate has heterogeneous effects due to generational differences:*

$$\frac{\partial}{\partial R_t} c^u_{s|t} \neq \frac{\partial}{\partial R_t} c^u_{t|t} \quad \textit{for } s \neq t$$

Newborn agents—entering the market with no financial wealth—adjust their consumption in response to shifts in expected income and borrowing costs. In contrast, older cohorts revalue existing assets, creating asymmetric consumption responses across generations.

Inactive households, by contrast, consume entirely out of fixed transfers and do not hold assets. As such, they are unaffected directly by interest rate changes:

Proposition 2. *A change in the real interest rate does not directly impact the consumption of inactive agents:*

$$\frac{\partial}{\partial R_t} c^r_{s|t} = \frac{\partial}{\partial R_t} T^r_t = 0, \quad \forall t$$

3.1.2 Aggregate Consumption Effects of Monetary Policy

At the aggregate level, the direct effects of monetary policy are concentrated among active households. Since these agents face no exogenous binding credit constraints and share a common elasticity of inter-temporal substitution, they respond like permanent income consumers:

Proposition 3. *A change in the real interest rate affects aggregate consumption of active households proportionally:*

$$\frac{\partial c^u_t}{c^u_t} = -\frac{\partial R_t}{R_t}$$

Inactive households' consumption remains unaffected:

$$\frac{\partial}{\partial R_t} c^r_t = 0$$

Hence, the per capita effect on total consumption is simply the active agents' response scaled by their population share. Proposition 4 below formalises this result.

Proposition 4. *The direct effect of an interest rate change on per capita (total) consumption depends on how it impacts the consumption of the active agents scaled by the share of this household type* (ξ) *in the total population.*

$$\frac{\partial}{\partial R_t} c_t = \xi \cdot \frac{\partial}{\partial R_t} c_t^u$$

3.1.3 Fiscal Policy and Redistribution

Fiscal policy redistributes income through government debt issuance and transfers to inactive and unemployed households. Under the fiscal rule, lump-sum taxes on active agents adjust residually to maintain debt sustainability. This structure creates offsetting forces: bond issuance raises active households' wealth, but this is partially undone by higher taxes.

Inactive households, by contrast, respond one-for-one to changes in transfers due to their hand-to-mouth nature. This creates a clear lever for reducing cross-sectional consumption inequality:

Proposition 5. *An increase in transfers to inactive households reduces cross-sectional inequality:*

$$\frac{\partial}{\partial T_t^r} S_t = -\frac{1}{c_t^u}\left(\frac{1}{(1-\xi)} + \Omega_t\right) < 0 \tag{60}$$

where,

$$\Omega_t = (1 - S_t)\left[\frac{(1-\beta\gamma)}{\xi}\left(\frac{\phi_b}{\phi_b + 4Y_t}\right)\right]$$

The magnitude of this inequality reduction depends on the size of the OLG channel, the share of active agents, and the responsiveness of taxes to debt dynamics. With greater MPC dispersion amplifying these effects.

In summary, monetary policy operates primarily through the active population, with heterogeneous responses by age and asset position. Fiscal policy, especially via transfers to the inactive, offers a direct tool for managing cross-sectional inequality without distorting labour supply. These trade-offs—between inter-temporal smoothing, redistribution, and generational equity—will be further explored in the numerical results that follow.

The complete proofs of Propositions 1 through 5 are provided in A.1.

3.2 Steady-State Allocations and Labour Market Equilibrium

This section examines the model's steady-state allocations, comparing the RANK, the traditional FLANK (BY model), and the main FLANK (with stochastic transitions into inactivity) environments. Both monetary and fiscal policies use rule-based approaches, so the steady-state values for inflation and the debt-to-GDP ratio are set exogenously. Additionally, due to the presence of labour market frictions, the separation rate (ρ) and matching efficiency $(\bar{m})$ are also fixed.

Table 2 presents the steady-state outcomes for inflation targets of $\pi^* = 0\%$ and $\pi^* = 2\%$ per annum across three model variants: RANK (columns I–II), FLANK without inactivity (III–IV), and the main FLANK with stochastic inactivity (V–VI), under a common calibration for labour market and public debt.

Table 2: Steady-State: RANK vs. FLANK

Model Specification						
Parameter	**RANK**		**FLANK**			
	I	**II**	**III**	**IV**	**V**	**VI**
Prob. of Survival (γ)	1	1	0.996	0.996	0.996	0.996
Prob. of Inactivity ($1-f$)	0	0	0	0	0.0022	0.0022
Share of Active Households (ξ)	1	1	1	1	0.65	0.65
Steady-State Variables						
Inflation Target (%, p.a.)	0	2	0	2	0	2
Debt-to-GDP (%, p.a.)	46	46	46	46	46	46
Lump-sum Tax (T)	0.0328	0.0328	0.0329	0.0329	0.1903	0.1903
Aggregate Output (Y)	0.9408	0.9408	0.9408	0.9408	0.6115	0.6115
Aggregate Consumption (C)	0.9113	0.9106	0.9113	0.9106	0.5924	0.592
Real Interest Rate (R)	2.0151	2.0151	2.0557	2.0557	2.0963	2.0963
Nominal Rate (I)	2.0151	4.0604	2.0557	4.1016	2.0963	4.1428
Asset Prices (P^M)	19.9	18.1031	19.8726	18.0803	19.8412	18.0541
Employment Rate (n)	0.9408	0.9408	0.9408	0.9408	0.9403	0.9403
Searching (u)	0.1721	0.1721	0.1721	0.1721	0.1725	0.1725
Vacancy Rate (v)	0.1683	0.1683	0.1683	0.1683	0.1671	0.1671
Job-Filling Rate (p)	0.6559	0.6559	0.6558	0.6559	0.6541	0.6542
Job-Finding Rate (q)	0.6708	0.6706	0.6708	0.6707	0.6754	0.6753
Tightness (θ)	0.9778	0.9781	0.9777	0.978	0.9684	0.9687
Real Wage Rate (w)	0.8766	0.8767	0.8766	0.8767	0.8768	0.8769
Cross-Sectional Inequality (S)	–	–	–	–	0.2607	0.2599

Table 3: Steady-State: FLANK under Increasing Debt-to-GDP Ratios

FLANK with Stochastic Inactivity Transitions						
Debt-to-GDP (%, p.a.)	0	46	60	100	123	200
Lump-sum Tax (T)	0.1845	0.1903	0.1922	0.1976	0.2008	0.2123
Aggregate Output (Y)	0.6115	0.6115	0.6115	0.6115	0.6115	0.6114
Aggregate Consumption (C)	0.5924	0.5924	0.5924	0.5924	0.5924	0.5924
Nominal Rate (I)	2.0151	2.0963	2.0963	2.1369	2.1776	2.2996
Asset Prices (P^M)	19.9	19.8412	19.8233	19.7725	19.7435	19.6467
Employment Rate (n)	0.9403	0.9403	0.9403	0.9403	0.9403	0.9403
Searching (u)	0.1725	0.1725	0.1725	0.1725	0.1725	0.1725
Vacancy Rate (v)	0.1671	0.1671	0.1670	0.1671	0.1670	0.1670
Job-Filling Rate (p)	0.6541	0.6541	0.6541	0.6541	0.6541	0.6540
Job-Finding Rate (q)	0.6754	0.6754	0.6754	0.6755	0.6755	0.6756
Tightness (θ)	0.9686	0.9684	0.9684	0.9683	0.9682	0.9680
Real Wage Rate (w)	0.8768	0.8768	0.8768	0.8768	0.8767	0.8767
Cross-Sectional Inequality (S)	0.2607	0.2607	0.2607	0.2607	0.2607	0.2607

As expected, without the stochastic transition to inactivity ($f = \xi = 1$), the differences across the traditional BY model and the nested RANK are quantitatively small. Still, the assumption of finite-lived agents ($\gamma < 1$) coupled with positive steady-state government debt breaks the Ricardian equivalence and causes the equilibrium real interest rate to be higher than the rate of time preference ($R > \frac{1}{\beta}$). The differences across the two frameworks become more pronounced as the size of the active population decreases.

Across all specifications, labour market allocations align with empirical US averages. For the benchmark FLANK model, the steady-state unemployment rate is approximately 5.97%, matching the historical quarterly average of 5.8% (BLS series LNS14000000). The model predicts around 17% of the labour force is actively searching. This variable refers to workers that are actively looking for jobs at the start of the period. And, given that the FLANK model results in higher equilibrium unemployment, it naturally reports a higher steady-state of job searching.

The steady-state production technology is always normalised to one. As a result, the steady-state output is determined by the equilibrium employment (see eq.(46)) and the share of the active population (ξ). Thus, both the traditional BY model and the standard RANK specification always delivers higher aggregate output due to their higher equilibrium employment and higher share of households participating in the labour market.

The choice of the inflation target affects inequality by differentially impacting savers and borrowers. Higher steady-state inflation reduces the purchasing power of inactive households but benefits younger active agents by decreasing their real debt burden. On the other, older active households are typically saver and thus, the opposite effect is found. Since older cohorts dominate the population, the net effect reduces cross-sectional inequality.

Increasing the debt-to-GDP target has no measurable impact on cross-sectional inequality because inactive agents receive fixed transfers, unaffected by interest rate or tax changes, while active agents can smooth consumption through financial markets.

Overall, the FLANK model introduces realistic trade-offs in macroeconomic allocations and distributional outcomes, setting the stage for evaluating policy shocks in the following dynamic simulations.

3.3 Dynamic Responses

This section analyses the perfect foresight equilibrium path following a one-time, positive, and autocorrelated shock to government spending, modelled as a direct transfer to inactive households. The framework abstracts from aggregate risk and follows the standard MIT shock approach (see Blanchard 1985; Yaari 1965; Angeletos et al. 2024*a*,*b*; Leith et al. 2019; among others), with agents regaining full information immediately after impact.

