Does the financial accelerator accelerate inequalities?*

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Abstract

This study investigates the redistribution effects of a contractionary conventional monetary policy shock on households within a HANK framework that incorporates financial frictions in the production sector of the economy. The findings reveal that the financial accelerator also acts as an "inequality accelerator," indicating that the financial structure of productive firms plays an important role in shaping the distribution of wealth and consumption among households. Additionally, I show that financial frictions amplify wealth changes not only within households but also across household types, namely workers and rentiers.

Keywords: Heterogeneous agents, financial frictions, monetary policy, New Keynesian models, inequalities.

JEL codes: E12, E21, E44, E52, G51

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1 Introduction

While the literature on the impact of monetary policy on inequality has blossomed in the last decade, very little has been said about the role of financial frictions in this regard, especially when these frictions affect the production side of the economy. Standard New Keynesian models aimed at studying monetary policy usually ignore the production sector's financial structure, in light of the Modigliani and Miller (1958) theorem of capital structure irrelevance. However, several recent findings indicate that firms' financial structure plays a significant role in the business cycle. For instance, Caldara and Herbst (2019) employ a structural vector autoregressive model and discover that large effects of monetary policy shocks in the US during the Great Moderation period are explained by a strong systematic response of monetary policy to financial conditions. Gilchrist and Zakrajšek (2012) focus their research on the relationship between corporate bond credit spreads and economic activity, building the "GZ credit spread", a reliable measure of the strength of financial frictions concerning the non-financial corporate sector in the US, and finding a correlation with substantial contractions in economic activity. In terms of theoretical contribution, the so-called "financial accelerator" was first introduced by Bernanke et al. (1996), and is based on a mechanism that amplifies initial shocks due to changes in financial conditions for non-financial companies. The theoretical and empirical literature has yet to fully investigate how corporate financial frictions influence the transmission of monetary policy to household wealth and consumption distributions. This study aims to address this gap by introducing a theoretical framework to better understand these dynamics.

The core intuition of this paper builds on a key insight from the seminal work of Kaplan et al. (2018): in the presence of household heterogeneity, the majority of monetary policy transmission to consumption occurs not through direct effects, such as intertemporal substitution, but through indirect ones, such as labor dynamics, fiscal policy, and fluctuations in asset prices.[1] More specifically, in their baseline model, labor income fluctuations are the most important component, accounting for more than half of the percentage change in aggregate consumption, leaving a marginal role for direct effects. In light of this result, financial frictions in the production sector are likely to have a substantial impact on shifts in wealth and consumption distributions following a monetary policy change. This effect stems from the presence of "Hand-to-Mouth" households—those with minimal or no wealth—who rely heavily on labor income for saving and consumption smoothing. Households with high liquidity levels may also be affected,

[1]Table 1 in Kaplan et al. (2018) displays how in standard Representative Agent New Keynesian (RANK) models, direct effects account for almost 100% of the monetary transmission. This percentage could drop up to 50% in a Two Agents New Keynesian (TANK) model, indicating that heterogeneity among households actually matters. Nonetheless, in TANK models, direct effects are still the most important.

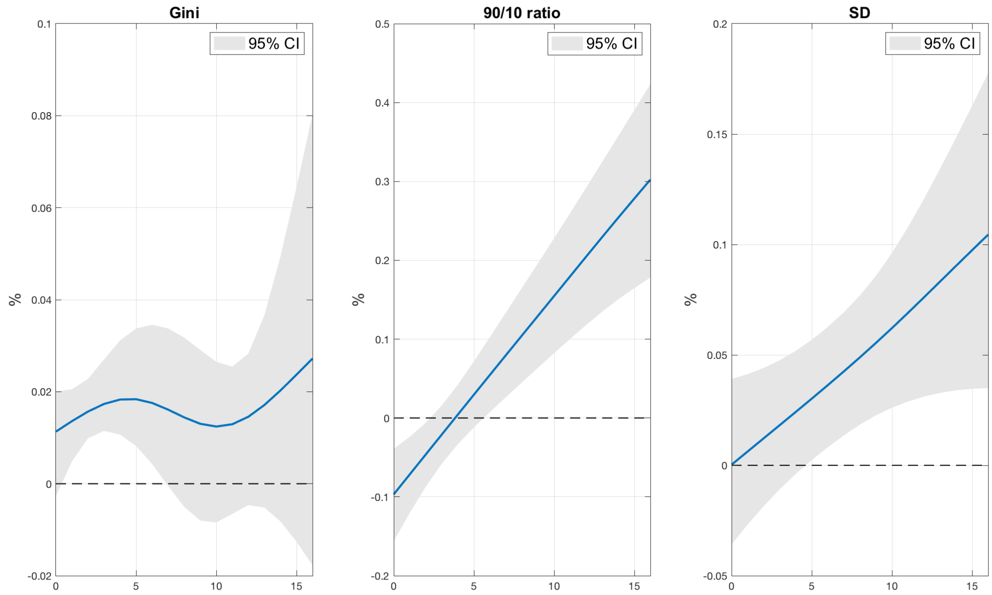

Figure 1: IRFs of consumption inequality to a financial condition tightening
The shock applied to the corporate spread is one standard deviation. The blue solid line refers to the impulse response function for the dependent variable considered. The shaded area denotes the 95% confidence interval.

likely experiencing the opposite effect due to increased financial income gains.

The empirical literature has established that contractionary monetary shocks result in higher consumption inequality (e.g., Coibion et al., 2017) and increased corporate spreads (e.g., Gertler and Karadi, 2015). However, to the best of my knowledge, there are no empirical studies that explicitly confirm the role of corporate financial frictions in amplifying wealth and consumption inequality after a monetary shock. Nonetheless, the available data remain useful to gain an understanding of the validity of the theoretical intuition proposed earlier. For instance, using the smooth local projection approach proposed by Barnichon and Brownlees (2019), it can be assessed whether a tightening of financial conditions is linked to a rise in measures of inequality. To examine the correlation between the GZ spread and consumption inequality, I estimate the same local projection model separately for three distinct measures of consumption dispersion: the Gini index, the 90th/10th percentile ratio, and the standard deviation of the distribution. The GZ spread, introduced by Gilchrist and Zakrajšek (2012), serves as a reliable proxy for the financial conditions of non-financial firms, while consumption inequality data are sourced from the series developed by Coibion et al. (2017) using CEX data on U.S. household consumption.[2] The model further accounts for lagged values of both the dependent and independent variables, alongside other macroeconomic control variables.[3] Results are displayed in Figure 1.

[2] https://www.bls.gov/cex/

[3] More details on the the local projection regression can be found in Appendix A

Regardless of the consumption inequality measure used, a tightening of financial conditions is consistently associated with greater consumption dispersion. In all cases, the impulse responses exhibit positive values within the 95% confidence interval. The only exception is the ratio of the 90th to the 10th percentile of the consumption distribution, which initially shows significantly negative values for the first two quarters. However, subsequent values for the impulse response function become significantly positive and remain persistent over the analyzed period. Together with the existing literature, these findings suggest that corporate financial conditions could significantly influence the impact of monetary shocks on household consumption inequality.

To investigate the transmission mechanism hypothesized above, I develop a Heterogeneous Agents New Keynesian (HANK) model that incorporates asset market incompleteness, idiosyncratic income risk, sticky prices, and a financial accelerator on the production side, in line with Bernanke et al. (1999). The "acceleration" effect arises due to friction in the way entrepreneurs obtain funds for the production of goods. Since an asymmetric information problem is introduced between lenders (financial intermediaries) and borrowers (entrepreneurs), lenders must pay auditing costs to check the actual production and to verify whether borrowers can repay their debt. This implies the existence of an "external finance premium", which is defined as the difference between the cost of funds raised externally (debt) and the opportunity cost of funds internal to the firm (net worth or equity).[4] This premium is directly related to entrepreneurs' leverage: the greater their exposure, the higher the premium. Whereas lenders are risk-averse and borrowers are risk-neutral, auditing costs are ultimately rebated to entrepreneurs themselves. Therefore, a contraction of economic activity that causes an increase in entrepreneurs' leverage will, in turn, result in higher auditing costs and a higher external finance premium. Entrepreneurs' net worth suffers a further depression due to these higher costs. Ceteris paribus, with lower equity to be used for production, entrepreneurs have to resort to more external funding, increasing their leverage and, consequently, incurring in a higher external finance premium, generating the financial acceleration in the economy. In short, higher leverage increases the cost of external funding, and vice versa, higher cost of external funding negatively affects entrepreneurs' net worth, increasing their leverage. Incorporating this mechanism into a model with household heterogeneity allows for an assessment of its impact on wealth and consumption distribution.

The main finding is that the financial accelerator is also an accelerator of inequalities. The monetary contraction leads to a higher level of the Gini index for wealth and consumption when there are active financial frictions. This phenomenon occurs because households respond differently in terms of saving and consumption behaviors along their wealth distributions. Households experiencing the most significant effects are those closest to the borrowing constraint, aligning with recent findings in the HANK literature that

[4]Throughout the paper, I treat net worth and equity as synonymous terms.

challenge the permanent income hypothesis. These individuals rely primarily—if not entirely—on their current labor income for consumption and are unable to smooth it due to insufficient savings.[5] The further decline in production due to the financial accelerator has a significant impact on labor and wages and therefore has a greater impact on households relying more on labor income than on income from profits or savings. Conversely, wealthy households benefit from the rise in interest rates, allowing them to accumulate more wealth. In terms of consumption, they can better smooth their spending or even increase it, particularly at the uppermost end of the wealth distribution. Because the financial accelerator magnifies disparities at the two tails of the distribution, the model produces even greater aggregate inequality in wealth and consumption in the presence of active financial frictions.

My research lies in the rapidly growing literature on household heterogeneity within a New Keynesian framework. Two Agents New Keynesian (TANK) models constitute a parsimonious yet powerful way to introduce household heterogeneity, with interesting results in monetary and fiscal policy evaluations (e.g., Galí et al., 2007; Bilbiie, 2008). Moreover, Debortoli and Galí (2024) show how TANK models can reasonably approximate the predictions of a HANK model regarding the effects of an aggregate shock on aggregate variables. Nevertheless, TANK models are not suitable for addressing other questions, such as the change in households' wealth distribution. Therefore, in such cases, we must resort to fully-fledged HANK models (e.g., Kaplan et al., 2018; Auclert et al., 2021; Luetticke, 2021). Beyond the remarkable contribution of developing algorithms that account for multiple asset heterogeneity, thereby handling vast numbers of grid points, a common objective of these studies is to achieve the closest possible match with empirical microdata. Differently, this study aims to employ a relatively simpler version of this class of models to examine the dynamics arising from the distinctive structure of the production sector while still matching specific moments of the household distribution and the business cycle.

My contribution is also closely linked to the financial frictions literature, particularly the strand examining the financial accelerator driven by the existence of an "External Finance Premium" for firms (e.g., Carlstrom and Fuerst, 1997; Bernanke et al., 1999; Christiano et al., 2014; Carlstrom et al., 2016). Incorporating household heterogeneity allows for an analysis that extends beyond aggregate business cycle dynamics to examine the effects at the idiosyncratic level.

To the best of my knowledge, only a handful of studies, such as Guerrieri and Lorenzoni (2017), Nakajima and Ríos-Rull (2019), Fernández-Villaverde et al. (2023), and Chiang and Żoch (2022), have integrated financial frictions into a HANK framework.

[5] As outlined in Section 2, the baseline model assumes that households cannot borrow to smooth consumption. However, the results remain robust even when accounting for households with negative wealth.

However, none of these studies seem to focus on the effects of these frictions on household inequality in response to aggregate shocks.

The paper by Faccini et al. (2024) is probably the closest to my research. The key difference lies in the type of friction considered and the corresponding dynamics being explored. Building on the work of Gertler and Karadi (2011), they investigate how frictions in bank balance sheets influence households' ability to obtain credit from financial intermediaries, primarily through variations in the household borrowing rate. In contrast, my study focuses on frictions faced by production firms, which influence household distributions primarily through changes in labor income. Therefore, I consider my results to be complementary to those of Faccini et al. (2024), extending the evidence on the effects of financial frictions from a different perspective. Given that a significant portion of households depend largely (or entirely) on labor income for consumption and wealth accumulation, it is crucial to understand how inequalities are shaped not only when the banking sector faces disruptions, but also when the cost of financing for firms rises due to their financial structure.

The remainder of this paper is organized as follows. Section 2 outlines the model. Section 3 explains the calibration. Section 4 displays quantitative results. Section 5 gives summary conclusions.

2 Model

The model comprises households, financial intermediaries, a production sector, a central bank, and the government. Households consume, earn income (either from labor or profit, depending on the household type), and save in a liquid asset, which yields an interest rate. Financial intermediaries obtain deposits from households and lend them to the production sector, which, in turn, is responsible for the production of goods and capital. The central bank is in charge of monetary policy and sets the nominal interest rate, whereas the government acts as fiscal authority and chooses how to finance government spending. Time is discrete and infinite. The behavior of each agent is explained in detail below.[6]

2.1 Households

There is a continuum of ex ante identical households of measure one indexed by $i \in [0, 1]$. They are infinitely lived, have time-separable preferences with time-discount factor β and their utility function u is affected positively by consumption, c_{it}, and negatively by labor, l_{it}, with $l_{it} \in [0, 1]$ being hours worked as a fraction of the time endowment, normalized to 1. The utility function u is strictly increasing and strictly concave in consumption

[6] The core structure of the model is based on the 1-asset HANK version presented in Luetticke (2021).

and strictly decreasing and strictly convex in labor. Household i value function is the following:

$$V = E_0 \max_{\{c_{it}, l_{it}\}} \sum_{t=0}^{\infty} \beta^t u(c_{it}, l_{it}) \ , \tag{1}$$

where I assume households have separable preferences with a Constant Relative Risk Aversion (CRRA) form:

$$u(c, l) = \frac{c^{1-\xi}}{1-\xi} - \psi \frac{l^{1+1/\nu}}{1+1/\nu} \ . \tag{2}$$

There are two types of household: workers and rentiers. Workers supply labor, l_{it}, in the production sector and have positive idiosyncratic labor productivity, $h_{it} > 0$. Because the global wage level, W_t, is the same for everyone, their income is given by $W_t h_{it} l_{it}$. Rentiers have zero labor productivity, $h_{it} = 0$, but collect a proportional share of total profits generated from the production sector, Π_t. Idiosyncratic labor productivity h_{it} follows an exogenous Markov chain according to the following first-order autoregressive process and a fixed probability of transition between the worker and the rentier state:

$$h_{it} = \begin{cases} \exp(\rho_h \log(h_{it-1}) + \epsilon_{it}^h) & \text{with probability } 1-\zeta \text{ if } h_{it-1} \neq 0 \\ h_t^H & \text{with probability } \iota \text{ if } h_{it-1} = 0 \\ 0 & \text{else} \end{cases} \tag{3}$$

where $\epsilon_{it}^h \sim N(0, \sigma_h)$ and h_t^H is the highest possible productivity realization for workers. The parameter $\zeta \in (0, 1)$ is the probability that a worker becomes a rentier, while $\iota \in (0, 1)$ is the probability that a rentier becomes a worker. As stated above, workers who become rentiers leave the labor market ($h_{it} = 0$), whereas rentiers that become workers are endowed with productivity h_t^H.[7] Workers and rentiers pay the same level of taxation, τ, on their income.