Figure 1 shows the responses under four different levels of persistence of the transfer shock: fully transitory ($\rho_{tr} = 0$), low (0.1), medium (0.5), and high (0.97). The fiscal response coefficient ϕ_b is deliberately kept below one in all cases, allowing government debt to evolve almost like a random-walk, consistent with empirical fiscal behaviour even in the post-Covid era (see Ramey 2025) and theoretical findings in Leith et al. (2019).

Figure 1 shows that the initial impact of the transfer uniformly reduces cross-sectional inequality, as

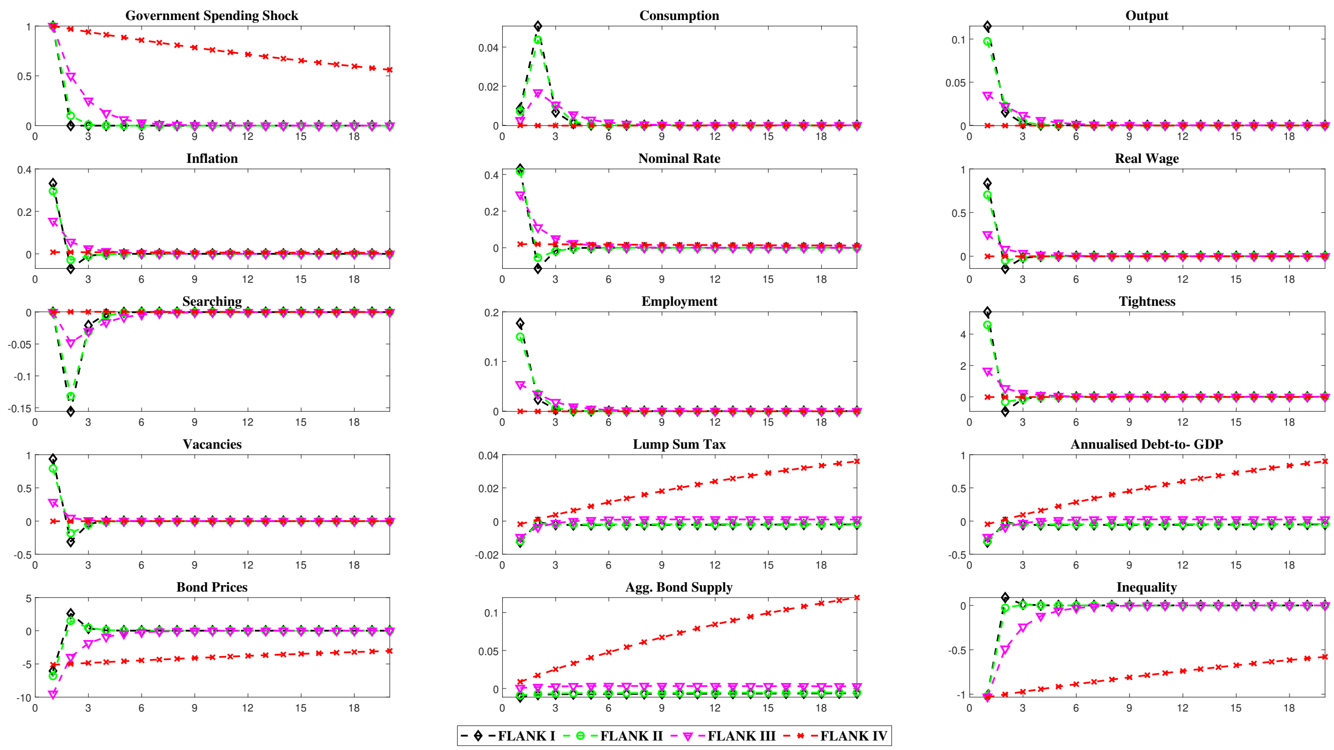

Figure 1: Dynamic responses to a one-time positive government spending shock. FLANK I refers to the case with a fully transitory government spending shock ($\rho_{tr} = 0$). FLANK II allows for low persistence in the shock ($\rho_{tr} = 0.1$). FLANK III introduces mild shock persistence ($\rho_{tr} = 0.5$). FLANK IV refers to the benchmark case with high persistence in the government spending shock ($\rho_{tr} = 0.97$).

inactive households receive a proportional increase in their income. However, as the persistence of the government spending shock increases, its ability to stimulate the macroeconomy gradually diminishes.. When the transfer is transitory or mildly persistent, aggregate consumption increases: the rise in debt is temporary, and taxes remain low, enabling active consumers to smooth consumption. When the shock is highly persistent, the sustained increase in government debt eventually leads to higher path for taxes—even though they are lump-sum—which depresses active households' consumption and offsets the initial stimulus. This reflects a key feature of the FLANK structure: despite inelastic labour supply and non-Ricardian households, rising taxes reduce human wealth and dampen demand.

Importantly, the consumption dynamics diverge from standard HANK models. In OLG environments, consumption is increasing in financial wealth, but fiscal expansions financed by debt create tensions. More specifically, higher government debt raises private wealth via the market clearing condition, yet this is offset by future taxes that lower human wealth. Thus, for active consumers, the net effect is ambiguous and depends on fiscal responsiveness. In contrast, inactive households benefit unambiguously, as transfers increase their permanent income regardless of age. These effects are magnified when the fiscal adjustment is slow, confirming that the macroeconomic efficiency of fiscal stimulus depends jointly on the shock persistence and the stance of monetary and fiscal policy.

Consistent with the empirical literature (e.g., Elsby et al. 2015; Hall & Schulhofer-Wohl 2018), a positive government spending shock that successfully stimulates aggregate demand leads firms to increase hiring efforts. This results in more vacancies, a higher matching rate, and a rising employment rate. As unemployed workers find jobs more quickly, the pool of job seekers declines. Conversely, when the fiscal stimulus fails to raise output—typically under high persistence and/or hawkish monetary policy—firms scale back vacancy postings, matches fall, and unemployment rises.

Real wages also respond cyclically. In line with findings from Mortensen & Pissarides (1999), the model produces pro-cyclical wage dynamics: wages rise when the economy expands and fall during downturns. However, due to the presence of wage rigidity embedded, wages return to their steady state more slowly than output. Inflation does not directly feed into wage-setting as in the standard New Keynesian model; instead, its impact is mediated through firm marginal costs and the bargaining power of workers.

Finally, the inflation response depends crucially on the persistence of the fiscal shock. Low-persistence transfers create a sharp but temporary boost to output, leading to a quick rise in prices. Since the monetary authority follows an active inflation targeting rule, interest rates increase more aggressively in these cases to stabilize inflation. In contrast, when fiscal transfers are highly persistent, the gradual nature of the stimulus leads to a more muted and delayed inflationary response, with correspondingly smaller interest rate movements.

3.4 Cyclicality of the Equilibrium Matching Efficiency

Empirical evidence suggests that matching efficiency varies with the business cycle. Using JOLTS data (2001–2013), Elsby et al. (2015) document strong pro-cyclicality in matching efficiency across 17 U.S. industrial sectors, with a sharp rebound following the Great Recession. Hall & Schulhofer-Wohl (2018) report similar patterns. Motivated by this evidence, this subsection examines the role of pro-cyclical matching within the FLANK framework.

The analysis begins with a nearly transitory government spending shock, modelled as a one-time increase in transfers to inactive households with low persistence ($\rho_{tr} = 0.1$). Figure 2 compares two scenarios: one with a-cyclical matching efficiency ($\mu = 0$), and another with pro-cyclical matching ($\mu = 1$).

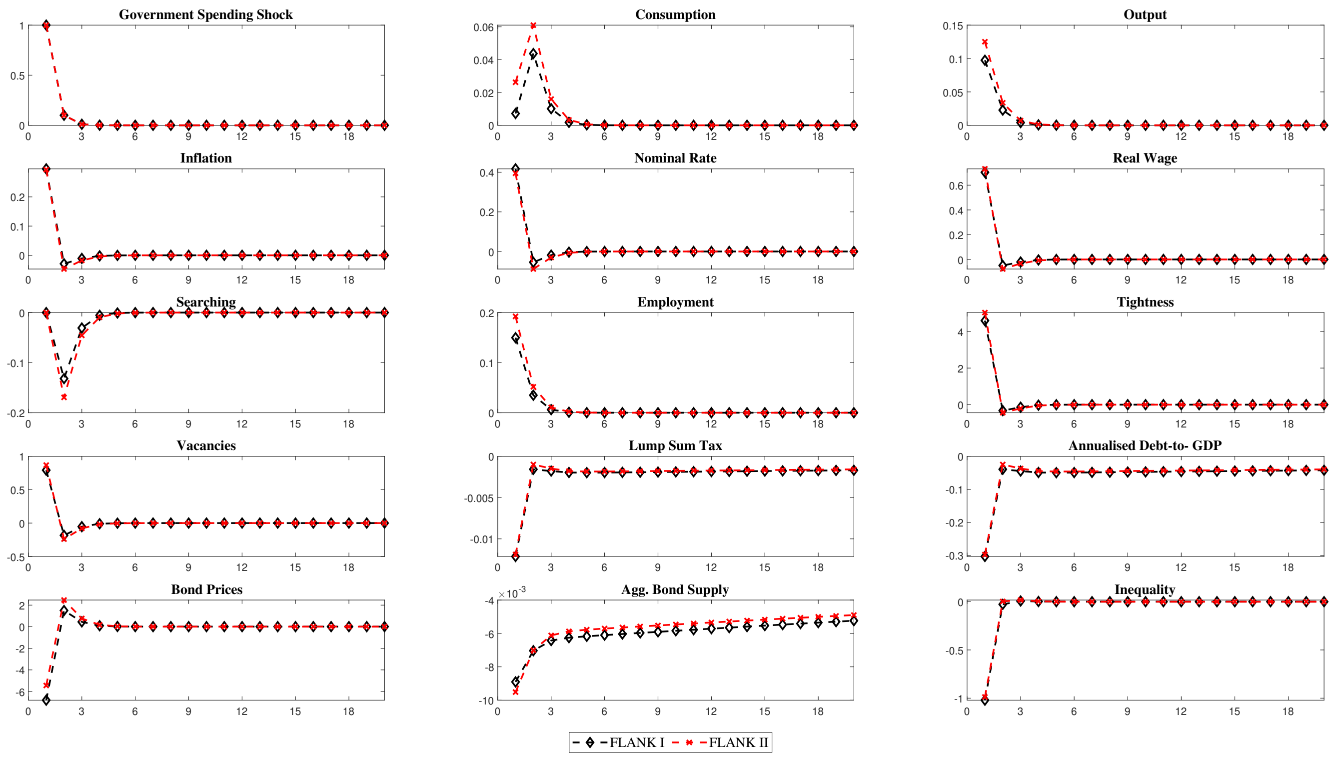

Figure 2: Response to a one-time government spending shock. FLANK I: low persistence ($\rho_{tr} = 0.1$) and a-cyclical matching ($\mu = 0$); FLANK II: pro-cyclical matching ($\mu = 1$).

When matching efficiency is pro-cyclical, the labour market adjusts more elastically: even at unchanged vacancy and unemployment levels, more matches are formed, leading to a sharper rise in employment. Output increases by approximately 25% more than in the a-cyclical case, and labour market tightness rises faster. Search activity also declines more quickly and remains subdued for longer, driven by faster job-finding and higher employment retention. Amplified consumption demand leads to stronger inflation and a more pronounced real interest rate response.

Despite this real-side amplification, inequality remains largely unaffected. Inactive (Keynesian) households consume fixed transfers and are insulated from interest rate or price fluctuations, rendering short-run cross-sectional inequality dynamics insensitive to labour market frictions.

The analysis then turns to a highly persistent shock ($\rho_{tr} = 0.97$), shown in Figure 3. The same two matching regimes are compared.

Under high persistence, the government spending shock becomes contractionary, especially when matching is pro-cyclical. With higher government debt and an active monetary response ($\phi_\pi > 1$), interest rates rise, and private demand is crowded out. Output, consumption, and employment decline. This aligns with findings in Ramey (2025), who argue that fiscal transfers may reduce activity when persistent deficits raise

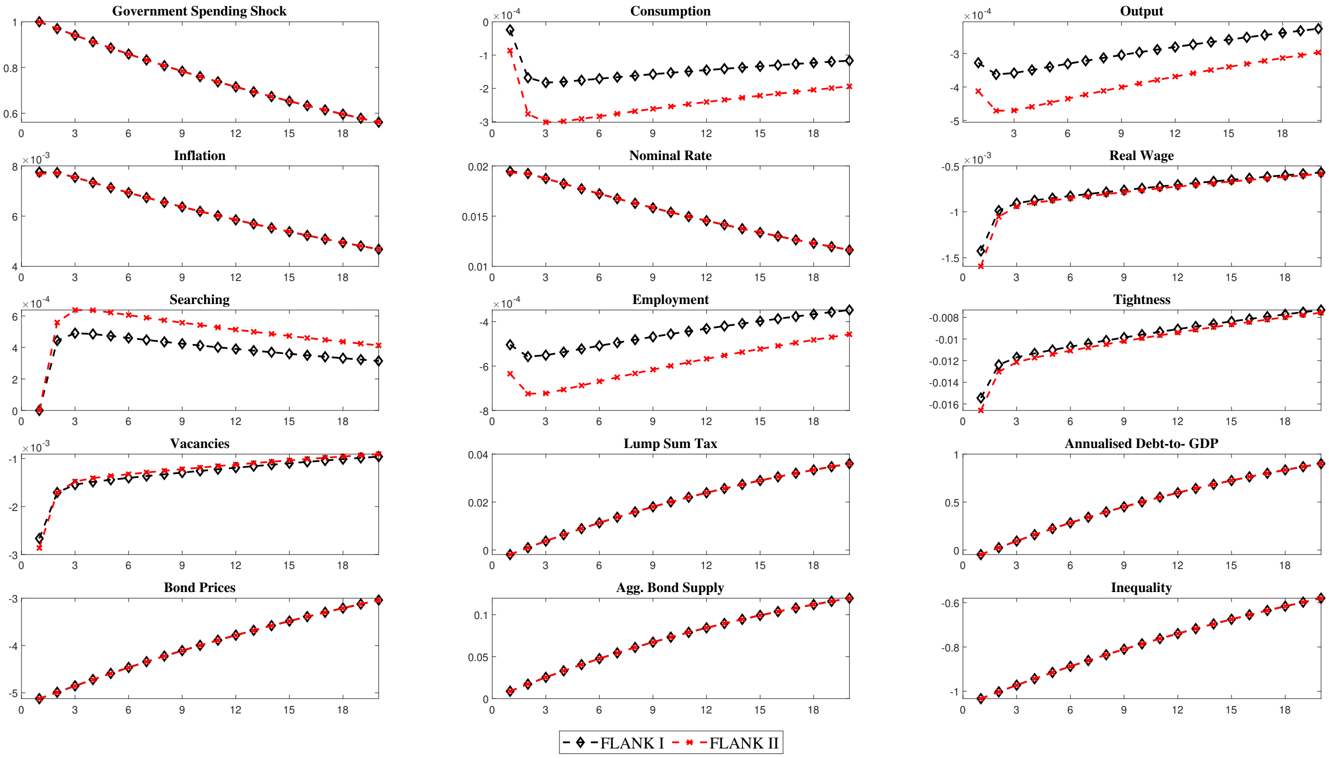

Figure 3: Response to a one-time government spending shock. FLANK I: high persistence ($\rho_{tr} = 0.97$) and a-cyclical matching ($\mu = 0$); FLANK II: pro-cyclical matching ($\mu = 1$).

debt service costs.

While inequality initially declines due to the direct transfer, the effect is short-lived. With pro-cyclical matching, deteriorating labour market conditions dominate: vacancy postings fall, successful matches decline, and unemployment rises. Wages fall alongside inflation and the interest rate, though less sharply than in the transitory case.

All in all, the cyclicality of matching efficiency significantly shapes the transmission of fiscal policy. When the shock is transitory, pro-cyclical matching amplifies the stimulus—raising employment, output, and labour market tightness. When the shock is persistent, those same mechanisms reinforce the contractionary dynamics triggered by tighter fiscal and monetary conditions. In both cases, the effects on inequality remain muted, as hand-to-mouth consumers are unaffected by interest rate dynamics and asset price movements.

Hawkish vs Dovish Monetary Policy

Recent advances in the HANK literature emphasize that strict inflation targeting may be suboptimal in the presence of household heterogeneity and financial market incompleteness. Building on this insight, this section compares the effects of fiscal transfers under two alternative monetary policy stances: a "hawkish" regime ($\phi_\pi = 1.5$) and a "dovish" regime ($\phi_\pi = 0.9$). The policy regime follows a fully persistent two-state Markov process, which is known to all agents and incorporated into their decision-making under perfect foresight.

Although the inflation coefficient ϕ_π does not alter the model's steady state, it has first-order implications for the transitional dynamics. Following an unanticipated government spending shock at time $t = 0$, all households condition expectations on the observed regime and forecast accordingly. Monetary policy is conducted via a standard Taylor-type rule, and fiscal policy adjusts slowly (with $\phi_b < 1$), allowing debt to follow an approximate random walk.

Figures 4 and 5 display dynamic responses to a low-persistence fiscal shock ($\rho_{tr} = 0.1$) and a high-persistence shock ($\rho_{tr} = 0.97$) under both monetary regimes.

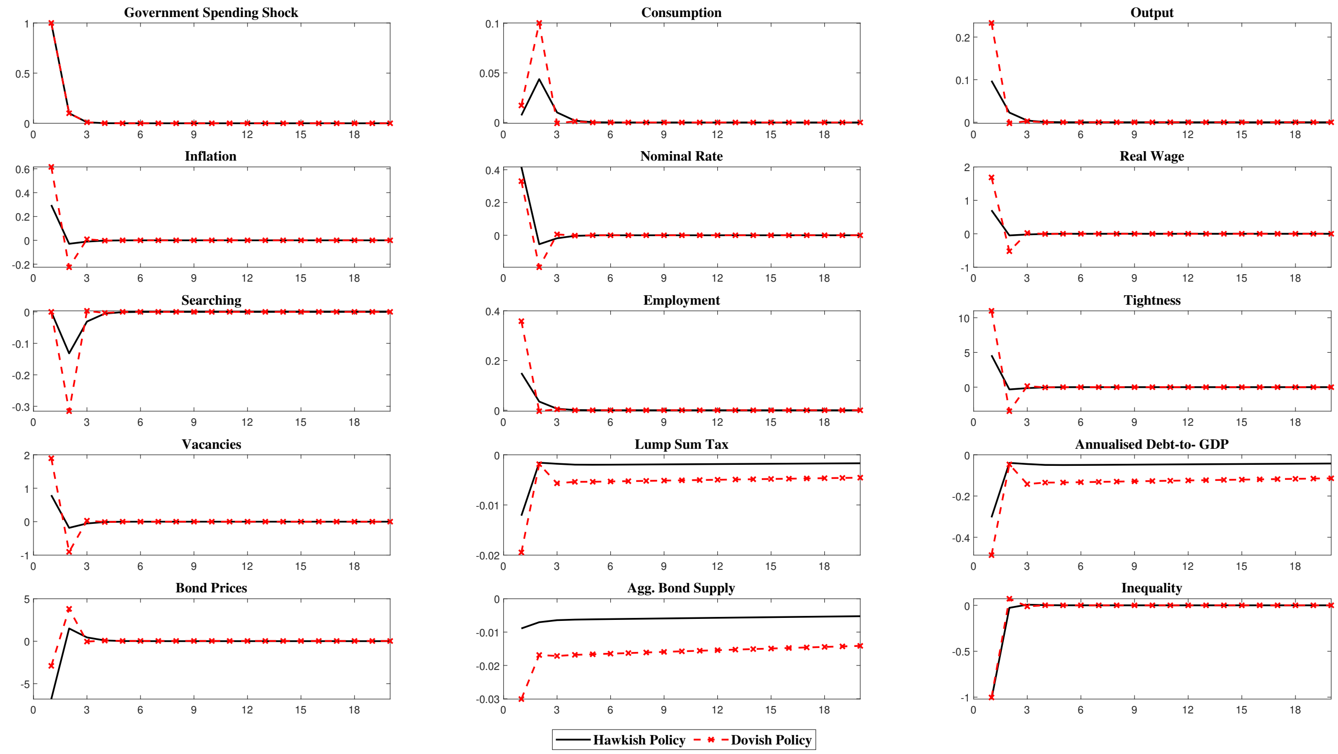

Figure 4: Dynamic responses to a one-off government spending shock with low persistence ($\rho_{tr} = 0.1$). Hawkish ($\phi_\pi = 1.5$) vs. Dovish ($\phi_\pi = 0.9$) monetary policy.