The asset market is incomplete: there are no Arrow-Debreu state-contingent securities, households self-insure themselves only through savings in a non-state contingent risk-free liquid asset, a_{it}, and they cannot get indebted on that, that is, an *ad hoc* borrowing constraint exists ($a_{it} \geq 0$). Thus, households cannot borrow from financial intermediaries to smooth their consumption. The household's budget constraint is:

$$c_{it} + a_{it+1} = \left(\frac{R_t}{\pi_t}\right) a_{it} + (1-\tau)(W_t h_{it} l_{it} + \mathbf{I}_{h_{it}=0} \Pi_t) \ , \tag{4}$$

where $\mathbf{I}_{h_{it}=0}$ takes the value of 1 if the household is a rentier and 0 otherwise. On the right-hand side, we have households' expenditure, that is, consumption, c_{it} and 1-year-maturity savings, a_{it+1}. The left-hand side corresponds to households' total earnings:

[7] Appendix B contains details on the transition matrix for household productivity.

work/rent income net of taxes, $(1-\tau)(W_t h_{it} l_{it} + \mathbf{I}_{h_{it}=0}\Pi_t)$, and the gross real interest rate on previous savings, $(R_t/\pi_t)a_{it}$, where $\pi_t = (P_t/P_{t-1})$ is the inflation rate.

Households' liquid assets consist of a combination of deposits, D_t, and government bonds, B_t, resulting in the following equation:

$$A_t = D_t + B_t \ , \tag{5}$$

where $A_t = \int a_{it} di$. Deposits and bonds are perfect substitutes, which means that they carry the same real interest rate, $\frac{R}{\pi}$, and that households are indifferent to the composition of A_t.[8]

2.2 Financial intermediaries

Financial intermediaries collect deposits from households and offer returns equal to the real risk-free interest rate, R/π. I assume that the production sector is run by entrepreneurs,a mass-zero group of managers who receive all the profits generated in the sector and redistribute them to rentier households. Financial intermediaries and entrepreneurs are the key agents responsible for the financial frictions present in this model. In line with Bernanke et al. (1999), there exists a continuum of entrepreneurs, indexed by j. Entrepreneur j acquires capital, K_j, from capital producers at the end of period t that is used at time $t+1$. To buy capital for production, entrepreneurs rely on two type of financing: internal financing, that is, equity, N_j, and external financing, D_j.

Entrepreneur j balance sheet at period $t+1$ is:

$$q_t K_{jt+1} = N_{jt+1} + D_{jt+1} \ , \tag{6}$$

where q is the price of capital at the time of the purchase.

A key condition for the functioning of this financial accelerator is that entrepreneurs are not indifferent to the composition of their balance sheet, meaning that external financing is more costly than internal financing. To capture this, I introduce a Costly State Verification (CSV) problem, as in Townsend (1979), where lenders (i.e., financial intermediaries) incur a fixed auditing cost to observe the realized returns of borrowers (i.e., entrepreneurs). An increase in the demand for debt raises auditing costs, which in turn reduces the total level of capital available for production.

Entrepreneurs repay financial intermediaries with a portion of their realized returns on capital. In this setup, entrepreneurs are risk-neutral, while households are risk-averse, implying a loan contract in which entrepreneurs bear all aggregate risk associated with the realization of their profits. I also assume the existence of an idiosyncratic shock to

[8] I assume that each household has the same portfolio composition of liquid assets, determined by the aggregate levels.

entrepreneur j, ω_j,[9] on the gross return on aggregate capital, R^K. The idiosyncratic shock ω has a log normal distribution of mean $E(\omega) = 1$ that is i.i.d. across time and across entrepreneurs, with a continuous and once differentiable c.d.f., $F(\omega)$.[10]

The optimal contract for financial intermediaries is:

$$\bar{\omega}_{jt+1} R^K_{t+1} q_t K_{jt+1} = Z_{jt+1} D_{jt+1} \ , \tag{7}$$

where Z_j is the gross non-default loan rate and $\bar{\omega}_j$ is the threshold value for entrepreneur j such that, for $\omega_{jt+1} \geq \bar{\omega}_{jt+1}$, entrepreneur j repays $Z_{jt+1}D_{jt+1}$ to financial intermediaries and retains $\omega_{jt+1}R^K_{t+1}q_tK_{jt+1} - Z_{jt+1}D_{jt+1}$. When $\omega_{jt+1} < \bar{\omega}_{jt+1}$, instead, entrepreneur j is unable to repay and defaults on the debt, resulting in no repayment. Since entrepreneurs' future capital returns are only known ex-post, financial intermediaries must incur a fixed auditing cost, μ, to recover the remaining value of entrepreneur j's activity after default, which is $(1-\mu)\omega_{jt+1}R^K_{t+1}q_tK_{jt+1}$.

Due to the optimal contract, financial intermediaries are expected to receive a return equal to the opportunity cost of their funds. By assumption, they hold a perfectly safe portfolio, meaning they can fully diversify the idiosyncratic risk associated with lending. Thus, the opportunity cost for financial intermediaries is the real gross risk-free rate, R/π. Therefore, the participation constraint for financial intermediaries that must be satisfied is:

$$[1 - F(\bar{\omega}_{jt+1})] Z_{jt+1} D_{jt+1} + (1-\mu) \int_0^{\bar{\omega}_{jt+1}} \omega_j dF(\omega_j) R^K_{t+1} q_t K_{jt+1} \geq \frac{R_{t+1}}{\pi_{t+1}} D_{jt+1} \ , \tag{8}$$

where $F(\bar{\omega}^F_j)$ is entrepreneur j default probability. Since financial markets are in perfect competition, (8) must hold with equality. The first term on the left-hand side of (8) represents the revenue financial intermediaries receive from the fraction of entrepreneurs who do not default, while the second term corresponds to what intermediaries can recover from defaulting entrepreneurs after deducting auditing costs.

Following the notation proposed in Christiano et al. (2014), I combine (6), (7), and (8) to write the following relationship:

$$EFP_{jt+1} = f\left(\bar{\omega}_{jt+1}, LEV_{jt+1}\right) \ , \ \text{with} \ f'(LEV_{jt+1}) > 0 \ . \tag{9}$$

where EFP is the "External Finance Premium" that Bernanke et al. (1999) define as the ratio between the return on capital and the real risk-free rate, $R^K/(R/\pi)$, and $LEV =$

[9] As noted by Christiano et al. (2014), ω could be thought of as the idiosyncratic risk in actual business ventures: in the hands of some entrepreneurs, a given amount of raw capital is a great success, while in other cases may be not.

[10] Appendix C.1 provides analytical expressions for $F(\omega)$ and other functions employed in the subsequent equations.

qK/N is entrepreneur's leverage. The EFP serves as a measure of the cost of external funds for entrepreneurs and can thus be viewed as a proxy for the intensity of financial frictions. The $(\bar{\omega}_{jt+1}, LEV_{jt+1})$ combinations that satisfy (9) define a menu of state $(t+1)$-contingent standard debt contracts offered to entrepreneur j, who chooses the contract that maximizes its objective.

In Appendix C.2, I present the optimization problem of entrepreneur j, which leads to three key conclusions. First, the EFP increases monotonically with leverage, implying that entrepreneurs with higher leverage face a higher EFP. Second, the default threshold for entrepreneur j, $\bar{\omega}_j$, is determined endogenously by the EFP. Third, since $\bar{\omega}_j$ depends solely on aggregate variables (R, R^K, and π), it follows that all entrepreneurs will adopt the same firm structure, meaning $\bar{\omega}$ and leverage are the same for everyone. Consequently, the superscript j can be omitted, allowing for the analysis of a representative entrepreneur.

A further fundamental equation describing the functioning of this financial accelerator is the law of motion for entrepreneurs' equity, given by the following expression:

$$N_{t+1} = \gamma \left[q_{t-1} R_t^K K_t - \frac{R_t}{\pi_t} D_t - \mu G(\bar{\omega}_t) q_{t-1} R_t^K K_t \right] . \tag{10}$$

Equation (10) states that entrepreneurs' equity after the production process at time t is equal to the gross return on capital net of the loan repayment and auditing costs (which are borne by the entrepreneurs due to their risk-neutrality). Parameter γ represents the share of surviving entrepreneurs who carry their equity to the production process from one period to the next. Conversely, the share of entrepreneurs $1-\gamma$ dies and consumes equity at time t (we can think of this as entrepreneurial consumption). As explained by Carlstrom et al. (2016), this assumption avoids excessive entrepreneurs' self-financing in the long run.[11]

Alternatively, (10) can be written in a more compact form as:

$$N_{t+1} = \gamma \left[1 - \Gamma(\bar{\omega}_t)\right] R_t^K q_{t-1} K_t \ , \tag{11}$$

where $[1 - \Gamma(\bar{\omega}_t)]$ is the share of capital returns to which non-defaulting entrepreneurs are entitled.[12] Equation (11), together with (9), explains the financial accelerator mechanism. Equation (9) states that an increase in entrepreneurs' leverage increases also the

[11]Note that in (10) I did not included entrepreneurial labor, as usual in the literature (e.g., Bernanke et al., 1999, Christiano et al., 2014). The assumption of entrepreneurial labor was introduced mainly to justify the initial amount of equity for new entrepreneurs that take the place of the dead ones. However, to keep the model as simple as possible, I follow Carlstrom et al. (2016), assuming that new entrepreneurs' initial equity comes from a lump-sum transfer from existing entrepreneurs. Even so, since the funding can be arbitrarily small and since only aggregate equity matters, this transfer can be neglected in equation (10). Bernanke et al. (1999) keep the share of income going to entrepreneurial labor at a very low level (on the order of 0.01), therefore neglecting this income sounds as a reasonable model simplification.

[12]See Appendix C.2

EFP. At the same time, (11) tells that an increase in the EFP increases $\bar{\omega}$ as well, negatively affecting entrepreneurs' equity level for the next period and, therefore, impacting the aggregate leverage.

2.3 Intermediate-goods producers

Intermediate-goods producers adopt a standard Cobb-Douglas production function with constant returns to scale, employing aggregate capital, K, supplied by entrepreneurs and labor, L, from workers:

$$Y_t = z_t L_t^{\alpha} K_t^{1-\alpha} \ , \tag{12}$$

where z represents the Total Factor Productivity (TFP).

TFP follows a first-order autoregressive process of type:

$$log(z_t) = \rho_z log(z_{t-1}) + \epsilon_t^z \ , \tag{13}$$

with ϵ_t^z following a normal distribution with mean 0 and variance σ^z.

Intermediate-good producers sell their production to resellers at a relative price MC_t. Therefore, their profit optimization is given by:

$$\Pi_t^{IG} = MC_t z_t L_t^{\alpha} K_t^{1-\alpha} - W_t L_t - r_t^K K_t \ . \tag{14}$$

Since they are in perfect competition, their profit optimization problem returns the wage paid per unit of labor and the rent paid per unit of capital:

$$W_t = \alpha MC_t z_t \left(\frac{K_t}{L_t}\right)^{(1-\alpha)} \ , \tag{15}$$

$$r_t^K = (1-\alpha)\, MC_t z_t \left(\frac{L_t}{K_t}\right)^{\alpha} \ . \tag{16}$$

2.4 Resellers

Resellers are agents assigned to differentiate intermediate goods and set prices. Price adjustment costs follow a Rotemberg (1982) setup. The demand for the differentiated good g is:

$$y_{gt} = \left(\frac{p_{gt}}{P_t}\right)^{-\eta} Y_t \ , \tag{17}$$

where $\eta > 1$ is the elasticity of substitution and p_g is the price at which good g is purchased.

Given (17) and the quadratic costs of price adjustment, resellers maximize:

$$E_0 \sum_{t=0}^{\infty} \beta^t Y_t \left\{ \left(\frac{p_{gt}}{P_t} - MC_t \right) \left(\frac{p_{gt}}{P_t} \right)^{-\eta} - \frac{\eta}{2\kappa} \left(log \frac{p_{gt}}{p_{gt-1}} \right)^2 \right\} , \tag{18}$$

with a discount factor that remains constant over time and is the same as that of households.

The New Keynesian Phillips Curve (NKPC) derived from the F.O.C. for price setting is as follows:

$$log(\pi_t) = \beta E_t \left[log(\pi_{t+1}) \frac{Y_{t+1}}{Y_t} \right] + \kappa \left(MC_t - \frac{\eta - 1}{\eta} \right) , \tag{19}$$

where π_t is defined as $\frac{P_t}{P_{t-1}}$.

2.5 Capital producers

After production at time t, entrepreneurs sell depreciated capital to capital producers at a price q_t. They refurbish depreciated capital at no cost,[13] and uses goods as investment inputs, I_t, to produce new capital, $\Delta K_{t+1} = K_{t+1} - K_t$, subject to quadratic adjustment costs. Finally, they resell the newly produced capital to entrepreneurs before entering the next period (therefore still at price q_t).

The law of motion for capital producers is:

$$I_t = \Delta K_{t+1} + \frac{\phi}{2} \left(\frac{\Delta K_{t+1}}{K_t} \right)^2 K_t + \delta K_t . \tag{20}$$

where δ is the depreciation rate for capital.

Then, capital producers maximize their profit, $q_t \Delta K_{t+1} - I_t$, w.r.t. newly produced capital, ΔK_{t+1}. This optimization problem delivers the optimal capital price:

$$q_t = 1 + \phi \frac{\Delta K_{t+1}}{K_t} . \tag{21}$$

This ensures that if the level of aggregate capital increases over time, so does its price.

It follows that entrepreneurs' return on capital does not depend only on goods production, but also on fluctuations of the capital price. Since entrepreneurs buy capital at the end of the period, they see that their capital at the beginning of the next period appreciated (depreciated) if q increases (decreases). The gross return on capital employed at time t can be written as:

$$R_t^K q_{t-1} K_t = r_t^K K_t + q_t K_t (1 - \delta) , \tag{22}$$

[13] The "no cost" assumption does not mean that δK is refurbished for free. Capital producers still need to buy the exact amount of I necessary to refurbish depreciated capital, but do not waste any further resources in this process. In fact, the law of motion for capital producers in the steady state (when $\Delta K = 0$) is $I = \delta K$.

where the first term on the right-hand side is the marginal productivity of capital derived in (16) and the second term represents the eventual capital gain (or loss) net of capital depreciation.

I can rearrange and finally derive the gross interest rate of capital as:

$$R_t^K = \frac{r_t^K + q_t(1-\delta)}{q_{t-1}} \ . \tag{23}$$

2.5.1 Final-goods producers

Final-goods producers are perfectly competitive, buy differentiated goods from resellers at a given price, and produce a single homogeneous final good used for consumption, government spending, and investment. The optimization problem of final-goods producers is:

$$\max_{\{Y_t, y_{gt} \in [0,1]\}} P_t Y_t - \int_0^1 p_{gt} y_{gt} dg \ , \tag{24}$$

subject to the following Constant Elasticity of Substitution (CES) function:

$$Y_t = \left(\int_0^1 (y_{gt})^{\left(\frac{\eta-1}{\eta}\right)} dg \right)^{\left(\frac{\eta}{\eta-1}\right)} \ . \tag{25}$$

From the zero-profit condition, the price index of the final good is:

$$P_t = \left(\int_0^1 (p_{gt})^{(1-\eta)} \right)^{\left(\frac{1}{1-\eta}\right)} \ . \tag{26}$$

2.6 Central bank

The central bank is responsible for the monetary policy. It sets the gross nominal risk-free interest rate, R, reacting to the deviation from steady state inflation, and engages interest rate smoothing. The Taylor-type rule employed by the central bank is as follows:

$$\frac{R_{t+1}}{\bar{R}} = \left(\frac{R_t}{\bar{R}}\right)^{\rho_R} \left(\frac{\pi_t}{\bar{\pi}}\right)^{(1-\rho_R)\rho_\pi} \epsilon_t^R \ , \tag{27}$$

where ϵ_t^R is the monetary policy shock defined as $log(\epsilon_t^R) \sim N(0, \sigma_R)$. The parameter $\rho_R \geq 0$ rules interest rate smoothing (if $\rho_R = 0$, the next-period interest rate depends only on inflation), whereas ρ_π captures the magnitude of the central bank's response to inflation fluctuations: the larger ρ_π, the stronger the central bank reaction (for the case limit $\rho_\pi \to \infty$, inflation is perfectly stabilized at its steady state level).