Across both scenarios, the stance of monetary policy has limited impact on inequality dynamics but significant consequences for the output, employment, and consumption path. In the case of a transitory fiscal shock, both regimes produce short-run output gains, but the dovish policy stance yields significantly stronger macroeconomic performance. The real interest rate rises by less, reducing the inter-temporal distortion faced by active consumers. Aggregate demand expands more robustly, encouraging vacancy creation, employment gains, and higher consumption. Since taxation is lump-sum and labour is inelastic, the policy does not distort labour supply directly, but it does affect lifetime wealth and, hence, consumption-savings decisions.

As the persistence of the spending shock increases, so does the fiscal burden—via greater issuance of government debt and higher taxes required for solvency. Since the fiscal authority issues bonds with longer maturities, the rise in interest rates induces valuation effects, as emphasized by Leeper & Leith (2016). Even though taxation is lump-sum and labour supply is inelastic, the fiscal drag leads to a demand-driven contraction. Figure 5 shows that under both regimes, output and employment fall relative to the transitory case, but the contraction is notably milder under the dovish policy.

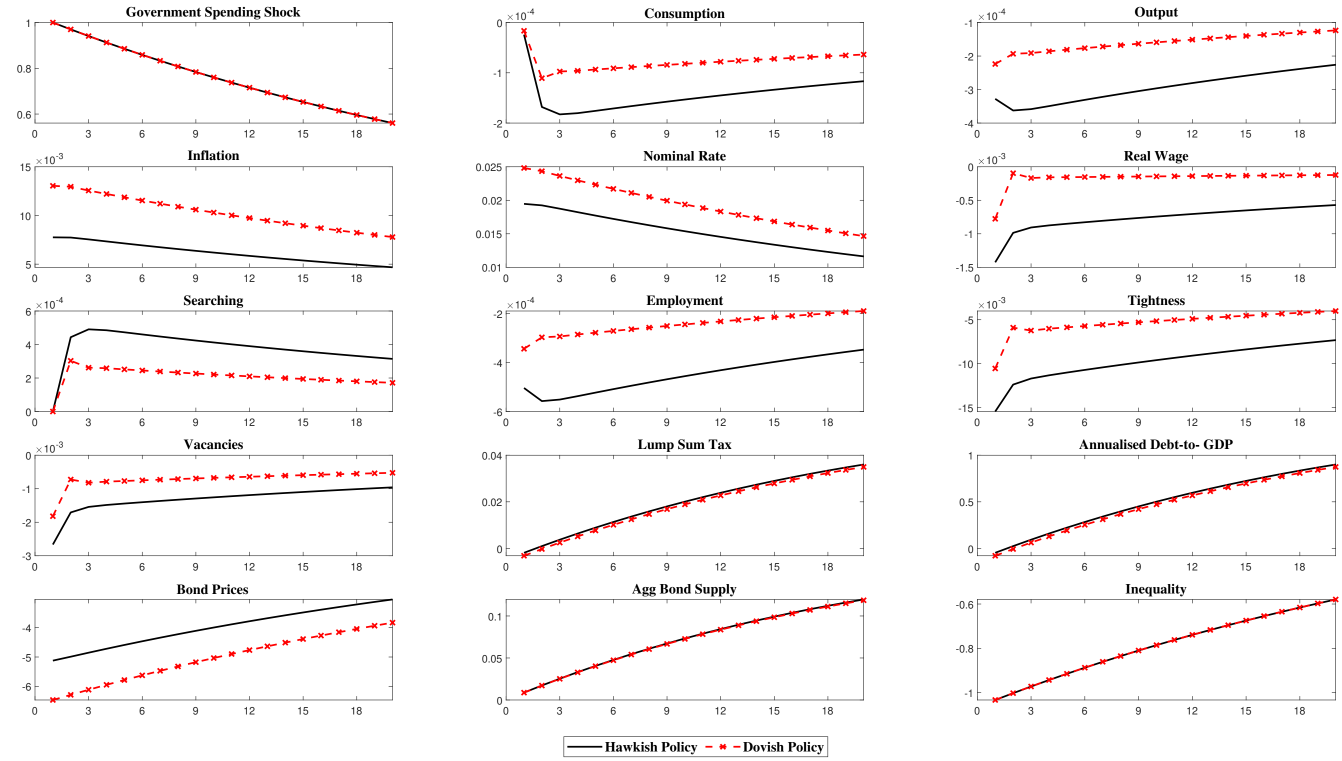

Figure 5: Dynamic responses to a one-off government spending shock with high persistence ($\rho_{tr} = 0.97$). Hawkish ($\phi_\pi = 1.5$) vs. Dovish ($\phi_\pi = 0.9$) monetary policy.

The labour market adjusts more elastically under dovish policy: vacancy posting is stronger, matching rates improve, and unemployment falls more quickly. Market tightness rises faster, and the search pool shrinks accordingly. Nonetheless, the presence of nominal rigidities implies that real wages return to steady state only gradually, amplifying differences across monetary regimes. Importantly, these dynamics occur despite the absence of distortionary taxation or endogenous labour supply responses.

The effect on inequality remains minimal in both regimes. Inactive agents—by design—do not participate in asset or labour markets and are thus insulated from interest rate and inflation fluctuations. Their consumption tracks the transfer path closely. Consequently, the implications of alternative monetary stances are driven almost entirely by macroeconomic efficiency: higher output path, smoother transitions, and lower consumption volatility for active consumers.

While monetary policy does not affect the steady state, it critically shapes the economy's dynamics in response to the government spending shock. A dovish stance consistently improves short-run macroeconomic outcomes by mitigating the contractionary effects of fiscal drag and smoothing consumption dynamics. These findings reinforce results in the recent HANK literature (e.g., Auclert et al. 2024), suggesting that deviating from strict inflation targeting enhances macroeconomic efficiency even when fiscal transfers are only partially effective.

3.5 Welfare Analysis Along the Equilibrium Path

In models without aggregate uncertainty, expected social welfare coincides with its deterministic counterpart along the perfect-foresight transition path. This modelling choice enhances transparency while retaining tractability. While introducing aggregate risk would allow for richer precautionary behaviour and endogenous volatility, it would also preclude closed-form aggregation. Achieving analytical solutions under aggregate risk typically requires strong assumptions on preferences—such as recursive utility with unit elasticity of inter-temporal substitution and unit risk aversion. Absent these, one must rely on fully numerical methods (e.g., Krusell & Smith 1998, Maliar et al. 2010), which risk obscuring the underlying macro-distributional channels this paper aims to highlight. For these reasons, the deterministic approach is standard in the Blanchard (1985)–Yaari (1965) tradition and widely adopted in recent studies (e.g., Benhabib et al. 2016, Leith et al. 2019).

To evaluate the welfare consequences of alternative monetary policy stances, the paper computes the social welfare along the transition path of the FLANK model in response to a one-time transfer shock targeted at inactive households. While this temporary fiscal intervention reduces cross-sectional inequality across all regimes, the aggregate macroeconomic response—particularly in output, consumption, and employment—varies substantially with the degree of inflation targeting. This is especially true under a highly persistent shock, where the fiscal stimulus may fail to crowd in private demand due to expectations of higher future taxes and interest rates.

To make welfare comparisons tractable, the paper adopts a cohort-specific lump-sum transfer scheme that eliminates inter-generational inequality among active households while preserving cross-sectional heterogeneity due to the coexistence of active and inactive agents. This adjustment allows for a closed-form expression of the social welfare function. While its derivation and theoretical justification is discussed in Appendix A.2.

Under this framework, welfare is computed as the discounted sum of aggregate utility (eq. (59)) along the deterministic transition path. The length of the simulations is chosen to be 100,000-period horizon to ensure full-convergence. The inflation coefficient ϕ_π is varied from 0.9 (dovish) to 1.5 (hawkish), holding all other parameters fixed. Figure 6 reports the level of welfare under each regime, and Figure 7 shows welfare losses relative to the dovish benchmark.

The results confirm that despite identical distributional effects across regimes, aggregate welfare is significantly higher under more accommodative monetary policy. These differences stem not from changes in inequality—whose path is unaffected by ϕ_π—but from variation in macroeconomic efficiency. Dovish regimes dampen the contractionary effects of inflation stabilization and support stronger recoveries in output and employment, leading to improved social welfare.