2.7 Government

The government acts as fiscal authority. It determines the level of public expenditure, G_t, tax revenues, T_t and issuance of new bonds, B_{t+1}. Its budget constraint is given by:

$$B_{t+1} = \left(\frac{R_t}{\pi_t}\right) B_t + G_t - T_t \ , \tag{28}$$

where T_t are taxes collected from both worker and rentier households:

$$T_t = \tau \left[\int W_t h_{it} l_{it} d\Theta_t(a,h) + \mathbf{I}_{h_{it}=0} \Pi_t \right] \ , \tag{29}$$

and $\Theta_t(a,h)$ is the joint distribution of liquid assets and productivity across households on date t.

Government bond issuance is regulated by the following rule:

$$\frac{B_{t+1}}{\bar{B}} = \left(\frac{B_t \frac{R_t}{\pi_t}}{\bar{B} \frac{\bar{R}}{\bar{\pi}}} \right)^{\rho_B} \ . \tag{30}$$

The parameter ρ_B captures how fast the government wants to balance its budget. When $\rho_B \to 0$, the government balances its budget by adjusting its spending. Instead, when $\rho_B \to 1$, the government is willing to roll over most of its outstanding debt.

2.8 Market clearing

The labor market clears when:

$$\int h \ l^*(a,h)\Theta_t(a,h) da dh = L_t \ , \tag{31}$$

where $l^*(a,h)$ is the optimal labor supply policy function of the household.

The liquid asset market clears when:

$$\int a^*(a,h)\Theta_t(a,h) da dh = A_t \ , \tag{32}$$

where $a^*(a,h)$ is the optimal saving policy function of the household.

The market for capital clears for (20) and (21).

Finally, good market clearing, which holds by Walras' law when other markets clear, is defined as:

$$Y_t \left(1 - \frac{\eta}{2\kappa} \left(log(\pi_t)\right)^2\right) = C_t + G_t + I_t + C_t^E + \mu G(\bar{\omega}_t) R_t^K q_{t-1} K_t \ , \tag{33}$$

where on the left-hand side we have total output net of quadratic costs of price adjustment. On the right-hand side, apart from household consumption, public expenditure and investments, we also find entrepreneurial consumption, C^E (due to dying entrepreneurs), and auditing costs.[14]

2.9 Numerical implementation

To solve the model, I follow the solution proposed in Bayer and Luetticke (2020). Since the joint distribution, Θ_t, is an infinite-dimensional object (and therefore not computable), it is discretized and represented by its histogram, a finite-dimensional object. I solve the household's policy function using the Endogenous Grid-point Method (EGM) developed by Carroll (2006), iterating over the first-order condition and approximating the idiosyncratic productivity process using a discrete Markov chain with three states using the Tauchen (1986) method. The log grid for liquid assets comprises of 100 points. I solve for aggregate dynamics by first-order perturbation around the steady state, as in Reiter (2009). The joint distribution is represented by a bi-dimensional matrix (capital K does not display heterogeneity) with a total of 300 grid points, maintaining a sufficiently low computational time.[15]

3 Calibration

The model is calibrated on the US economy, and because the focus is on conventional monetary policy, business cycle moments are targeted on the Great Moderation (i.e., 1983-2007). Periods in the model represent quarters; consequently, the following values for the calibrated parameters are intended quarterly unless otherwise specified. Table 1 presents a list of calibrated model parameters, with their calibration methodology detailed in this section. Table 2 displays the key moments of the wealth distribution used as targets and examines how well the model replicates them.

3.1 Households

For the households' utility function, I assume the coefficient of relative risk aversion $\xi = 2$, which is consistent with the findings of Attanasio and Weber (1995) and already used by Auclert et al. (2021). I set the Frisch elasticity of labor supply $\nu = 1$, in line with the results of Chetty et al. (2011). The parameter for the disutility of labor, ψ, is set to 5.5, to have an average value for hours worked equal to 1/2, as in Kaplan et al. (2018). The intertemporal discount factor, β, is equal to 0.988, so savings in deposits by households are sufficient to have a leverage for entrepreneurs of 2, the same value used by Bernanke et al. (1999) in their model, and a fair calibration given historical levels of corporate leverage. I decide on purpose to impose a non-borrowing condition for households, setting the

[14] Similarly to Kaplan et al. (2018), we can think of this last term as "financial services".

[15] A visual representation of the joint distribution can be found in Appendix B

Table 1: Calibrated parameters

Parameter	Value	Description
β	0.988	Discount factor
ξ	2	Relative risk aversion
ν	1	Frisch elasticity of labor
ψ	5.5	Disutility of labor
$\underline{a}$	0	Borrowing constraint
ι	0.0625	Prob. of leaving entr. state
ζ	0.00055	Prob. become rentier
ρ_h	0.98	Persistence of idio. prod. shock
σ_h	0.06	SD if idio. prod. shock
α	0.7	Labor share of production
δ	0.2	Depreciation rate
η	20	Elasticity of substitution
κ	0.09	Price stickiness
ϕ	2.5	Adjustment cost of capital
μ	0.12	Auditing costs
σ_ω	0.27	SD of the id. shock on entr.
γ	0.985	Entr. surviving rate
ρ_z	0.95	TFP shock persistence
σ_z	0.01	TFP shock SD
R	1.0063	Nominal int. rate
ρ^R	0.8	Int. rate smoothing
ρ^π	1.5	Reaction to inflation
σ_R	0.0025	Monetary shock SD (p.a.)
τ	0.3	tax rate
ρ_B	0.86	Auto-correlation of debt

Table 2: Wealth distribution moments

Target	Model	Data
Gini index (calibrated)	0.78	0.78
top 10% wealth	0.71	0.67
HtM households	0.24	0.30

borrowing limit for liquidity $\underline{a} = 0$, to highlight the transmission mechanism of monetary policy through financial frictions on the production sector rather than on the lending sector. The absence of an explicit negative borrowing constraint removes an additional parameterization tool, as this feature is often used in the literature to calibrate the share of hand-to-mouth (HtM) or borrowing households. Nevertheless, the model still generates a substantial share of HtM households—approximately 24%—which is consistent with empirical estimates, which typically indicate that around 30% of U.S. households are HtM.[16]

The calibration of the productivity transition matrix, which determines how households move between the worker and rentier states, aims to provide a distribution of wealth consistent with empirical data. As in Luetticke (2021), I assume that the probability of becoming a rentier is the same for workers independent of their labor productivity, and once they become workers again, they start with the highest productivity realization. The probability of leaving the rentier state is $\iota = 0.0625$, following the findings of Guvenen et al. (2014) on the probability of dropping out of the top 1% income group in the US. The probability of moving from the worker to the rentier state is $\zeta = 0.00055$, a value calibrated to obtain a Gini coefficient for wealth of 78%, in line with empirical data from the Survey of Consumer Finances (Luetticke, 2021), implying a share of rentier households of approximately 0,9%. Regarding idiosyncratic income risk for labor productivity, I set autocorrelation $\rho_h = 0.98$ and standard deviation $\sigma_h = 0.06$, as estimated by Bayer et al. (2019).

3.1.1 Financial Intermediaries

The parameters concerning financial frictions on firms are in the ballpark of Bernanke et al. (1999) calibrations; therefore, the auditing cost is $\mu = 0.12$ and the standard deviation of the idiosyncratic shock on the entrepreneur's returns is $\sigma_\omega = 0.27$, which are calibrated to have $EFP = 1.005$ (and, therefore, a credit spread of 2% p.a.) when the corporate leverage is 2. The share of surviving entrepreneurs, γ, is calibrated such that, at steady state, the equity level in (11) is equal to the equity implied by (9).

3.1.2 Production Sector

The labor share of production (accounting for profits) and capital depreciation rate follow standard values in the literature and are set respectively to $\alpha = 0.7$ and $\delta = 2\%$. The mark-up is also standard, at 5%, which implies elasticity of substitution between goods varieties $\eta = 20$. The price stickiness parameter in the NKPC, $\kappa = 0.09$, is calibrated to generate a slope of the curve similar to the one that would arise in a model with sticky

[16] In line with Kaplan et al. (2014), I identify HtM households as those whose wealth falls below the equivalent of two weeks of the lowest possible labor income realization.

prices à la Calvo, with an average price duration of four quarters. The adjustment cost of the capital parameter is calibrated to $\phi = 2.5$ to match investment-to-output volatility $\sigma(I)/\sigma(Y) = 3$ after a TFP shock, a standard value in the literature, in the scenario where the financial accelerator is active.[17]

3.2 Central Bank and Government

Inflation at the steady state is set to 0% per annum, and the nominal (therefore real) interest rate on bonds is 2.5%, a value in line with the real average federal funds rate for the Great Moderation period. I impose the same interest rate on all types of liquid savings (i.e., government bonds and deposits); otherwise, households would choose to invest only in one asset or the other. Regarding the Taylor rule adopted by the Central Bank, the parameter for interest rate smoothing is $\rho_R = 0.8$, according to the findings of Clarida et al. (2000), whereas the reaction to inflation fluctuations from the steady state is $\rho_\pi = 1.5$, which is a common value in the macroeconomic literature. For the magnitude of the monetary policy shock, I assume that the central bank increases the nominal interest rate by 25 basis points on annual basis.[18]

The taxes set by the government are proportional to both labor income and profits, with a tax rate $\tau = 0.3$ that targets the ratio of government spending to GDP to a standard value in the New Keynesian literature, $G/Y \approx 20\%$. Since I am using a fiscal policy rule similar to the one adopted by Bayer et al. (2019), I also follow their estimation and set $\rho_B = 0.86$. This implies that the fiscal dynamic passes through government debt, with public spending adjusting to re-stabilize debt to its steady state level.

4 Results

The analysis of the impulse responses begins with an overview of fluctuations in aggregate variables. This helps to assess the consistency of the results with respect to the findings of Bernanke et al. (1999). I then investigate the dynamics of inequality within the model, a key aspect of this study.

4.1 Aggregate fluctuations

During the first period, the economy experiences an unexpected increase in the nominal interest rate (one-time innovation). Figure 2 compares the response of several aggregate variables to this shock when financial frictions are active (blue solid line) or not (red dashed line), i.e., when the EFP can fluctuate or is fixed to its steady state value.

[17] The TFP considered for this calibration has a standard deviation of $\sigma_z = 0.01$ and a persistence parameter of $\rho_z = 0.95$.

[18] Bernanke et al. (1999) analyze a shock of the same magnitude but with the opposite sign.

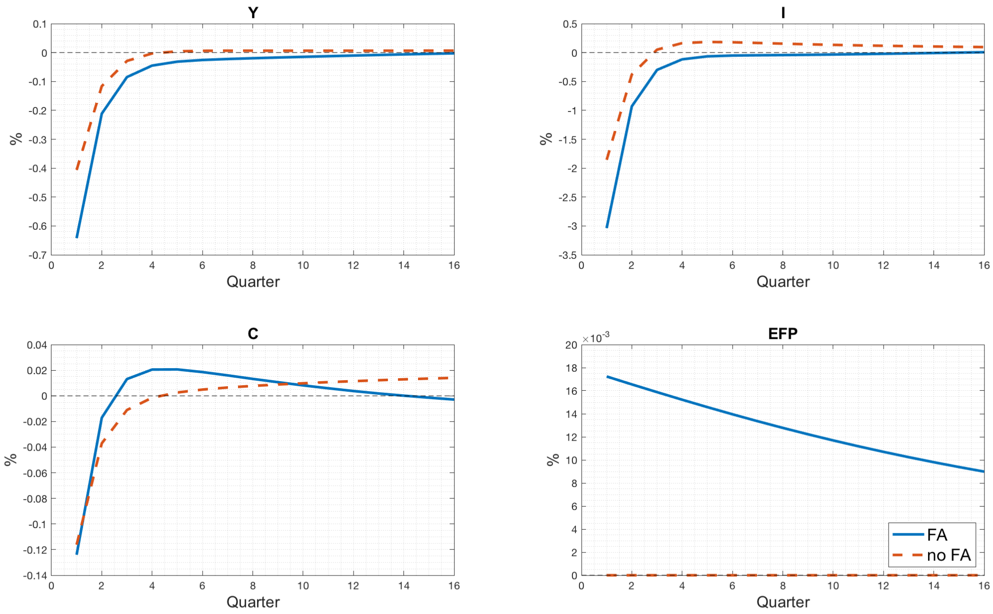

Figure 2: Impulse response to a monetary contraction for aggregate variables
Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off.

The impact of the financial accelerator on aggregate variables is also demonstrated in presence of heterogeneous households. Results are fairly similar to Figure 3 in Bernanke et al. (1999), with output and investment responses under financial frictions exhibiting higher magnitude on impact and higher persistence over time,[19] although IRFs in the HANK model converge to the steady state (or even overshoot) more rapidly. Aggregate consumption exhibits an "accelerated" response as well, albeit to a lesser degree and with less persistence than output and investment. In the case of active financial frictions, consumption overshoots sooner than in the comparative scenario after a few periods. However, this result remains broadly consistent with the findings of Bernanke et al. (1999).[20]

To illustrate the dynamics of the financial accelerator in details, Figure 3 displays the IRFs for leverage, firm equity, and household liquidity.[21] A rise in the nominal interest rate dampens economic activity, reducing the demand for capital and, consequently, lowering both investment and the price of capital. However, it also encourages households to accumulate liquidity, particularly in the form of loans to firms through financial intermediaries. As suggested by equation (10) and shown in Figure 3, lower levels of capital and capital price and higher levels of firms' debt cause a stronger decline in firms' equity

[19]Since in Bernanke et al. (1999) there is a fall in the nominal interest rate, the dynamics are mirrored.

[20]While the authors do not provide impulse responses for consumption, these dynamics can be observed using replication codes, such as those found in the Macroeconomic Model Data Base (`https://www.macromodelbase.com`).

[21]More IRFs for aggregate variables are shown in Appendix D

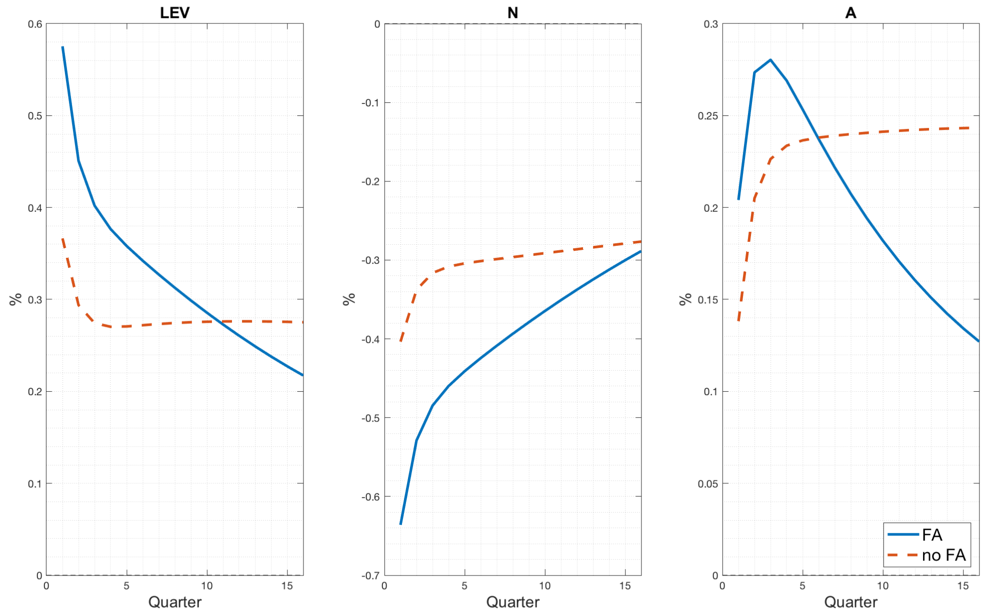

Figure 3: Impulse response to a monetary contraction for aggregate variables
Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off.

and, therefore, a higher level of leverage.[22] Higher leverage implies higher firm financing costs, i.e., higher EFP, as pointed out by by eq. (9). Simultaneously, the entrepreneur's default threshold value, $\bar{\omega}$, also increases, which negatively affects the firm's equity level in the next period. With lower equity, firms need to resort to more external financing, but since the latter is more expensive as leverage and EFP increase, the level of capital that firms can afford is even lower, which means less investment and less goods production, generating the multiplier effect of the financial accelerator.

It is worth closely analyzing the differences in leverage and output behavior across the two scenarios (active versus passive financial frictions). While financial frictions persistently amplify output fluctuations throughout the considered horizon, leverage exhibits a contrasting pattern, declining to a relatively lower level under active frictions after three years. While seemingly counterintuitive, this outcome is a common finding in the theoretical literature,[23] highlighting the strength of the friction itself. Consider the scenario with inactive financial frictions. In this case, external funding is relatively cheaper for firms because the EFP remains fixed at its steady state level. As a result, firms deleverage more gradually over time, as entrepreneurs prefer to sustain a relatively higher level of debt, which households—particularly wealthier ones—are willing to supply through financial intermediaries. Although the equity IRF remains at a relatively higher level throughout the entire period considered, leverage surpasses the comparative scenario af-

[22]Recall that in this model leverage is defined as $\frac{qK}{N}$, or equivalently, $\frac{D+N}{N}$.
[23]A similar dynamic emerges in the original Bernanke et al. (1999) model.

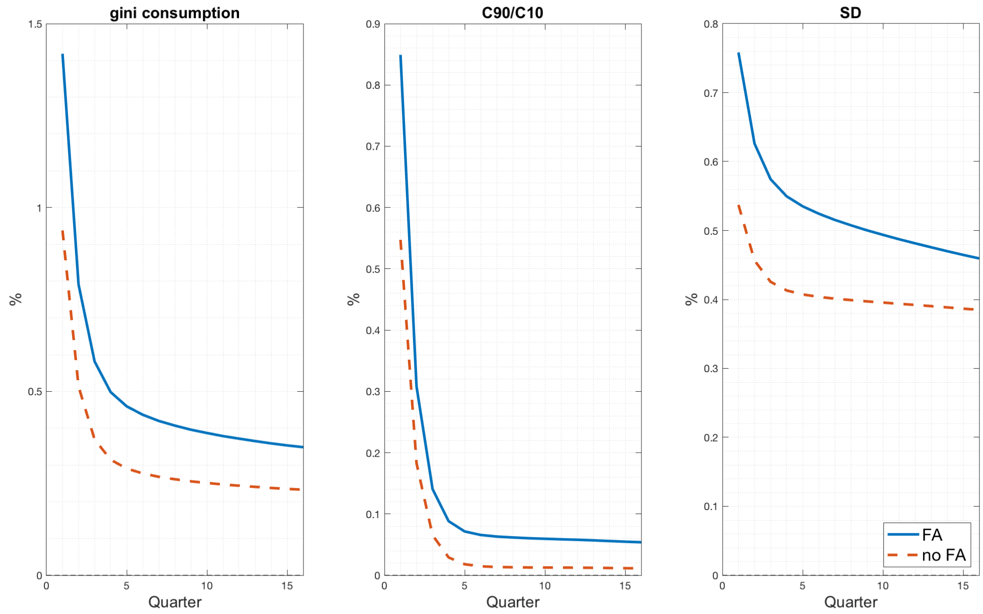

Figure 4: IRF for Gini index, 90/10 percentile ratio and SD of consumption
Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off.

ter approximately three years. This occurs because, with a fixed EFP, firms' debt levels (which correspond to household deposits) exceed those in the comparative scenario after about six quarters.[24] Nevertheless, despite leverage reverting more quickly to its steady-state level under active financial frictions, such frictions still amplify economic downturns, leading to a more persistent contractions in output and investment following a monetary shock.

4.2 Inequality among households: consumption

I begin by examining the evolution of consumption dispersion to assess whether the model's results align with the existing empirical literature. I then proceed to analyze wealth dynamics, for which empirical evidence is more scarce.

Figure 4 presents the impulse responses for the Gini index of consumption, the consumption ratio between the 90th and 10th percentiles of the wealth distribution, and the standard deviation of the consumption distribution—measures commonly used in the literature. The model aligns with the findings of Coibion et al. (2017), which show that contractionary monetary policy leads to an increase in all the inequality measures mentioned above, regardless of whether the financial accelerator is active or passive. The impact of financial frictions in amplifying consumption inequality is clear, and this effect persists across the quarters displayed. Thus, the financial accelerator appears to exacer-

[24]The impulse response for deposits/debt (D) is presented in Figure D.1. Nonetheless, its shape closely resembles that of the household wealth (A)

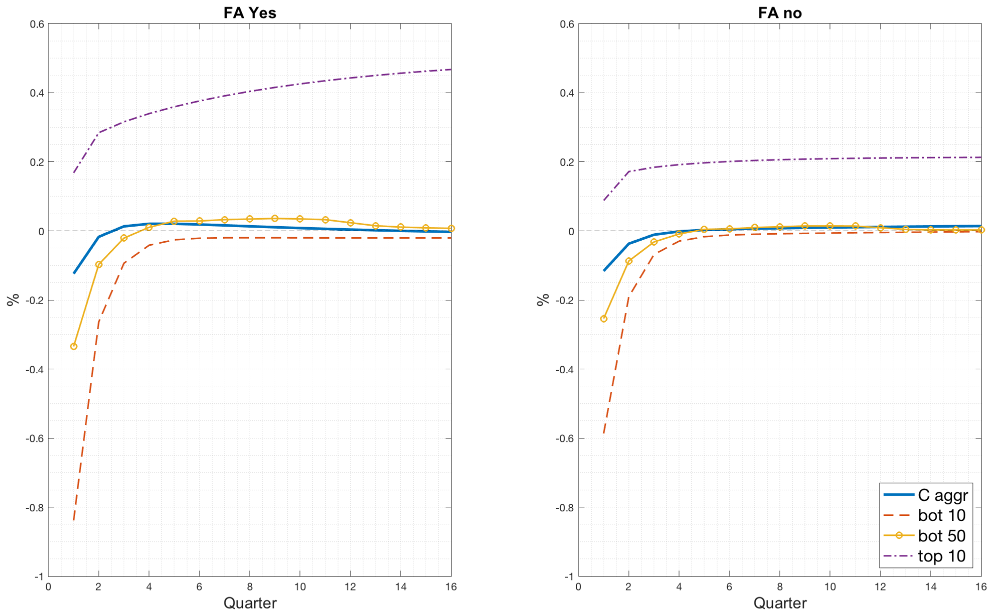

Figure 5: IRFs for consumption, aggregate and averages per wealth share

Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line represents the aggregate consumption. Other lines represent the average consumption of specific shares of households. The left panel represents the scenario with active financial frictions, while the right panel depicts the case where financial frictions are shut off.

bate consumption inequality, confirming the intuition presented earlier in this study, as illustrated in Figure 1.

The results for the Gini index and the standard deviation of consumption indicate that overall inequality rises more significantly due to the financial accelerator. Moreover, the trend for the 90/10 ratio shows that the disparity in consumption between poorer and wealthier households expands further due to the frictions examined. To gain a deeper understanding of these dynamics, I decompose the impulse response of aggregate consumption by analyzing average consumption across different household wealth shares. Figure 5 displays the impulse response for aggregate consumption, along with the average consumption of the bottom 10% of the wealth distribution—who are constrained by the zero-borrowing limit—the bottom 50%, and the top 10%.[25]

Figure 5 reveals some critical key insights. A monetary contraction leads to a stark decline in average consumption among poorer households, aligning with findings in the existing literature. The bottom 10% of the wealth distribution experiences a significant drop in consumption relative to aggregate consumption, regardless of the presence of financial frictions. Since these households are fully constrained, this decline is entirely driven by worsening labor market conditions. The contraction extends up to the bottom 50% of the distribution; however, in this case, consumption overshoots after approximately one year, as some households within this group possess liquidity holdings and

[25]Note that the average consumption of the bottom 50% also includes consumption of the bottom 10%

benefit from financial income. Notably, this overshooting effect is more pronounced when the financial accelerator is active.

On the other hand, the average consumption at the top of the wealth distribution increases steadily. In this model, where households can only save in liquid assets, a rise in the interest rate disproportionately benefits wealthier households, who hold substantial liquidity.[26] Although wealthier households have a lower marginal propensity to consume, their financial gains are sufficiently large to generate a noticeable increase in their average consumption. Nevertheless, the significance of the marginal propensity to consume becomes evident when comparing the percentage deviations of the IRFs across the wealth distribution. On impact, independent of the presence of financial frictions, the percentage deviation in consumption among constrained households far exceeds the corresponding increase among the richest 10%.

Another key insight from Figure 5 is the difference in the persistence of impulse responses for consumption across the wealth distribution. While consumption for the bottom 10% exhibits greater initial volatility, it rapidly converges to its steady-state level. In contrast, consumption at the top of the distribution fluctuates less on impact but remains persistently elevated over time. This divergence arises from differences in income sources across the wealth distribution. As previously noted, HtM households rely predominantly on labor income dynamics, which tend to recover quickly following a monetary shock. In contrast, wealthier households derive a substantial share of their income from financial assets, which, in this model, are determined by their accumulated wealth. The consumption pattern observed for the top 10% suggests that these households are experiencing wealth gains, pushing them to a higher financial position relative to the steady state. Given that wealth dynamics tend to exhibit greater persistence, this results in a more sustained change in consumption behavior for households that depend more heavily on financial income. In Section 4.3, I conduct a wealth distribution analysis to assess whether this pattern holds.

Finally, as evident from Figure 5, the financial accelerator primarily acts as an amplifier of fluctuations. When financial frictions are active, the magnitude and persistence of the impulse responses at both extremes of the distribution increase compared to the counterfactual scenario, explaining the amplification effect obtained in Figure 4.

As previously discussed in the literature review, an important contribution to the study of financial frictions within a HANK framework is the work by Faccini et al. (2024). Among the various aggregate shocks examined in their analysis, the authors also present impulse responses for consumption across different percentiles of the wealth distribution following a monetary policy contraction. Consistent with my findings, their results indicate that, even under a different type of financial friction, poorer households significantly

[26] A more comprehensive discussion on the implications of restricting household savings to liquid assets can be found in Section 4.3.

reduce their consumption compared to a scenario in which this friction is absent. Their results for the upper segments of the wealth distribution appear to diverge quantitatively with respect to the one shown in this section, with the latter suggesting a stronger impact of financial frictions on firms. However, it is essential to note that the discrepancy in results at the upper end of the distribution may not be entirely attributable to differences in friction dynamics but also to distinct calibration choices, given that their model is based on the Danish economy.[27]

4.3 Inequality among households: wealth

Empirical research on changes in wealth distribution following monetary policy shocks in the U.S. remains limited, primarily due to the absence of suitable databases for statistical analysis.[28] As a result, theoretical models that account for household heterogeneity play a key role in shedding light on these dynamics. To examine the evolution of wealth inequality within the framework presented in this study, Figure 6 displays IRFs for the respective Gini index, illustrating percentage deviations from its steady-state value under both active and passive financial accelerator scenarios.

The IRFs for both scenarios exhibit a significant and persistent increase, peaking one year after the shock before gradually reverting. This prolonged effect has already been observed in consumption dynamics (Figure 4) and is similarly reflected in household liquidity fluctuations (Figure 3). Recall that, within this framework, households can only accumulate liquid wealth, as they are restricted to saving in deposits and government bonds by design.[29]

Even in the context of wealth, the financial accelerator serves as a mechanism that intensifies inequality. This is evident from the red dashed line, which illustrates the IRFs for the Gini index in the absence of financial frictions, showing significantly weaker and less persistent effects. To further illustrate the contrast between the two scenarios, I also include a green line with circles, representing the percentage change in the Gini index impulse response when transitioning from the muted financial accelerator scenario to the one with active frictions. Upon impact, financial frictions lead to a fluctuation in wealth inequality that is approximately 50% larger. Although both the solid and dashed curves

[27] Danish data assume that the top 10% of the wealth distribution holds 55% of total wealth, whereas US data estimate this share to be around 67%. In a model featuring only liquid assets, this discrepancy could lead to slightly weaker responses in the Danish case.

[28] The Survey of Consumer Finances (SCF), the most reliable source of data on household financial positions in the U.S., is conducted every three years. Another potentially valuable dataset is the Distributional Financial Accounts (DFA), which provides quarterly data on wealth distribution across household percentiles. However, since the DFA dataset begins in 2009Q3, it falls outside the timeframe examined in this study, which centers on the Great Moderation period.

[29] Although this study does not extend to a multi-asset framework, incorporating multiple asset types is unlikely to significantly alter the shape of the Gini index. Luetticke (2021) analyzes a contractionary monetary policy shock in a model where households hold both liquid and illiquid assets, yet the evolution of the Gini index for wealth (see Figure 1 in its Appendix) closely resembles that depicted in Figure 6.

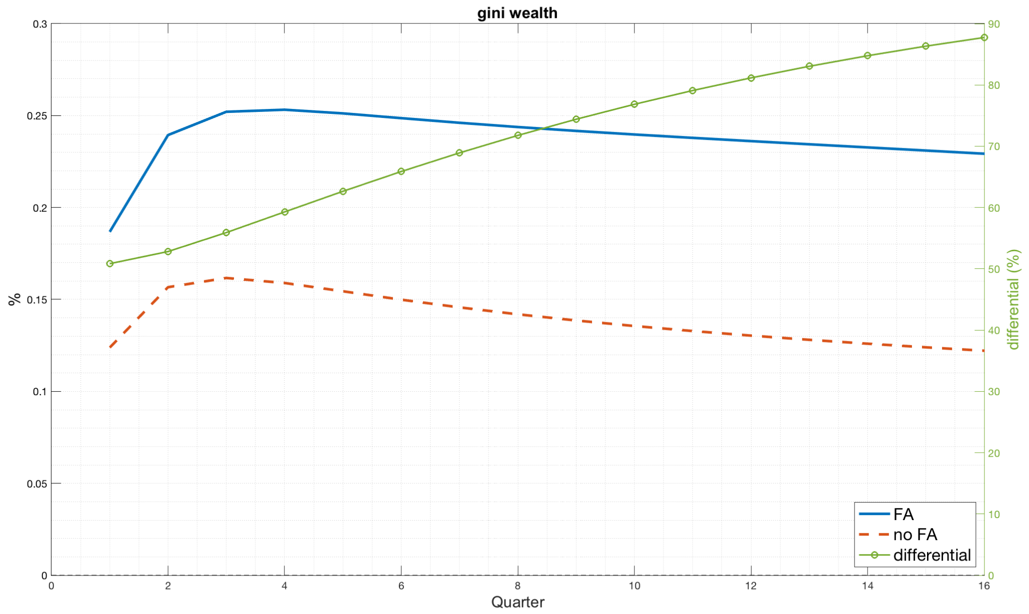

Figure 6: Impulse responses of the Gini index for wealth

Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off. The green line with circles (with values on the right side of the figure) represent the percentage variation between the two IRFs.

begin to revert to their steady state values after approximately one year, their rates of reversion differ. The trajectory of the line with circles illustrates how this divergence expands over time, reaching nearly 90% after four years.

Thus, the financial accelerator not only amplifies wealth inequality but does so persistently, at least in the medium term. Interestingly, while an increase in the magnitude of the monetary shock affects absolute values—leading to a greater rise in the Gini index relative to its steady state level in both scenarios—it does not alter relative values; the shape and magnitude of the green line with circles remain nearly unchanged. This suggests that inequality acceleration is largely independent of shock magnitude and is instead primarily driven by steady state factors such as leverage and initial wealth distribution. For instance, Figure E.1 in Appendix E shows that applying the same aggregate shock to a similar model with a higher initial leverage (2.5 instead of 2) leads to a substantially larger Gini index differential between the two scenarios.