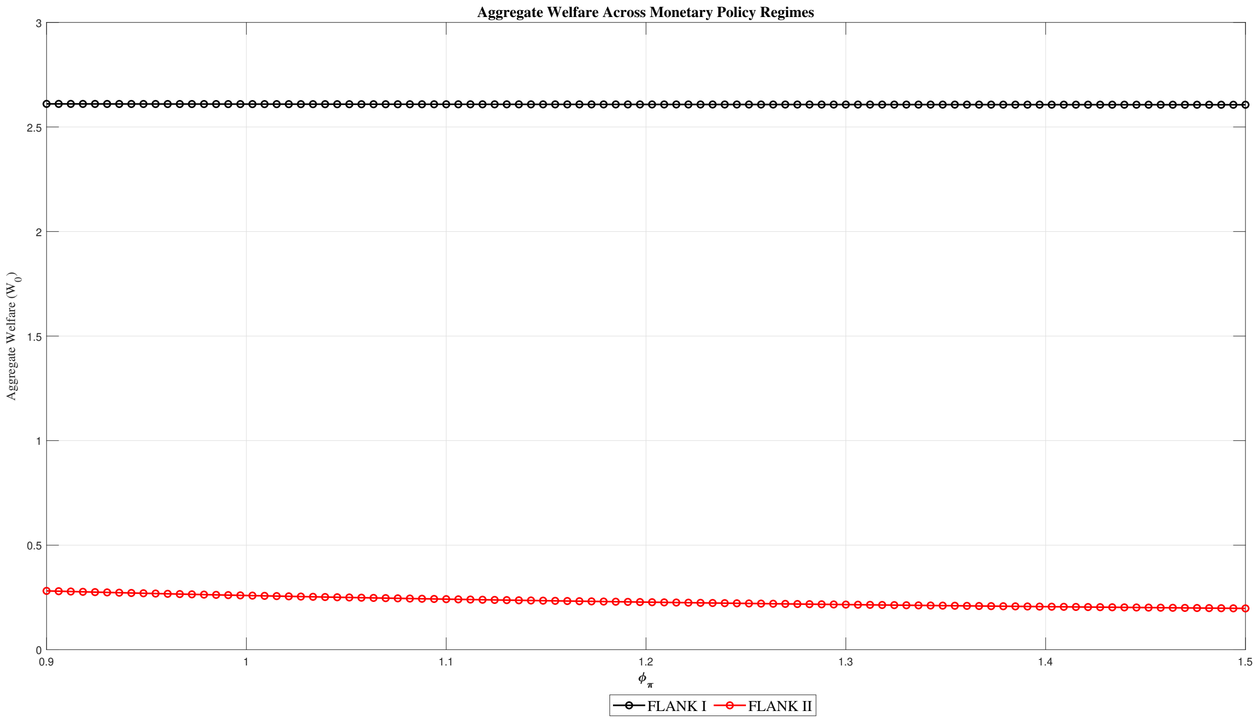

Figure 6: Aggregate welfare along the transition path following a one-time transfer to inactive households, under varying degrees of inflation targeting. FLANK I: Low persistence shock $(\rho_{tr} = 0.1)$. FLANK II: High persistence shock $(\rho_{tr} = 0.97)$.

In summary, although monetary policy does not alter the short-run distributional impact of the fiscal shock, it substantially affects the macroeconomic trajectory. A more accommodative stance—characterized by a lower ϕ_π—delivers higher aggregate welfare by mitigating the contractionary effects of inflation targeting. These results reinforce the paper's central message: in heterogeneous-agent economies, nominal stabilization involves real trade-offs that must be evaluated through their effects on both inequality and macroeconomic efficiency.

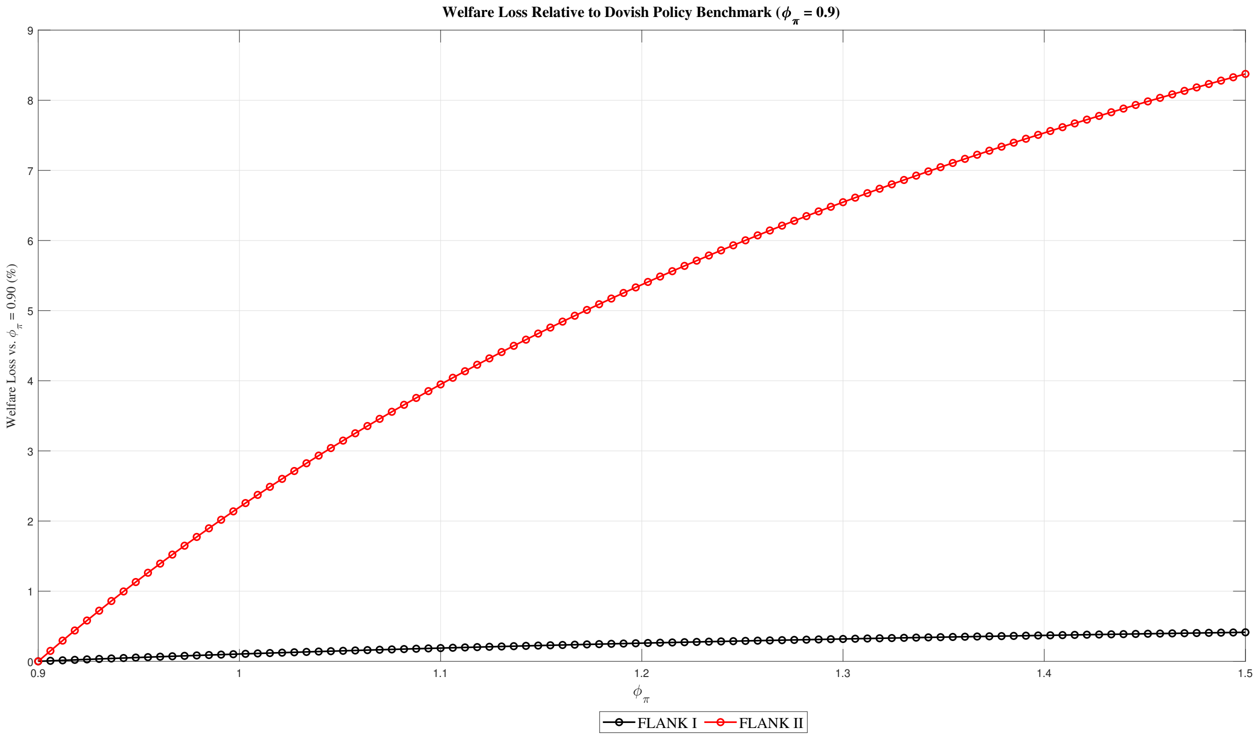

Figure 7: Welfare loss relative to the dovish benchmark ($\phi_\pi = 0.9$) following a one-time transfer shock, under varying degrees of inflation targeting. FLANK I: Low persistence shock ($\rho_{tr} = 0.1$). FLANK II: High persistence shock ($\rho_{tr} = 0.97$).

4 Conclusion

The paper develops a flexible heterogeneous-agent framework that incorporates overlapping generations, stochastic inactivity transitions, and frictional labour markets. This model provides a structured yet analytically transparent approach to studying inequality, macroeconomic dynamics, and the joint roles of fiscal and monetary policy. A central innovation is the inclusion of inactive, permanently hand-to-mouth households who do not participate in asset or labour markets. This generates a realistic participation margin and amplifies cross-sectional consumption heterogeneity—even in the absence of aggregate uncertainty.

The analysis mainly focuses on the short-run transitional dynamics following a one-off, unanticipated, and autocorrelated increase in government transfers to inactive households, interpreted as a stylized government spending shock. Under lump-sum taxation and inelastic labour supply, such transfers can reduce inequality without generating direct efficiency losses. However, their macroeconomic effectiveness depends critically on the monetary stance and the persistence of the shock. A dovish monetary regime consistently improves labour market outcomes and raises aggregate efficiency by mitigating the contractionary effects of future tax expectations and nominal rigidities. These results highlight the limitations of strict inflation targeting in heterogeneous-agent economies.

While the main study focuses on transitional dynamics, the paper also presents welfare analysis along the equilibrium path, under different monetary regimes. The welfare analysis reinforces key insights from the dynamic responses. Namely, even when inequality paths are invariant across regimes, macroeconomic efficiency can diverge sharply, leading to welfare gains under dovish policy.

A key strength of the framework lies in its tractability. By abstracting from aggregate risk and assuming log utility, the model delivers closed-form expressions for all per capita variables and preserves near-linear aggregation. Including aggregate uncertainty would require strong assumptions—such as either the inclusion of recursive preferences with particular parametrisation —or a fully numerical solution approach, such as that of Krusell & Smith (1998) or Maliar et al. (2010). Both would obscure the transparent policy mechanisms the paper aims to highlight.

Future research could extend this framework to incorporate aggregate risk, endogenous labour supply, and richer asset market structures, or apply it to the analysis of optimal policy design. However, the central contribution of this paper is to show that even in the absence of aggregate shocks, monetary-fiscal interactions generate meaningful trade-offs in heterogeneous-agent economies. The findings reinforce recent results in the HANK literature: strict inflation targeting may be inefficient, while dovish monetary policy can improve macroeconomic outcomes through smoother transitions and more effective fiscal transmission.