The Gini index offers the significant advantage of summarizing the overall level of inequality with a single percentage value. However, it does not specify which portion of the distribution is driving those changes. To address this, I examine fluctuations in three key measures: the share of perfectly constrained households (i.e., those with zero wealth), the share of households that are HtM, and the share of wealth held by the richest 10% of the population. While the first two measures focus on poorer households, the third provides insights for the top tail of the distribution. The results are presented in Figure 7.

Temporarily setting aside the impact of the financial accelerator, let us consider the

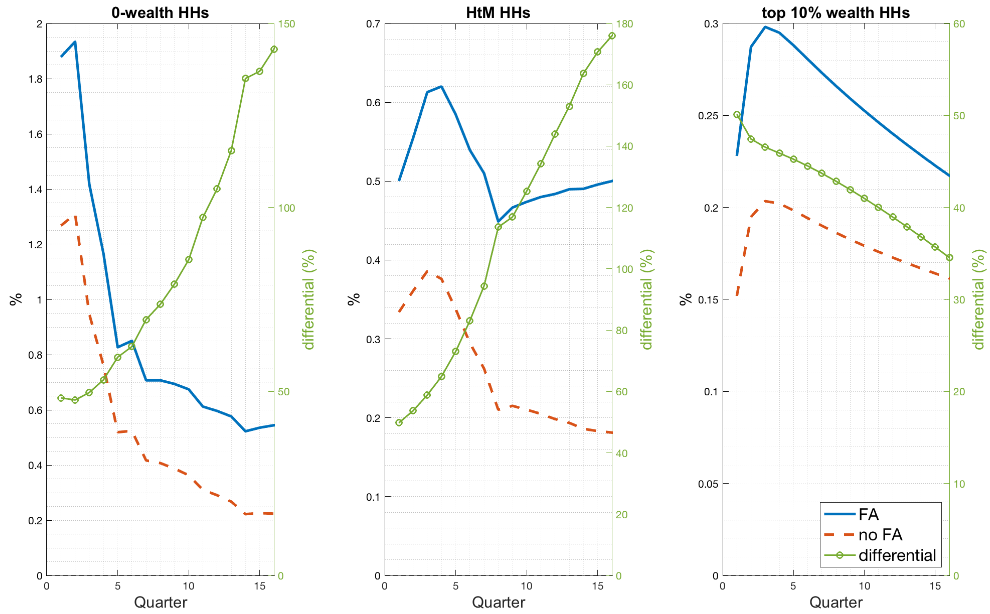

Figure 7: Impulse responses for households' share measures

Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue line refers to an economy with a financial accelerator. The red line refers to the case where financial frictions are shut off. The green dotted line (with values on the right side of the figure) represent the percentage variation from red line to the blue line.

scenario with active financial frictions (blue solid line). Figure 7 reveals that (i) the number of poorer households increases as more become constrained or HtM, (ii) wealth concentration among richer households strengthens, and (iii) the rise in the Gini index is driven by substantial shifts at both extremes of the wealth distribution. However, the underlying mechanisms behind these changes operate in fundamentally different ways.

Constrained households hold zero wealth, while HtM households possess savings amounting to less than two weeks of salary.[30] Consequently, an increase in the interest rate has little to no direct effect on their financial income. However, indirect effects, as emphasized by Kaplan et al. (2018), particularly those linked to fluctuations in labor income, drive the rise in the share of liquidity-poor households. The economic downturn induced by contractionary monetary policy reduces labor demand and wages (as shown in Appendix D). Since poor households primarily depend on labor income, they reduce their savings (if they possess any) in order to smooth consumption. Therefore, a growing number of them become HtM or even perfectly constrained, as the aggregate shock pushes them to the lowest end of the wealth distribution. Although the proportion of HtM households increases following a monetary contraction, the rise in the share of zero-wealth agents is more pronounced. Specifically, the share of HtM households grows by 0.5% on impact, whereas the share of perfectly constrained households increases by nearly 2%.

[30]Note that households with zero wealth are a subset of the HtM group.

When examining the upper end of the wealth distribution, it is crucial to recall that, under the model's assumptions, households can only accumulate wealth in liquid assets. Unlike capital, government bonds and deposits have a fixed price (normalized to one) and are thus unaffected by price fluctuations. This assumption abstracts from the empirical reality that a substantial portion of wealthy households' savings consists of illiquid assets, which typically offer higher returns but are subject to price variations. The choice to model household savings through a single liquid asset is driven by two main reasons: first, to preserve a simpler model structure, and second, to ensure consistency with the RANK framework outlined by Bernanke et al. (1999). As a result, there is a potential for upward bias in the IRFs for wealth among richer households, as they do not account for the negative effects of capital price fluctuations. Nevertheless, it is reasonable to assume that this limitation does not undermine the validity of the results, given that (i) illiquid assets typically offer higher interest rates, which can partially offset declines in asset prices, and (ii) empirical evidence suggests that wealthy households tend to increase the liquidity share of their portfolios in response to interest rate hikes, thereby mitigating the impact of capital price fluctuations on their overall wealth.[31] Given the structure of this model, households in the top 10% of the wealth distribution are significantly influenced by the direct effects of monetary policy, as they experience a notable rise in financial income. Additionally, wealth accumulation in the top decile is further reinforced by an increase in firms' profits, which, as is standard in the New Keynesian framework, exhibit countercyclical behavior. Although the proportion of rentiers—who are the sole recipients of profits—is relatively small (approximately 0.8% of the population), they are almost entirely concentrated within the top 10% of the distribution.

Consistent with the findings discussed thus far, the financial accelerator amplifies the magnitude of impulse responses for the wealth-related measures analyzed. This is evident in Figure 7, where the red dashed lines consistently remain below the blue solid ones throughout the four-year period considered. The key distinction in the dynamics at both ends of the distribution lies in the medium-term evolution of the differential (represented by the green line with circles). At the lower end, the financial accelerator's effect follows a steadily increasing trajectory, whereas for the top 10%, the differential begins to decline immediately. As previously noted, the financial accelerator primarily amplifies the so-called "indirect effects" of monetary policy at the lower end of the distribution, i.e., labor income dynamics. More specifically, Appendix D shows that the financial accelerator further reduces the labor demand for goods production, although it overshoots relative to the counterfactual scenario after approximately three years. The IRFs for the wage level remain consistently lower in the presence of active financial frictions, even over a long horizon. This latter effect is likely the primary driver of the sustained increase in

[31] Luetticke (2021) demonstrates that in response to a contractionary monetary policy, wealthy households increase their holdings of liquid assets and adjust their portfolios toward greater liquidity.

the differential line for constrained household wealth.

The evolution of aggregate household deposits provides insight into why the differential in the IRFs for wealth held by the top 10% of households converges in the short-medium term. In this model calibration, the wealthiest decile controls 71% of total wealth, implying that a substantial portion of firms' debt is derived from the deposits of these wealthy households. As previously mentioned, firm financing becomes less costly when financial frictions are absent. As a result, firms are able to access larger amounts of funding from households (through financial intermediaries) as the initial economic contraction wanes. Therefore, when considering fluctuations in the wealth held by the wealthiest decile, we observe a more rapid return to the steady state in the scenario with active financial frictions, since external financing is more costly for entrepreneurs. The fluctuations in the real interest rate are crucial as well. As shown in the IRFs in Appendix D, the real interest rate is higher on impact in the scenario with active financial frictions, but later undershoots the level seen when frictions are absent, introducing an additional channel for the decline in the differential.

The differential lines highlight another crucial aspect. The observed increase in overall wealth inequality across scenarios with active or passive financial frictions is primarily driven by changes at the lower end of the distribution rather than the upper end. Specifically, the differential lines for zero-wealth and hand-to-mouth (HtM) households exhibit an upward trend in the short-medium term, mirroring the pattern observed in the Gini index. In contrast, no such trend is evident in the differential line for changes in wealth among the richest 10%. These results offer additional support for the paper's initial intuition: financial frictions that constrain income sources for poorer households significantly influence both wealth and consumption inequality. The robustness of the results for wealth and consumption inequality is analyzed in Appendix F, Appendix G, and Appendix H. The findings hold under different assumptions regarding household risk aversion, investment costs, and fiscal policy, including scenarios in which the government keeps its spending at the steady-state level and adjusts the tax rate instead.

4.4 Inequality between households: skilled-unskilled workers and rentiers

This model incorporates household heterogeneity along two dimensions: wealth and productivity. Consequently, an important additional analysis involves examining how inequality develops between workers, who earn wages, and rentiers, whose income consists of firms' profits. Workers can be further classified into two categories based on productivity: low and high. As expressed in equation (4), pre-tax labor income for workers is given by $W_t h_{it} l_{it}$. Since the wage level, W_t, is uniform across all individuals and not idiosyncratic, a high-productivity worker, h_{it}, will earn a higher salary than a low-productivity

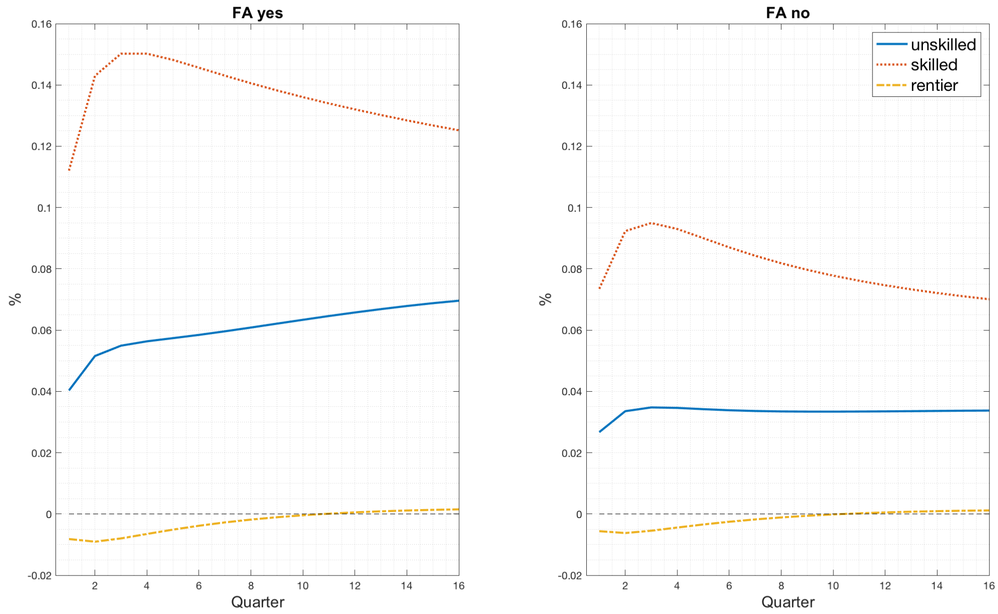

Figure 8: Gini index for wealth inequality according to households type

Monetary shock $\epsilon^R = 25$ b.p. (annualized). Deviations are expressed as percentages relative to their respective steady-state values. The left panel represents the scenario with active financial frictions, while the right panel depicts the case where financial frictions are shut off.

worker if both supply the same amount of labor, l_{it}. Accordingly, and with an abuse of notation, I categorize households into three groups: unskilled (low-productivity workers), skilled (high-productivity workers), and rentiers (profit collectors). I analyze the evolution of wealth inequality across household types and examine the impact of the financial accelerator on these dynamics. To do so, I compute the wealth Gini index for each household category. The results, presented in Figure 8, indicate that the financial accelerator not only amplifies the magnitude of Gini index fluctuations but, in some cases, also alters the trajectory of the curves over time. For example, while the variation in the Gini index for unskilled workers appears to stabilize after one year when financial frictions are absent, it continues to rise in the scenario where such frictions are present. In contrast, the fluctuations in the Gini index for rentiers follow the same trajectory in both cases, though they are amplified in the presence of financial frictions.

Beyond the effects of the financial accelerator, Figure 8 reveals an interesting result: wealth inequality does not always increase across household types. In fact, among rentiers, wealth inequality decreases. This divergence in the behavior of the Gini IRF is likely due to two key factors. First, workers can earn both labor and financial income. Given that they are affected by both dynamics, it seems plausible that the shape of the evolution of their inequality mimics the shape of the global Gini index. In contrast, rentiers always benefit from rising interest rates, as both their financial income and profits increase.[32]

[32]Recall that, by construction, rentiers do not supply labor.

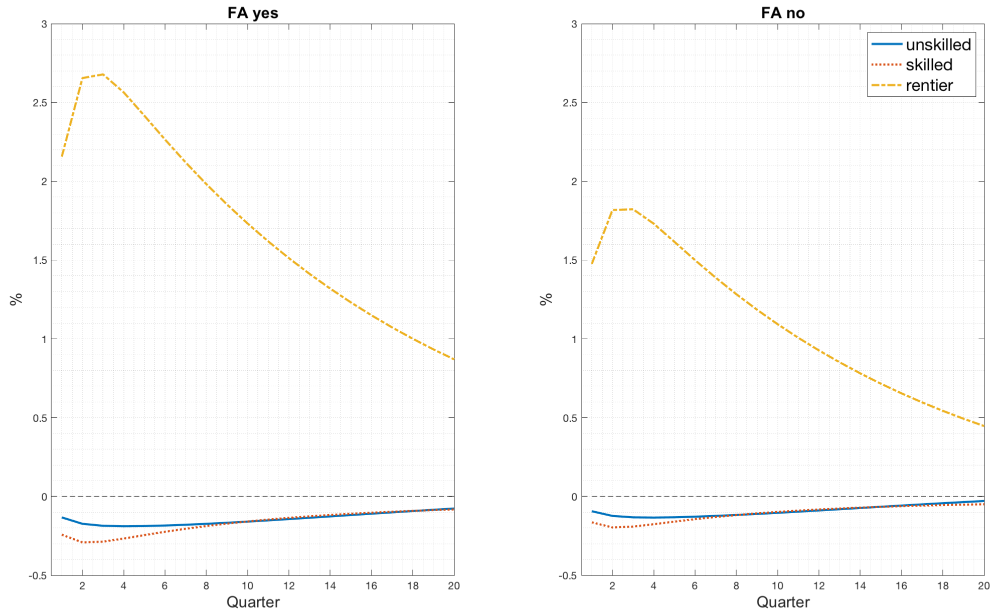

Figure 9: Relative wealth changes per households type

Monetary shock $\epsilon^R = 25$ b.p. (annualized). Deviations are expressed as percentages relative to their respective steady-state values. The left panel represents the scenario with active financial frictions, while the right panel depicts the case where financial frictions are shut off.

Consequently, even rentiers at the lower end of the wealth distribution experience gains.

Second, an important aspect of this analysis is not only how households shift within the wealth distribution but also how wealth itself is redistributed across different household types. To gain deeper insight into this phenomenon, Figure 9 illustrates how "relative wealth" evolves among workers and rentiers following a contractionary monetary shock.[33] The results suggest that, beyond changes in the household wealth distribution, variations in the Gini index for each household type may also be driven by wealth transfers between groups, with rentiers experiencing more evenly distributed relative gains. Furthermore, since rentiers are predominantly concentrated within the richest 10%, this dynamic could serve as an additional channel for amplifying overall wealth inequality—an effect further reinforced by the financial accelerator.

5 Concluding remarks

By incorporating financial frictions on productive firms, following the framework of Bernanke et al. (1999), into a full-fledged HANK model, I demonstrate that the finan-

[33] By "relative wealth", I refer to the share of total wealth held by a specific household type. Intuitively, a decline in the relative wealth of a particular group does not necessarily imply a reduction in their absolute wealth. In fact, since household savings generally increase following a rise in the nominal interest rate, the opposite is more likely. However, a decrease in relative wealth indicates that a household type's share of total wealth in the economy has diminished. This can be interpreted as a "relative drain" of wealth from certain household groups to the benefit of others.

cial accelerator not only exacerbates the downturn in aggregate variables such as output and investment after a monetary contraction but also amplifies inequality in wealth and consumption. This leads to the conclusion that the financial accelerator also acts as an "inequality accelerator," indicating that the financial structure of productive firms plays an important role in shaping the distribution of wealth and consumption among households.

This acceleration is primarily driven by movements at both ends of the wealth distribution, with constrained households playing a pivotal role. Lacking access to savings or borrowing to smooth consumption, these households depend almost entirely on labor income. Financial frictions on the production side, as analyzed in this paper, weaken labor earnings, thereby increasing the number of households facing borrowing constraints and exacerbating wealth and consumption inequality. Conversely, households at the top of the distribution benefit from an increase in the interest rate, as a significant portion of their income is derived from financial assets, leading to increases in both their wealth and consumption. While I expect the qualitative results to remain unchanged, extending the model to allow for savings in illiquid assets would provide further insight into the behavior of richer households. This will be left as a potential extension for future research.

Furthermore, financial frictions not only amplify wealth changes within households but also between household types (workers and rentiers). As a result of an increase in interest rates, rentiers become relatively wealthier, while workers become relatively poorer. Thus, wealth inequality in the economy is driven not only by shifts within the wealth distribution but also by the reallocation of wealth among household types, a process in which the financial accelerator plays a crucial role as well.

While central bankers have not traditionally focused on redistribution trends, their concern with this issue has grown in recent years. From a technical standpoint, the expanding literature on HANK models demonstrates that wealth distribution significantly influences the transmission of monetary policy. Recognizing that the financing structure of non-financial firms plays a crucial role in the wealth and consumption redistribution caused by monetary policy shocks could be an important consideration for future policy-making.

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Appendix

A Local projections: corporate spread and consumption inequality

The local projection structure for Figure 1 is the following:

$$y_{t+h} = \alpha_h + \beta_h x_t + \sum_{i=1}^{4} \gamma_{h,i} \boldsymbol{z}_{t-i} + u_{t+h} \quad , \tag{A1}$$

where y is the dependent variable, x is the independent variable, $\boldsymbol{z}$ is a vector of control variables, u is the residual and h is the horizon considered for the IRFs.

The dependent variable is a measure of consumption inequality, derived from the time series created by Coibion et al. (2017). Specifically, the Gini index is represented by the series C_GINI_CONS_SA, the 90th/10th percentile ratio by C_P9010_LNCONS_SA, and the standard deviation by C_SD_LNCONS_SA. All of these series are smoothed using a centered moving average over three quarters.

The independent variable is the GZ spread, constructed by Gilchrist and Zakrajšek (2012). I deliberately chose to use the full GZ spread rather than the Excess Bond Premium (EBP) developed by the authors, as the latter does not fully capture the systematic variations in the default risk of individual firms. As outlined in Section 2, the EFP introduced in the theoretical model is directly related to firms' default probabilities. Therefore, I argue that the GZ spread is a more suitable proxy for the premium term in the theoretical framework of this study. Nonetheless, using the EBP in the local projection yields results consistent with those shown in Figure 1.

To account for persistence in both inequality and financial frictions, I control for lags of the dependent and independent variables. Additionally, I include lags of key macroeconomic indicators as control variables: the Federal Funds Effective Rate (FEDFUNDS), the logarithm of GDP (GDP), the logarithm of the Consumer Price Index (CPIAUCSL), the unemployment rate (UN), and the logarithm of the Economic Policy Uncertainty Index (Baker et al., 2016). All variables, with the exception of the latter,[34] are obtained from the St. Louis FRED database.

I consider four lags of the control variables. Using a higher or lower number of lags (such as 6 or 2) does not change results significantly. The data are quarterly, covering the period from 1985Q1 to 2007Q2, resulting in a total of 86 observations for each variable.

[34] https://www.policyuncertainty.com/

B Idiosyncratic productivity process and the joint distribution

Households are categorized as either workers, with productivity $h > 0$, or rentiers, with $h = 0$, meaning they do not earn labor income but only profit income. Additionally, I assume that there are only two possible productivity realizations for workers: high productivity, h^H, and low productivity, h^L. This assumption not only simplifies the computations but also facilitates the analysis in Section 4.4 between skilled and unskilled workers. The Markov process generates the following transition matrix:

$$
\begin{array}{cc}
 & h_{t+1} \\
 & \begin{array}{ccc} h^L & h^H & 0 \end{array} \\
h_t \begin{array}{c} h^L \\ h^H \\ 0 \end{array} & \begin{bmatrix} p_{LL}(1-\zeta) & p_{LH}(1-\zeta) & \zeta \\ p_{HL}(1-\zeta) & p_{HH}(1-\zeta) & \zeta \\ 0 & \iota & 1-\iota \end{bmatrix}
\end{array}
$$

with probabilities, p, determined using the Tauchen method. In other studies using this household distribution framework, such as Luetticke (2021), rentiers who become workers are endowed with the median productivity level ($h = 1$). However, in this model, there are no states with median productivity levels.[35] Therefore, I assume that new workers are endowed with the highest productivity possible, h^H.

At the steady state, a joint distribution of households exists according to their wealth level, a, and their productivity, h. This joint distribution can be represented by the bi-dimensional matrix as follows:

$$
\text{prod. } h \quad \begin{array}{c} h_m \\ \cdots \\ h_2 \\ h_1 \end{array} \begin{bmatrix} H_{m,1} & H_{m,2} & \cdots & H_{m,n} \\ \cdots & \cdots & \cdots & \cdots \\ H_{2,1} & H_{2,2} & \cdots & H_{2,n} \\ H_{1,1} & H_{1,2} & \cdots & H_{1,n} \end{bmatrix}
$$
$$
\begin{array}{cccc} a_1 & a_2 & \cdots & a_n \end{array}
$$
$$
\text{wealth } a
$$

where $H_{1,1}$ is the share of households with the lowest level of wealth and labor productivity (except for the last state $h_m = 0$, since in this model they are rentiers), and $\int Hdadh = 1$. As the vector indicating possible household wealth levels is composed of 100 entries, this joint distribution matrix comprises 300 grid points ($a_n = 100$ and $h_m = 3$).

[35] Following the calibration of the baseline model, I obtain that $h^L = 0.786$ and $h^H = 1.272$

C Entrepreneurs optimal contract

C.1 Idiosyncratic shock on return on capital

I assume that the Idiosyncratic shock ω is distributed log-normally. i.e. $\omega \in [0, +\infty)$.[36] Using results from Appendix A.2 in Bernanke et al. (1999) I can write $F(\omega)$, $\Gamma(\omega)$ and $G(\omega)$ in the analytical expressions that I use in my code to solve the model:

$$F(\omega) = \Phi\left[\left(log(\bar{\omega}) + \frac{1}{2}\sigma_\omega^2\right)/\sigma_\omega\right] \ , \tag{A2}$$

$$\Gamma(\omega) = \Phi\left[\left(log(\bar{\omega}) - \frac{1}{2}\sigma_\omega^2\right)/\sigma_\omega\right] + \bar{\omega}\left\{1 - \Phi\left[\left(log(\bar{\omega}) + \frac{1}{2}\sigma_\omega^2\right)/\sigma_\omega\right]\right\} \ , \tag{A3}$$

$$G(\omega) = \Phi\left[\left(log(\bar{\omega}) + \frac{1}{2}\sigma_\omega^2\right)/\sigma_\omega - \sigma_\omega\right] \ . \tag{A4}$$

With $\Phi(\cdot)$ being the normal cumulative distribution function and σ_ω the standard deviation of the idiosyncratic shock on entrepreneurs' return on capital.

C.2 Financial intermediaries' participation constraint and entrepreneur j's optimization problem

After substituting (7) and (6) into (8), I obtain:

$$[1-F(\bar{\omega}_{jt+1})]\bar{\omega}_{jt+1}R^K_{t+1}q_tK_{jt+1}+(1-\mu)\int_0^{\bar{\omega}_{jt+1}}\omega_j dF(\omega_j)R^K_{t+1}q_tK_{jt+1} = \frac{R_{t+1}}{\pi_{t+1}}(q_tK_{jt+1}-N_{jt+1}) \ . \tag{A5}$$

Divide everything by $R^R_{t+1}q_tK_{jt+1}$:

$$\frac{R^K_{t+1}}{\frac{R_{t+1}}{\pi_{t+1}}}\left([1-F(\bar{\omega}_{jt+1})]\bar{\omega}_{jt+1} + (1-\mu)\int_0^{\bar{\omega}_{jt+1}}\omega_j dF(\omega_j)\right) = \left(1 - \frac{N_{jt+1}}{q_tK_{jt+1}}\right) \ . \tag{A6}$$

Following the notation used in Bernanke et al. (1999) and Christiano et al. (2014):

$$\Gamma(\bar{\omega}_j) \equiv \int_0^{\bar{\omega}_j}\omega_j dF(\omega_j) + \bar{\omega}_j\int_{\bar{\omega}_j}^{\infty}dF(\omega_j) \ , \qquad \mu G(\bar{\omega}_j) \equiv \mu\int_0^{\bar{\omega}_j}\omega_j dF(\omega_j) \ , \tag{A7}$$

[36] Note that other kinds of distribution with values greater or equal to 0 could be used as well. Here I choose to adapt the same distribution as in Bernanke et al. (1999) to give a sense of continuity between the two studies.

where $\Gamma(\bar{\omega}_j)$ is the expected gross share of profits going to the lender and $\mu G(\bar{\omega}_j)$ is the expected monitoring cost paid by the lender. $\Gamma(\bar{\omega}_j)$ can be rewritten as:

$$\Gamma(\bar{\omega}_j) = G(\bar{\omega}_j) + \bar{\omega}_j \left[1 - F(\bar{\omega}_j)\right] \ . \tag{A8}$$

I can now use (A7) and (A8) in (A6) and rearrange to finally obtain:

$$\frac{R^K_{t+1}}{\left(\frac{R_{t+1}}{\pi_{t+1}}\right)} = \frac{1}{\Gamma(\bar{\omega}_{jt+1}) - \mu G(\bar{\omega}_{jt+1})} \left(1 - \frac{N_{jt+1}}{q_t K_{jt+1}}\right) \ , \tag{A9}$$

where $\Gamma(\bar{\omega}_{jt+1}) - \mu G(\bar{\omega}_{jt+1})$ is the share of entrepreneur j's profits going to the lender (as loan repayment), net of auditing costs.

Equation (A9) is the complete version of (9), which explain the function underlying $f\left(\bar{\omega}_{jt+1}, LEV_{jt+1}\right)$. For a higher level of entrepreneur leverage, the EFP increases, raising the return on capital. However, it also increases the probability of an entrepreneur's default, thereby increasing the net share of profit demanded by financial intermediaries as loan repayment, resulting in higher financing costs for entrepreneurs. To see in detail how this mechanism works, I show the entrepreneur j's optimization problem below.

According to the optimal contract set by financial intermediaries, entrepreneur j's expected return can be expressed as:

$$E_t \left\{ \int_{\bar{\omega}_{jt+1}}^{\infty} \omega_j dF(\omega_j) R^K_{t+1} q_t K_{jt+1} - (1 - F(\bar{\omega}_j)) R^K_{t+1} q_t K_{jt+1} \right\} \ , \tag{A10}$$

with expectations taken with respect to the realization of R^K_{t+1}. The first term of (A10) represents the entrepreneur's profit when she does not default on debt, while the second term is the amount of profits that she uses to repay the lender. Following the notation used above, and considering that the entrepreneur's return is subject to the participation constraint (8), I write entrepreneur j's optimal contracting problem as:

$$\begin{aligned} &\max_{\{K_{jt+1}, \bar{\omega}_{jt+1}\}} E_t \left\{ \left[1 - \Gamma(\bar{\omega}_{jt+1})\right] R^K_{t+1} q_t K_{jt+1} \right\} \ , \\ &s.t. \quad \frac{R_{t+1}}{\pi_{t+1}} (q_t K_{jt+1} - N_{jt+1}) = \left[\Gamma(\bar{\omega}_{jt+1}) - \mu G(\bar{\omega}_{jt+1})\right] R^K_{t+1} q_t K_{jt+1} \ . \end{aligned} \tag{A11}$$

Deriving F.O.C. I obtain:

$$w.r.t. \ \ \omega_{jt+1}: \quad -\Gamma'(\bar{\omega}_{jt+1}) + \lambda_{jt+1} \left[\Gamma'(\bar{\omega}_{jt+1}) - \mu G'(\bar{\omega}_{jt+1})\right] = 0 \ , \tag{A12}$$

$$w.r.t.\ \ K_{jt+1}: \quad E_t\left\{[1-\Gamma(\bar{\omega}_{jt+1})]\,R^K_{t+1}-\lambda_{jt+1}\left[\frac{R_{t+1}}{\pi_{t+1}}-\left(\Gamma(\bar{\omega}_{jt+1})-\mu G(\bar{\omega}_{jt+1})R^K_{t+1}\right)\right]\right\}=0\ , \tag{A13}$$

$$w.r.t.\ \ \lambda_{jt+1}: \quad E_t\left\{\frac{R_{t+1}}{\pi_{t+1}}(q_tK_{jt+1}-N_{jt+1})-[\Gamma(\bar{\omega}_{jt+1})-\mu G(\bar{\omega}_{jt+1})]\,R^K_{t+1}q_tK_{jt+1}\right\}=0\ , \tag{A14}$$

where λ_j is the Lagrangian multiplier for entrepreneur j's problem. By rearranging (A12), it is possible to express λ_{jt+1} as a function of only $\bar{\omega}_{jt+1}$. Furthermore, rearranging (A13):

$$E_t\left\{\frac{R^K_{t+1}}{\frac{R_{t+1}}{\pi_{t+1}}}\right\}=\frac{\lambda_{jt+1}}{[1-\Gamma(\bar{\omega}_{jt+1})+\lambda_{jt+1}\left(\Gamma(\bar{\omega}_{jt+1})-\mu G(\bar{\omega}_{jt+1})\right)]}\ . \tag{A15}$$

It can be proven that there is a monotonically increasing relationship between the EFP and $\bar{\omega}_j$. According to (A9), we can extend this relationship between the EFP and the leverage level of j, assessing that a higher entrepreneur's leverage implies a higher EFP.[37]

Furthermore, it is clear from (A15) that $\bar{\omega}_j$ is determined only by aggregate variables. Thus, any entrepreneur chooses the same threshold $\bar{\omega}$ for the idiosyncratic shock on capital returns, below which they default, and the same leverage level.[38] This result allows to consider only the aggregate variables in the production sector part of the model, since every entrepreneur has the same firm structure.

D Impulse responses of MP contractionary shock

Figure D.1 presents impulse responses for several aggregate variables in response to the monetary policy shock under consideration. These results complement those shown in Figure 2 and Figure 3 from the main text.

E Inequality indices for higher leverage at steady state

Figure E.1 shows fluctuations of inequality indices for consumption and wealth in a model with a higher initial level of firm leverage. I show results for the case where the latter is

[37] See Appendix A.1 in Bernanke et al. (1999) for proofs.

[38] According to (A9), leverage is a function of the EFP (composed of only aggregate variables) and $\bar{\omega}_j$. If $\bar{\omega}_j$ depends only on aggregate variables (since it is a function of the EFP, according to (A15)), then the same can be said for the leverage.