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A Online Appendix

A.1 Proofs of Propositions 1–5

Proposition 1. *Even among active households, a change in the real interest rate has heterogeneous effects due to generational differences.*

Proof. Consider the consumption function for an active household of generation s (see eq. (7)):

$$c^u_{s|t} = (1-\beta\gamma)\left(f \cdot \gamma \mathscr{W}^u_{s|t} + \zeta^u_{s|t}\right)$$

Differentiating with respect to R_t yields:

$$\frac{\partial c^u_{s|t}}{\partial R_t} = (1-\beta\gamma)\left(f \cdot \gamma \cdot \frac{\partial \mathscr{W}^u_{s|t}}{\partial R_t} + \frac{\partial \zeta^u_{s|t}}{\partial R_t}\right)$$

For newly born households ($s = t$), $\mathscr{W}^u_{t|t} = 0$, so:

$$\frac{\partial c^u_{t|t}}{\partial R_t} = (1-\beta\gamma) \cdot \frac{\partial \zeta^u_{t|t}}{\partial R_t}$$

Since older cohorts hold positive financial wealth, it follows that:

$$\frac{\partial c^u_{s|t}}{\partial R_t} \neq \frac{\partial c^u_{t|t}}{\partial R_t} \quad \text{for all } s < t$$

□

Proposition 2. *There is no direct effect of interest rate changes on the consumption of inactive households.*

Proof. Inactive households consume entirely out of government transfers (see eq. (9)):

$$c^r_{s|t} = \frac{T^r_t}{1-\xi}$$

Since T^r_t is exogenous to monetary policy, it follows that:

$$\frac{\partial c^r_{s|t}}{\partial R_t} = 0$$

□

Proposition 3. *In a Blanchard–Yaari setting, active households respond to interest rate changes in the same manner as permanent income consumers.*

Proof. From the aggregate Euler equation for active households (see eq. (29)):

$$c^u_t = \frac{1}{\beta R_t} c^u_{t+1} + \frac{(1-f\gamma)}{f\gamma} \cdot \frac{(1-\beta\gamma)}{\xi\beta} P^M_t b^L_{t+1}$$

and the bond pricing formula (see eq. (14)):

$$P_t^M = \frac{f\gamma}{R_t} \cdot \frac{1+\rho P_{t+1}^M}{1+\pi_{t+1}} \Rightarrow \frac{\partial P_t^M}{\partial R_t} = -\frac{P_t^M}{R_t}$$

Substituting this result yields:

$$\frac{\partial c_t^u}{\partial R_t} = -\frac{1}{\beta R_t^2} c_{t+1}^u - \frac{(1-f\gamma)}{f\gamma} \cdot \frac{(1-\beta\gamma)}{\xi\beta} \cdot \frac{P_t^M b_{t+1}^L}{R_t}$$

Recognizing that the right-hand side equals $-\frac{c_t^u}{R_t}$, we obtain:

$$\frac{\partial c_t^u}{c_t^u} = -\frac{\partial R_t}{R_t}$$

□

Proposition 4. *The effect of an interest rate change on aggregate per capita consumption is proportional to the share of active households.*

Proof. Aggregate consumption is given by (eq. (23)):

$$c_t = \xi c_t^u + (1-\xi) c_t^r$$

Using the result of Proposition 2 and Proposition 3, we have:

$$\frac{\partial c_t}{\partial R_t} = \xi \cdot \frac{\partial c_t^u}{\partial R_t} = -\xi \cdot \frac{c_t^u}{R_t}$$

□

Proposition 5. *An increase in lump-sum transfers to inactive households reduces cross-sectional consumption inequality.*

Proof. The consumption inequality index (eq. (32)) is defined as:

$$S_t = 1 - \frac{c_t^r}{c_t^u}$$

Transfers increase c_t^r proportionally (see eq. (9)):

$$\frac{\partial c_t^r}{\partial T_t^r} = \frac{1}{1-\xi}$$

Through the fiscal rule (eq. (58)), increased transfers raise B_{t+1}, which then increases current taxes T_t:

$$\frac{\partial T_t}{\partial T_t^r} = \frac{\phi_b}{\phi_b + 4Y_t}$$

This reduces the human wealth of active agents and hence their consumption (eq. (30)):

$$\frac{\partial \tilde{c}_t^u}{\partial T_t^r} = -(1-\beta\gamma)\cdot\frac{\phi_b}{\phi_b+4Y_t}$$

Differentiating S_t with respect to T_t^r yields:

$$\frac{\partial S_t}{\partial T_t^r} = -\left(\frac{c_t^u\cdot\frac{\partial c_t^r}{\partial T_t^r} - c_t^r\cdot\frac{\partial c_t^u}{\partial T_t^r}}{(c_t^u)^2}\right) = -\frac{1}{c_t^u}\left(\frac{1}{1-\xi}+\Omega_t\right)$$

where:

$$\Omega_t = (1-S_t)\cdot\frac{(1-\beta\gamma)}{\xi}\cdot\frac{\phi_b}{\phi_b+4Y_t}$$

Since both terms inside the parentheses are positive, it follows that:

$$\frac{\partial S_t}{\partial T_t^r} < 0$$

Hence, redistribution toward inactive consumers reduces inequality. □

A.2 The Social Welfare Function

To derive a closed-form expression for the social welfare metric, it is first necessary to eliminate all inter-generational inequality among active households. The literature offers two primary approaches to address this. The first, developed by Leith et al. (2019) and grounded in the seminal work of Calvo & Obstfeld (1988), separates the inter-temporal and distributional components of welfare to facilitate aggregation. This paper adopts an alternative strategy, following Acharya et al. (2023) and Angeletos et al. (2024*a*,*b*), the study introduces a cohort-specific lump-sum tax/transfer system. Specifically, each cohort of active households receives a differentiated lump-sum transfer such that $(1-\gamma)\sum_{s=-\infty}^{t}(f\cdot\gamma)^{t-s}G_{s|t}^u = 0$, $\mathscr{W}_{s|t}^u = \mathscr{W}_{s+1|t}^u = \ldots = \mathscr{W}_{t|t}^u = \mathscr{W}_t^u$ and thus, $c_{s|t}^u = c_{s+1|t}^u = \ldots = c_{t|t}^u = c_t^u, \forall t$. This mechanism equalizes wealth across all active individuals within each period, ensuring identical consumption and saving choices. By eliminating inter-generational heterogeneity among active households, this approach simplifies the aggregation of preferences and allows the analysis to clearly focus on the trade-off between efficiency and cross-sectional equity. In particular, all heterogeneity in consumption is attributed to institutional or life-cycle transitions—namely, the transition of a fraction of active households to inactivity-rather than differences within the active population itself.

The social welfare metric is defined as the weighted sum of the lifetime utility of all generations both current and future. Formally:

$$W_0 = \sum_{s=-\infty}^{\infty}\omega_s W_s$$

where the lifetime utility of a cohort born at time s is:

$$W_s = f \cdot W_s^u + (1-f) \cdot W_s^r$$

Here, W_s^u and W_s^r are the lifetime utilities of an active and inactive household born at time s, respectively, and f is the probability of remaining active. These utilities are given by:

$$W_s^u = \sum_{t=s}^{\infty} (\beta\gamma)^{t-s} \log(c_t^u)$$
$$W_s^r = \sum_{t=s}^{\infty} (\beta\gamma)^{t-s} \log(c_t^r)$$

And, the weights ω_s account for both the demographic structure and inter-temporal aggregation, following the perpetual youth tradition. More specifically,

$$\omega_s = \begin{cases} (1-\gamma)\gamma^{-s}, & s \leq 0 \\ \gamma^s, & s > 0 \end{cases}$$

For $s \leq 0$, the weight reflects the mass of individuals from each past cohort who are still alive today, accounting for both mortality and the declining size of past generations. For $s > 0$, the weight represents the planner's valuation of unborn cohorts, combining time discounting and survival probability.

Substituting into the social welfare definition gives:

$$\begin{aligned} W_0 = (1-\gamma) \sum_{s=-\infty}^{0} \gamma^{-s} \left[f \sum_{t=s}^{\infty} (\beta\gamma)^{t-s} \log(c_t^u) + (1-f) \sum_{t=s}^{\infty} (\beta\gamma)^{t-s} \log(c_t^r) \right] \\ + \sum_{s=1}^{\infty} \gamma^s \left[f \sum_{t=s}^{\infty} (\beta\gamma)^{t-s} \log(c_t^u) + (1-f) \sum_{t=s}^{\infty} (\beta\gamma)^{t-s} \log(c_t^r) \right] \end{aligned}$$

To ensure maximal tractability, the study swaps the order of summation. Thus, summing over calendar time t instead of cohort birth time s. This change exploits the law of large numbers: in each period, the cross-sectional distribution of household types converges to the population shares of active (ξ) and inactive ($1-\xi$) households, given constant probabilities for mortality and activity transitions. As a result, the period t social welfare metric can be expressed, as a deterministic weighted sum of the felicity functions of the two groups[12].

The active utility terms become:

[12] As in the THANK literature (e.g. Bilbiie & Ragot 2021, Chien & Wen 2021) this result is motivated from the existence of perfect insurance within type.

$$\sum_{s=-\infty}^{\infty}\omega_s\sum_{t=s}^{\infty}(\beta\gamma)^{t-s}\log(c_t^u) = \sum_{t=0}^{\infty}\beta^t\log(c_t^u)\cdot\underbrace{\sum_{s=-\infty}^{t}\omega_s\gamma^{t-s}}_{=\xi}$$
$$= \sum_{t=0}^{\infty}\beta^t\xi\cdot\log(c_t^u)$$

Similarly, the inactive terms are:

$$\sum_{s=-\infty}^{\infty}\omega_s\sum_{t=s}^{\infty}(\beta\gamma)^{t-s}\log(c_t^r) = \sum_{t=0}^{\infty}\beta^t\log(c_t^r)\cdot\underbrace{\sum_{s=-\infty}^{t}\omega_s\gamma^{t-s}}_{=1-\xi}$$
$$= \sum_{t=0}^{\infty}\beta^t(1-\xi)\cdot\log(c_t^r)$$

Putting it together, we obtain:

$$W_0 = \sum_{t=0}^{\infty}\beta^t\left[\xi\cdot\log(c_t^u)+(1-\xi)\cdot\log(c_t^r)\right] \tag{61}$$

Reformulating the Social Welfare Function via Inequality

Interestingly, the welfare function can also be expressed in terms of the cross-sectional consumption inequality index (see eq.(32)). The cross-sectional consumption inequality takes the form

$$S_t = 1-\frac{c_t^r}{c_t^u}$$

And, since both sides are strictly positive as long as $(1-f)>0$ then, a logarithmic transformation can be applied. Hence,

$$\log(c_t^r) = \log(c_t^u)+\log(1-S_t) \tag{62}$$

Substituting this into eq.(61) gives:

$$W_0 = \sum_{t=0}^{\infty}\beta^t\left[\xi\cdot\log(c_t^u)+(1-\xi)\cdot(\log(c_t^u)+\log(1-S_t))\right]$$
$$= \sum_{t=0}^{\infty}\beta^t\left[\log(c_t^u)+(1-\xi)\cdot\log(1-S_t)\right] \tag{63}$$

This expression highlights the planner's trade-off: welfare is increasing in average (active) consumption c_t^u, but decreasing in cross-sectional inequality S_t, with the strength of the inequality penalty scaled by the stationary share of inactive households, $(1-\xi)$.