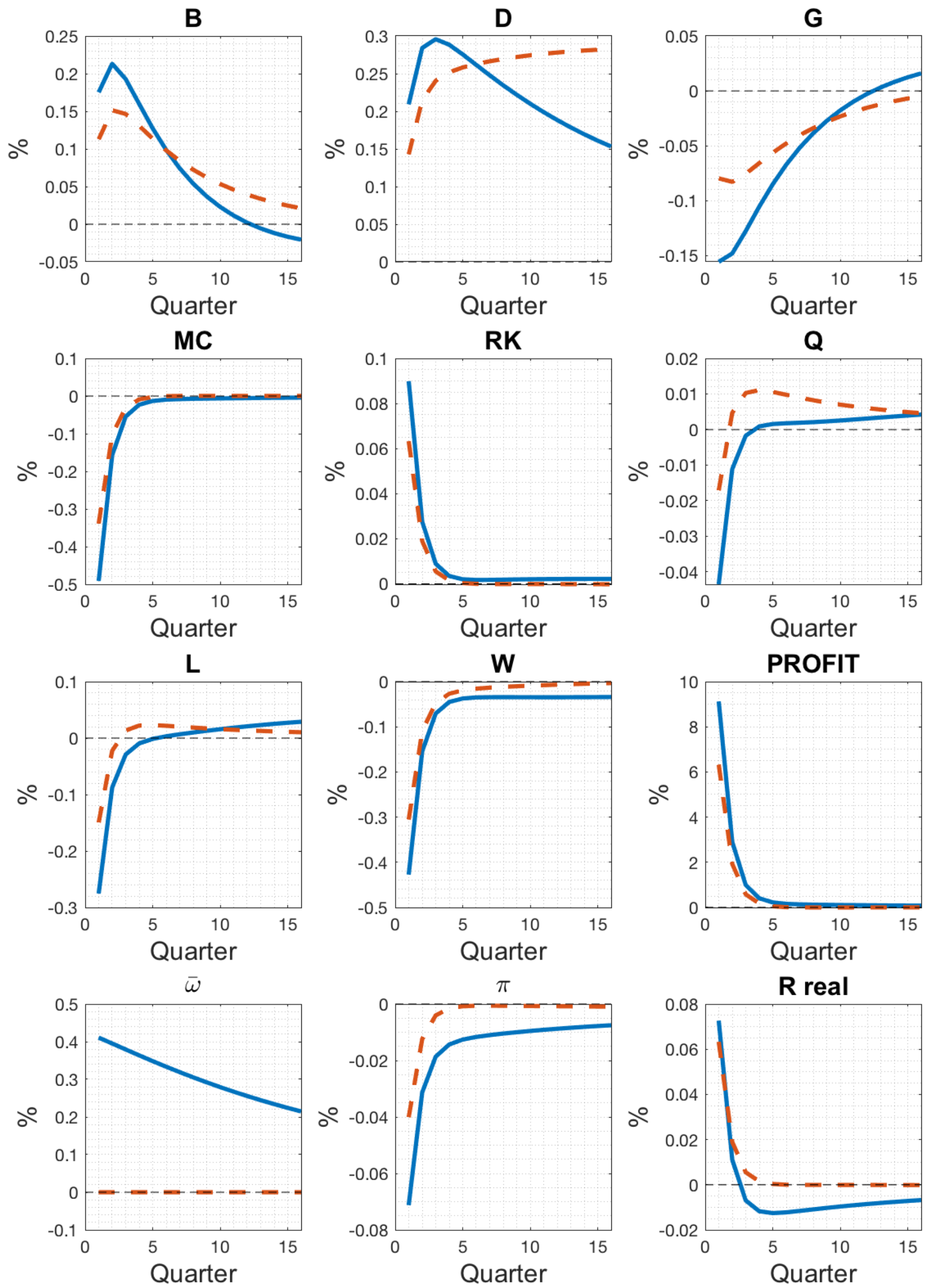

Figure D.1: Aggregate fluctuations consequent to an increase of the nominal interest rate.
Monetary shock $\epsilon^R = 0.0025$. The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off.

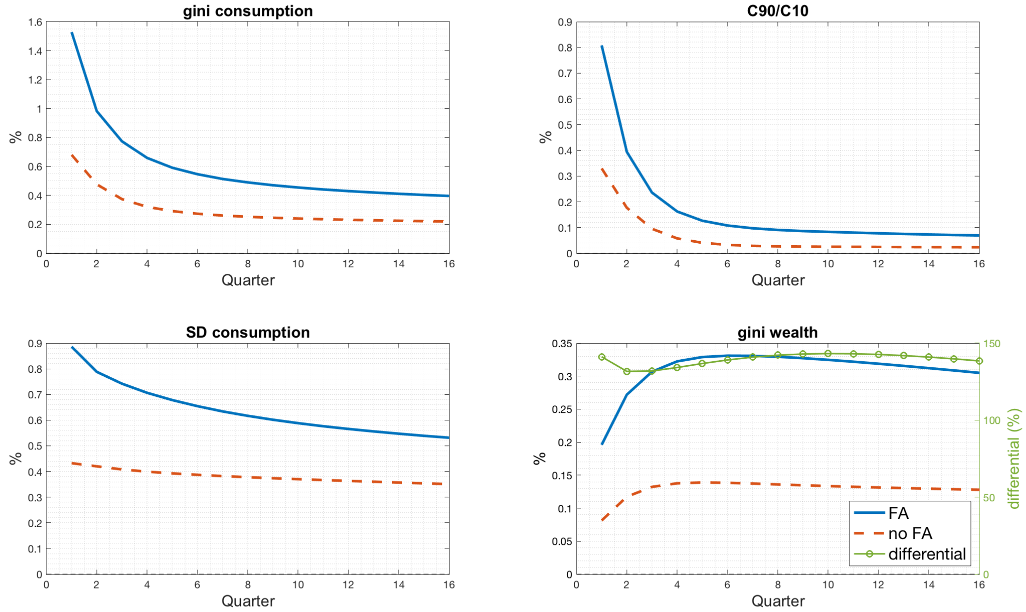

Figure E.1: IRFs for inequality indices, LEV = 2.5

Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off. The green line with circles (with values on the right side of the figure) represent the percentage variation from the solid line to the dashed line.

targeted to be equal to 2.5 (instead of 2, as in the baseline model). To reach this level of leverage while maintaining the general calibration, I slightly decrease the discount factor to $\beta = 0.987$, increase the labor disutility parameter ψ to 6, change the household probability to become a rentier, $\zeta = 0.006$, and the parameter governing the adjustment cost of capital, $\phi = 8$.

F Robustness to risk aversion

For the baseline model, I used a parameter for households' risk aversion $\xi = 2$, which is already used in other HANK models in the literature. However, other models used different values; for instance, Bayer et al. (2019) and Luetticke (2021) assume $\xi = 4$. I recalibrated the model with this parameter to obtain relevant moments as in the baseline version. This implies a discount factor $\beta = 0.986$, labor disutility parameter $\psi = 12$, household probability of becoming a rentier $\zeta = 0.0008$ and the parameter governing the adjustment cost of capital $\phi = 4$. Figure F.1 and Figure F.2 show fluctuations for aggregate variables and inequality indices, respectively.

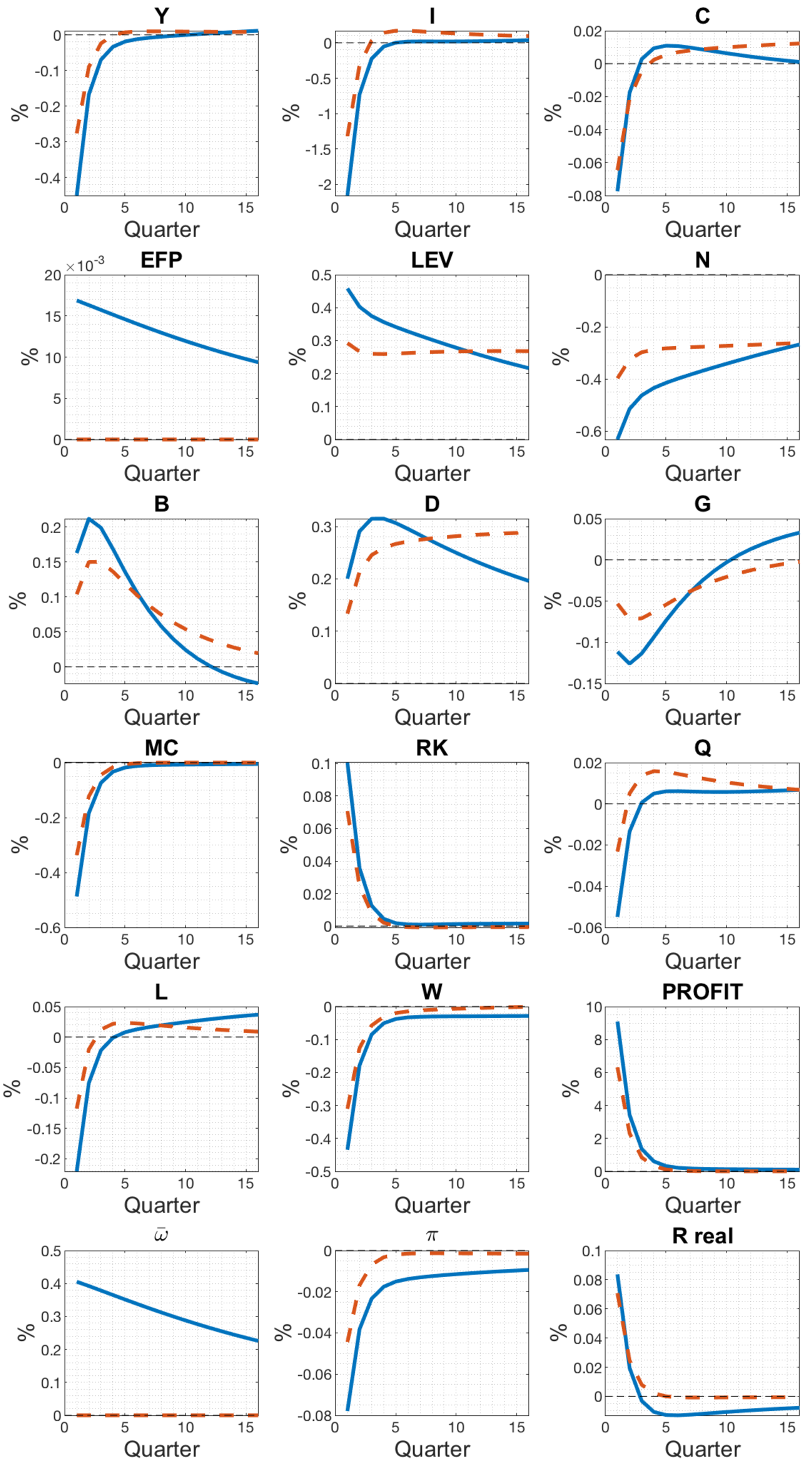

Figure F.1: IRFs for aggregate variables, $\xi = 4$

Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off.

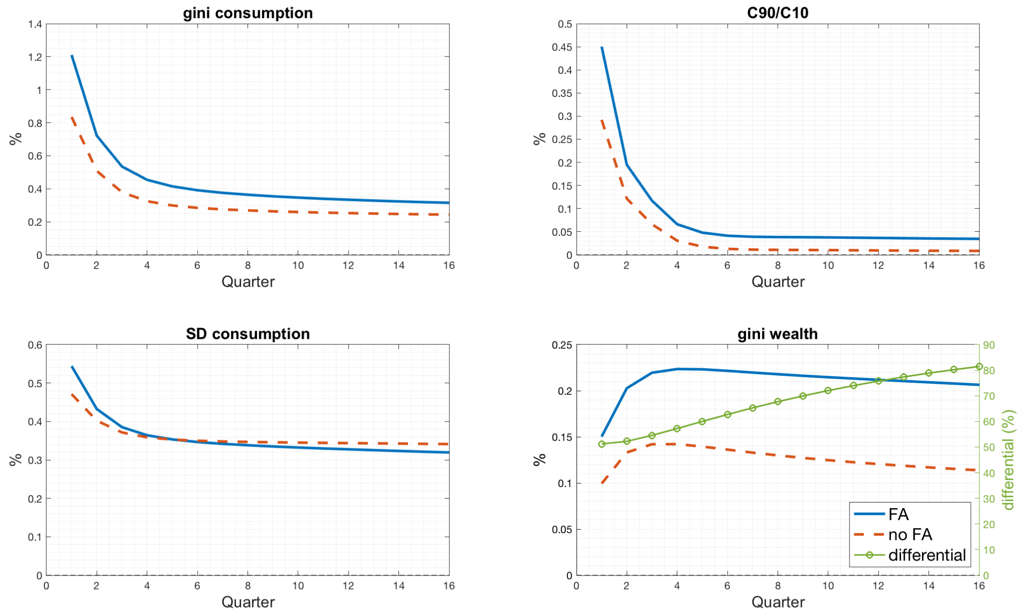

Figure F.2: IRFs for inequality indices, $\xi = 4$

Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off. The green line with circles (with values on the right side of the figure) represent the percentage variation from the solid line to the dashed line.

G Robustness to investment cost

The baseline model features quadratic investment costs (the central term on the right-hand side of Eq. (20)) where the parameter ϕ is calibrated to match an investment-to-output volatility $\sigma(I)/\sigma(Y) = 3$ after a TFP shock. In Figure G.1 and Figure G.2, I present the fluctuations of aggregate variables and inequality indices in the limiting case where investment costs are absent, i.e., $\phi = 0$. This means that the capital price q is fixed over time, and entrepreneurs do not make any profit from capital gains or creation of new capital ΔK. This extreme calibration also confirms the financial accelerator: the output, investment, consumption, and inequality indices are all greater when financial frictions are active. However, it is worth noting that some aggregate variables display completely different behaviors. For instance, the quantity of aggregate labor, L, increases after a MP contractionary shock.

H Robustness to fiscal policy

As is standard in models with agent heterogeneity, Ricardian equivalence does not hold, allowing different fiscal policies to significantly influence monetary transmission. In the baseline model, I assume that the government adjusts its spending to bring debt to steady state values. Following Bayer et al. (2019), I set the debt autocorrelation parameter at $\rho_B = 0.86$, indicating that the government is inclined to roll over most of its debt, thereby

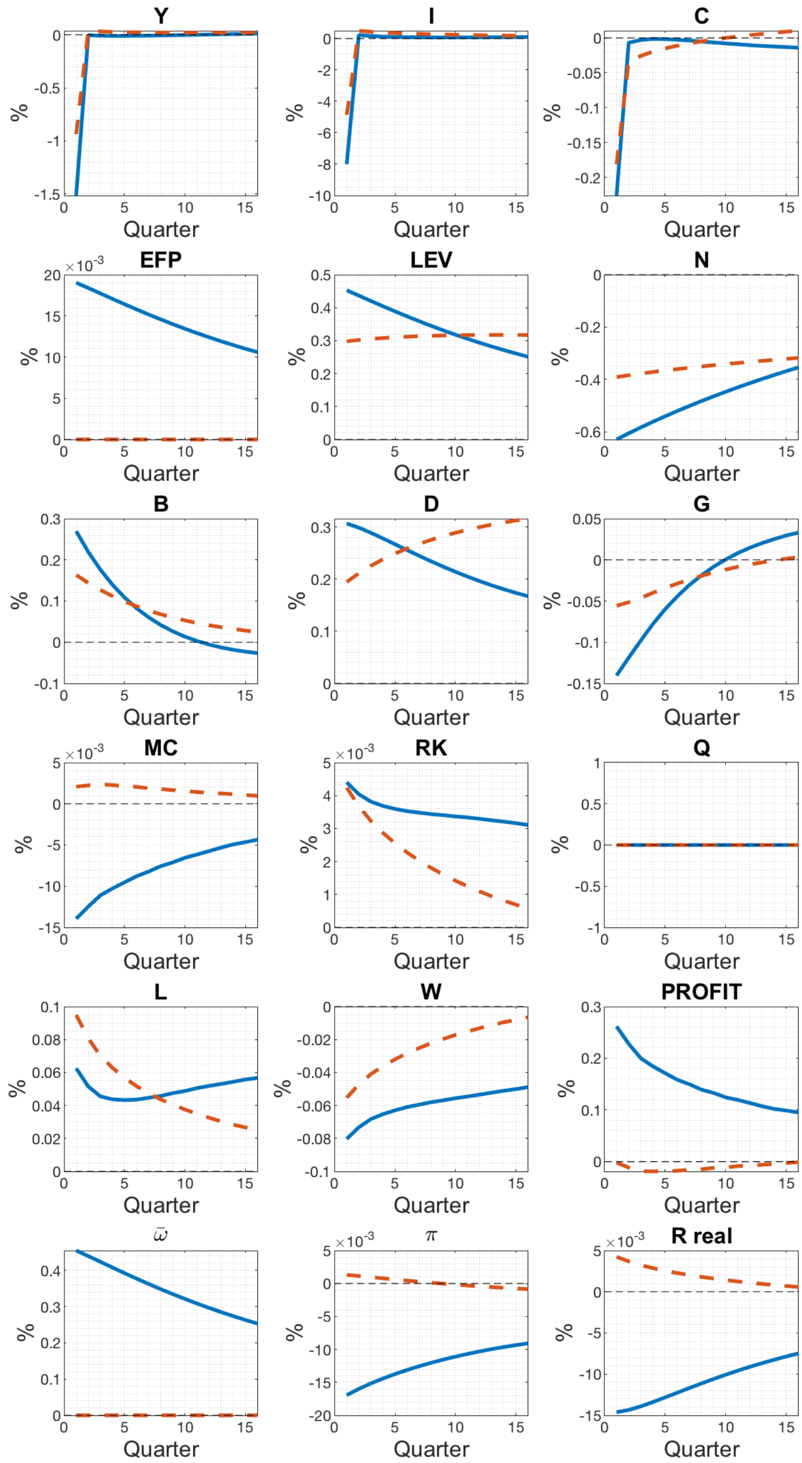

Figure G.1: IRFs for aggregate variables, $\phi = 0$

Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off.