B Supplemental Appendix

B.1 Dynamic Responses to a TFP Shock

In this section, the paper explores the dynamic effects of a one-time positive total factor productivity (TFP) shock within the FLANK model. As in the main paper, the analysis abstracts from aggregate risk and focuses on the perfect foresight equilibrium path following an unanticipated autocorrelated aggregate shock.

This section first considers the effect of a one-off increase in aggregate productivity, comparing the dynamic responses across three model variants: the nested RANK, the standard FLANK with only active households (FLANK I), and the main FLANK model with stochastic transitions into inactivity (FLANK II). To avoid confusion, the study refers to FLANK II as the "baseline FLANK" environment.

Figure 8 compares the responses across models. While all specifications yield qualitatively similar directional responses, key quantitative differences emerge. In particular, the coexistence of active and inactive agents in FLANK II amplifies marginal propensity to consume (MPC) heterogeneity, leading to more sluggish aggregate responses.

The $+1\%$ TFP shock raises output proportionally, scaled by the employment rate and the share of active participants. Because FLANK II has a lower participation margin and consistently higher unemployment, leading to a smaller initial output response than that of FLANK I or the RANK model. Moreover, the shock is highly persistent, and none of the specifications fully converge back to steady state within the 20-period (5-year) horizon.

In line with the empirical evidence of Elsby et al. (2015) and Hall & Schulhofer-Wohl (2018), the shock stimulates hiring with vacancies, wages, and employment rising, while search effort declines as more matches are made. These responses are dampened in FLANK II, where higher discounting reduces the value of employment, weakening household and firm surpluses and flattening the hiring condition.

Figure 9 presents monetary policy comparisons under two Taylor-type rules in the benchmark FLANK model. In Case I, the central bank targets both inflation and output ($\phi_\pi = 1.5, \phi_y = 0.125$). Output rises and inflation initially falls, prompting a modest increase in the real interest rate. In Case II, the central bank prioritizes inflation alone($\phi_\pi = 1.5, \phi_y = 0$). Here, inflation rises and the nominal interest rate responds more aggressively. These contrasting responses affect real interest rate dynamics and, consequently, the paths of asset prices and consumption.

Wage responses are consistent with Mortensen & Pissarides (1999): wages are pro-cyclical but lag behind output due to wage rigidities and Nash bargaining. Inflation affects wages indirectly—via marginal cost—rather than through standard New Keynesian Phillips curve dynamics. The path for aggregate consumption closely follows output, moderated by price-induced efficiency losses.

Inequality dynamics also differ across regimes. In Case II, a larger nominal interest rate response reduces bond prices, triggering valuation losses and a fall in financial wealth for active households. Since inactive agents consume fixed transfers, they are insulated. As shown in Proposition 4, only active agents' consumption responds to real interest rate changes, scaled by their population share. As a result, cross-sectional inequality rises initially.

Furthermore, interest rate shifts benefit younger/poorer active households through reduced borrowing

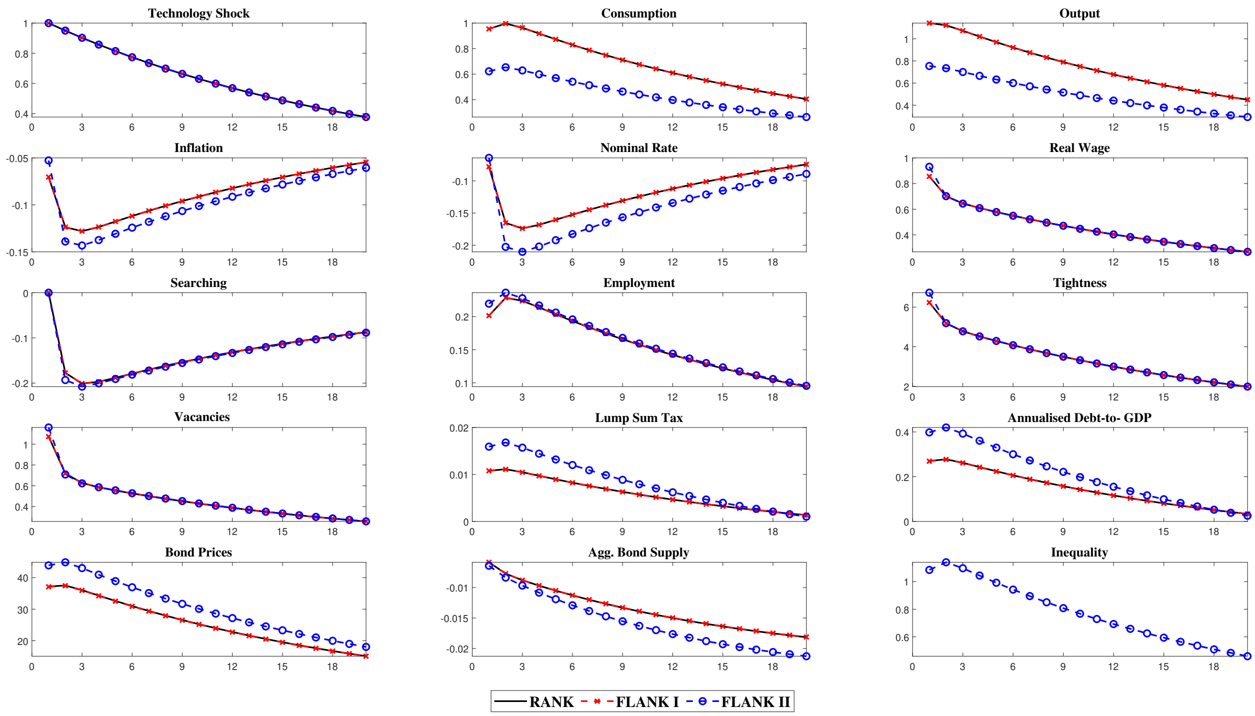

Figure 8: Dynamic responses to a positive technology shock. FLANK I refers to the standard FLANK model with only active consumers. FLANK II allows for stochastic transition to "inactivity".

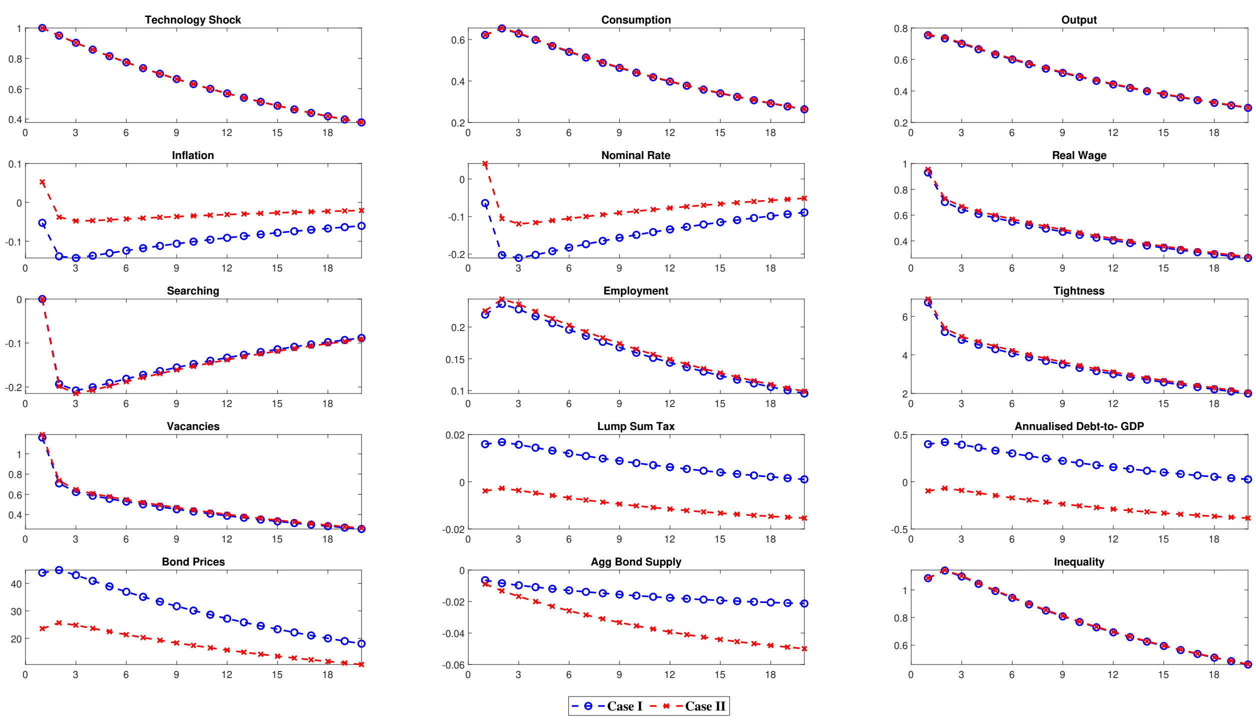

Figure 9: Dynamic responses to a positive technology shock. Case I refers to the benchmark case where the monetary authority targets both price and output stabilization. Case II removes the output gap from the interest rate rule.

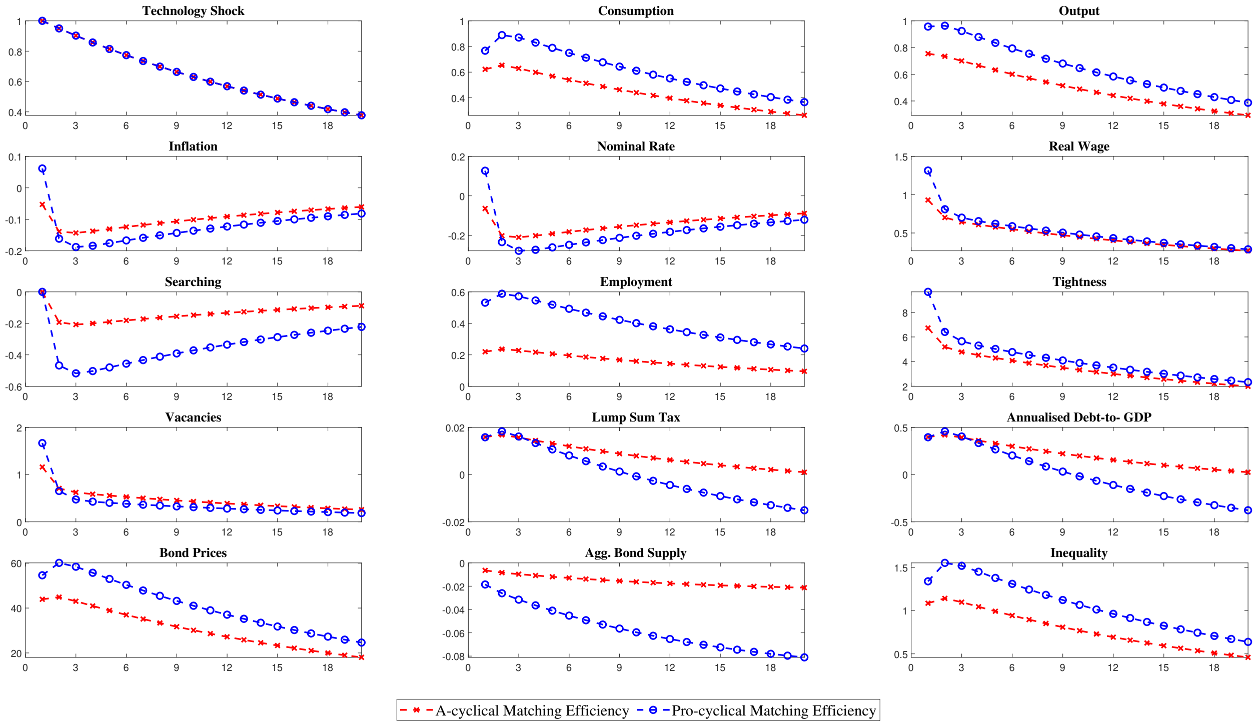

Figure 10: Policy response to an one-time unanticipated TFP shock. A-cyclical vs. Pro-cyclical matching efficiency.

costs, while older/richer cohorts see declines in asset income. However, strong revaluation effects from long-duration bonds amplify inequality. With persistent shocks and rigidities, convergence toward steady-state inequality is slow, and disparities among active households remain elevated over time.

Cyclicality of the Average Matching efficiency

In this section, the paper discusses the implications of allowing the (equilibrium) matching efficiency to be pro-cyclical instead of a-cyclical when the economy is experiencing an one-off autocorrelated aggregate shock. More specifically, the paper considers the dynamic responses to a one-off autocorrelated positive technology shock.

Figure 10 shows the effects of $+1\%$ unanticipated TFP shock. Under a pro-cyclical matching efficiency, the effects of the TFP shock on output and aggregate employment are amplified. Even for the same level of unemployed workers and/or vacancies, successful matching increases as output jumps above its equilibrium level.

Employment is experiencing more than double the increase in response to the positive TFP shock, compared to the benchmark FLANK model. As a result, aggregate output increases more than one- to- one with technology. Furthermore, the labour market itself becomes more resilient, which is evident from the fact that the tightness of the labour market initially jumps higher by more than 2%.

Furthermore, despite the fact that searching start from the same point in response to the aggregate shock, under pro-cyclical matching efficiency, searching drops further and remains below the equilibrium value for longer. This is hardly surprising since by definition searching is driven by the lagged value of employment, scaled by retention rate.

As anticipated, the positive technology shock leads to a more pronounced initial increase in output and aggregate consumption, driven by the pro-cyclical matching efficiency. This causes both inflation and the real interest rate to initially rise significantly higher compared to the benchmark case. As a result, inequality experiences a sharper initial surge and remains elevated compared to the benchmark scenario until the economy returns back to its steady-state.

Once again, searching and employment move in opposite directions. As the number of successful matches increase, in response to the positive technology shock, both the unemployment pool and the number of people searching decreases. As a result, the benefit of being employed, as measured by the real wage rate and aggregate consumption, increases by more compared to the baseline scenario. Finally, in line with the empirical evidence, vacancies are increasing in response to the unanticipated positive technology shock as firms increase their hiring intensity- since the economy is booming. Overall, the benefits from an unexpected positive aggregate shock show significantly higher gains under pro-cyclical matching efficiency, in terms of economic efficiency and labour market dynamics but, at the cost of higher cross-sectional lineality along the perfect foresight equilibrium path. This is a direct result of assuming the presence of a "Keynesian" population.

Hawkish vs. Dovish Monetary Policy

This subsection investigates how alternative monetary policy stances affect the dynamic adjustment of the FLANK model following a one-time autocorrelated technology shock. As in previous analyses, the study is concerned with the perfect foresight equilibrium path following the unanticipated TFP shock. The shock is realized in period 0, after which households fully anticipate the path of the economy and policy.

While the choice of monetary policy reaction coefficients does not influence the long-run equilibrium allocation, it plays a critical role in shaping the transitional dynamics. Figure 11 compares the responses under a hawkish regime ($\phi_\pi = 1.5$) and a dovish regime ($\phi_\pi = 0.9$).

Under the dovish regime, the central bank allows inflation to fall more sharply and recover more slowly in response to the positive TFP shock. Despite assigning lower priority to price stability, real interest rates still track inflation movements but less than one-for-one. The resulting fall in nominal rates induces large revaluation effects on financial portfolios. While aggregate real purchasing power rises across all consumers, the capital gains experienced by older, asset-rich active households outweigh borrowing gains for younger agents. As a result, initial inequality increases more under the dovish policy.

In contrast, the real economy—particularly the labour market—benefits more visibly from monetary accommodation. The larger decline in nominal interest rates under the dovish stance leads to a stronger expansion in output, vacancies, and employment. Wage growth and labour market tightness respond more forcefully as well, driven by heightened hiring incentives and a higher marginal value of job creation.

These differences in real activity are short-lived. After several periods, labour market variables—such as employment and vacancies—converge to a common trajectory, regardless of the monetary policy stance. However, in the early phases of adjustment, a dovish policy clearly accelerates labour market recovery and

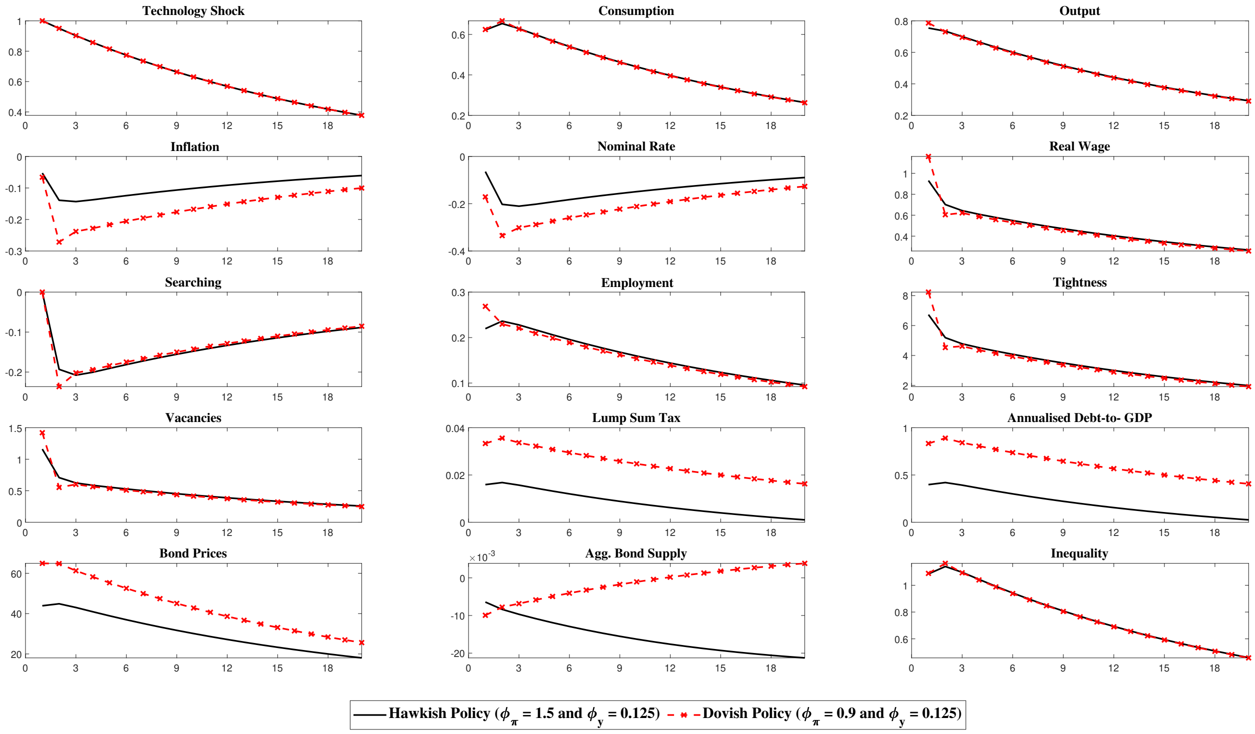

Figure 11: Dynamic responses to a one-off autocorrelated technology shock. Hawkish ($\phi_\pi = 1.5$) vs. Dovish ($\phi_\pi = 0.9$) monetary policy.

amplifies the benefits of the positive supply shock.

In summary, while both regimes deliver similar long-run outcomes, the dovish stance provides meaningful short-term gains by boosting output and employment more rapidly. These findings reinforce the view that, although monetary policy does not affect steady-state allocations, it plays a decisive role in managing the transition to full employment and stabilizing macroeconomic dynamics in the presence of aggregate shocks.