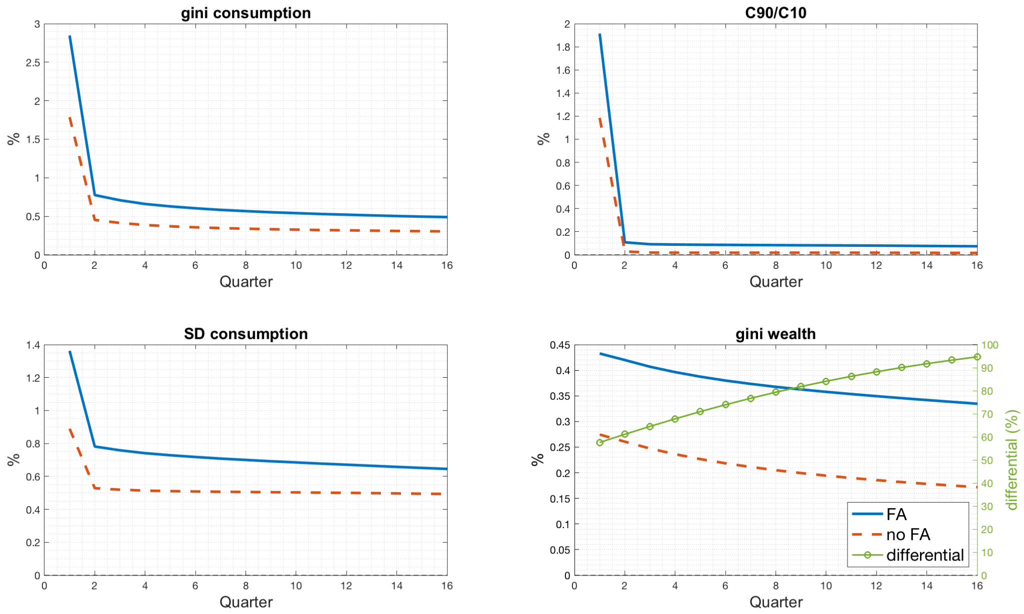

Figure G.2: IRFs for inequality indices, $\phi = 0$

Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off. The green line with circles (with values on the right side of the figure) represent the percentage variation from the solid line to the dashed line.

supporting a higher level of public expenditure. I now examine the extreme scenario in which the government aims to immediately return to its steady state debt level following a contractionary monetary policy shock, by setting $\rho_B = 0$. The results are presented in Figure H.1 and Figure H.2. In this case, the government exercises debt control by further reducing expenditure, leading to a deeper economic downturn in terms of output and consumption, and exacerbating inequalities relative to the baseline model specification.

Alternatively, the government could opt to keep spending at its steady state level and adjust taxation by modifying the tax parameter τ. The results are shown in Figure H.3 and Figure H.4. Although output and investment show no significant deviations from the baseline calibration, consumption experiences a slightly larger decline on impact. Inequality measures remain almost identical to those in the baseline model (if anything, they are marginally higher), further confirming that, even with tax adjustments, the financial accelerator acts as an inequality amplifier.

I Impulse responses to a TFP shock

In this section, I present the fluctuations in aggregate variables and inequality following a TFP shock. The shock to z_t follows an AR(1) process with persistence $\rho_z = 0.95$ and a standard deviation of $\sigma_z = 0.01$. Figure I.1 presents the fluctuations of aggregate variables, while Figure I.2 displays the fluctuations of inequality indices for wealth and

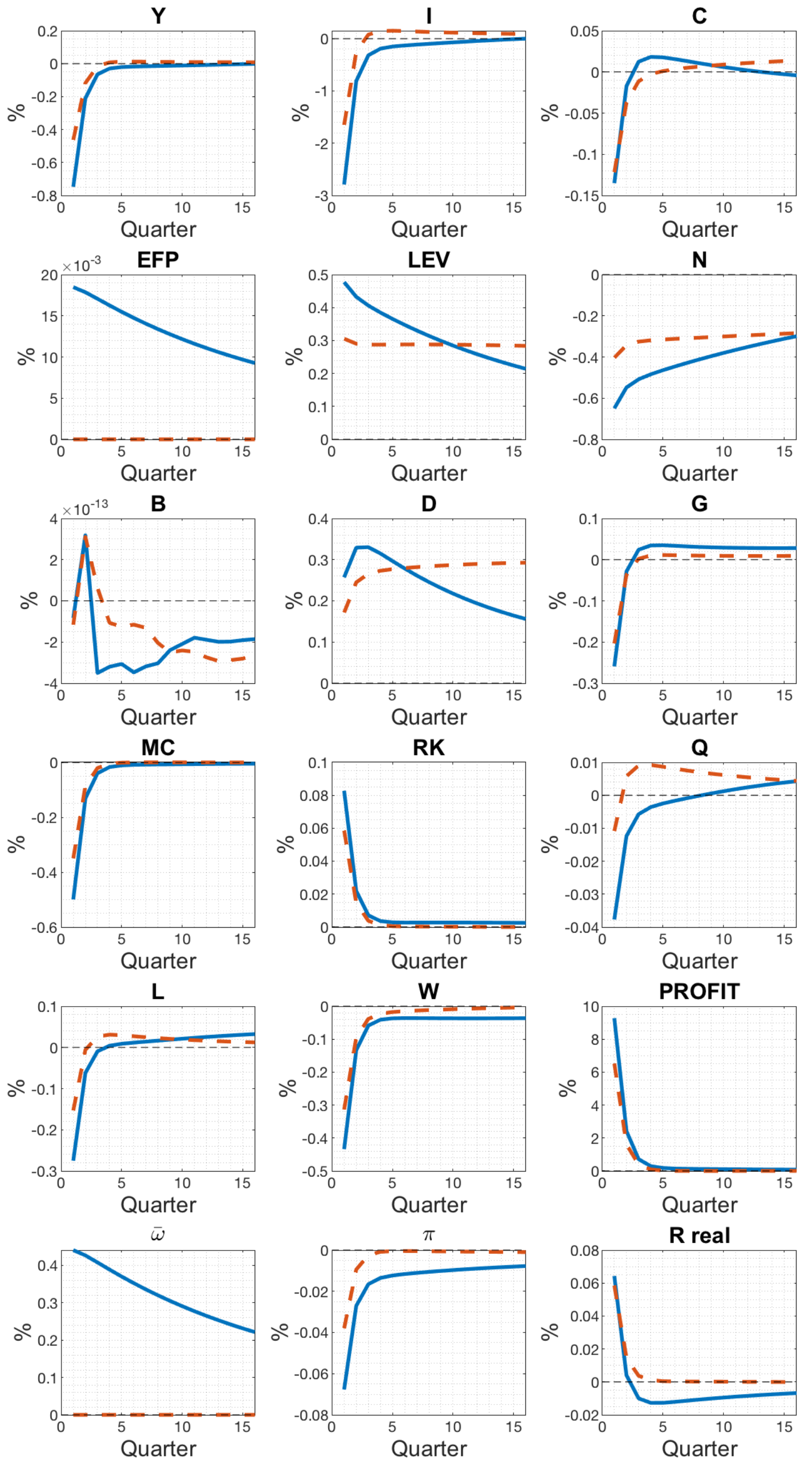

Figure H.1: IRFs for aggregate variables, $\rho_B = 0$

Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off.

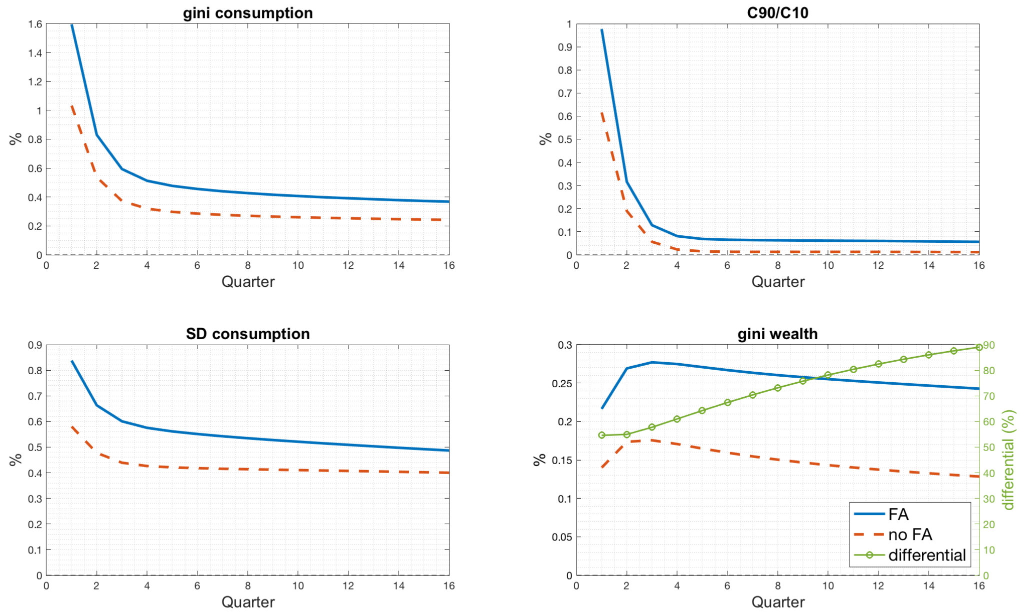

Figure H.2: IRFs for inequality indices, $\rho_B = 0$

Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off. The green line with circles (with values on the right side of the figure) represent the percentage variation from the solid line to the dashed line.

consumption. Notably, the HANK model appears to resolve the "financial accelerator dampening" effect of the TFP shock observed in Bernanke et al. (1999). In their framework, the financial accelerator is only confirmed when the TFP shock's persistence is set to $\rho_z = 1$, preventing the shock from reverting to zero over time. For more typical values of TFP shock persistence, such as $\rho_z = 0.95$, Bernanke et al. (1999) find a "financial deceleration." In contrast, as shown in Figure I.1, output, investment, and consumption increase, albeit modestly and primarily in the short term, when the persistence is less than 1. Inequality dynamics follow a similar pattern, with the financial accelerator's enhancing effect being weak and short-lived.

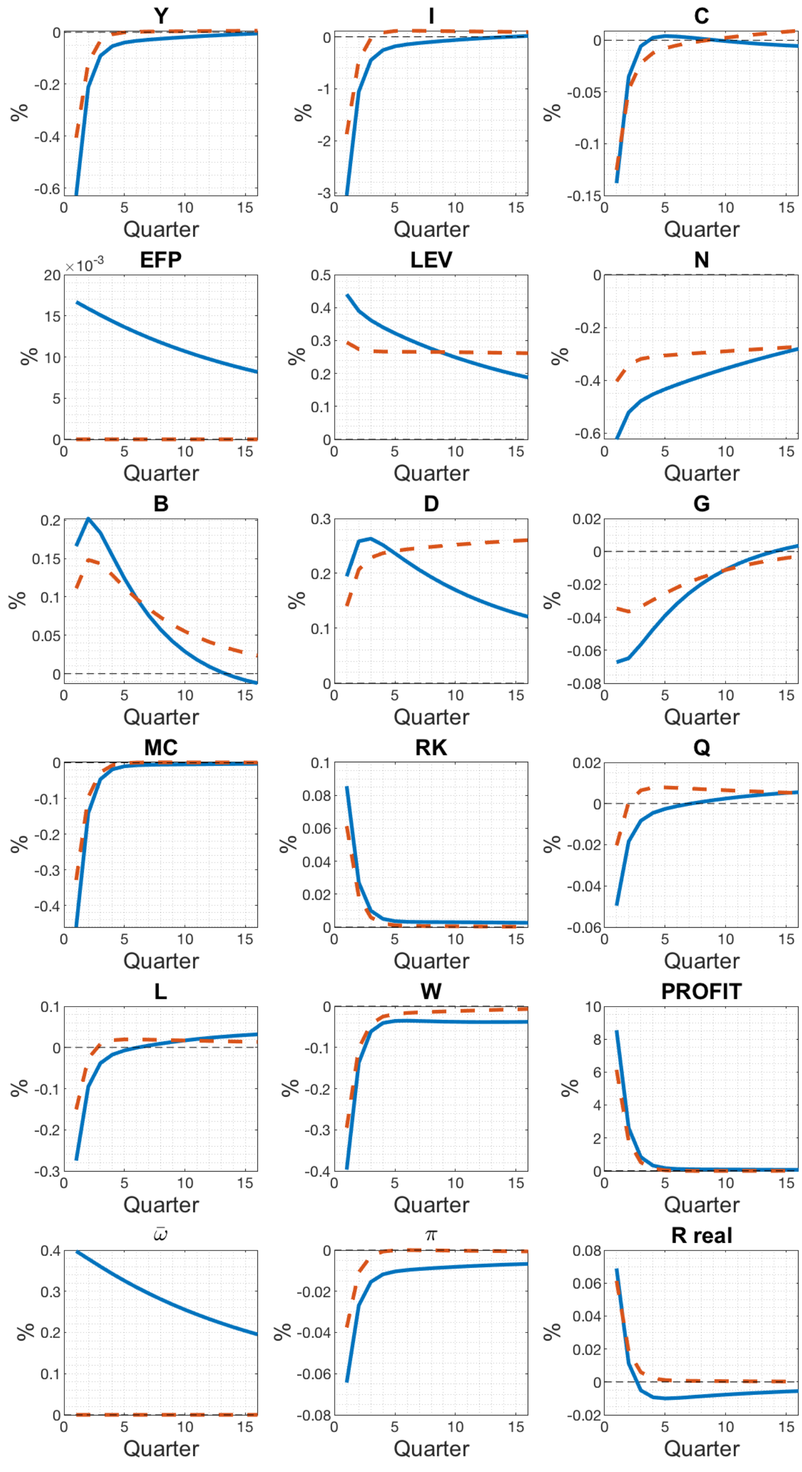

Figure H.3: IRFs for aggregate variables, τ adjustment

Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off.

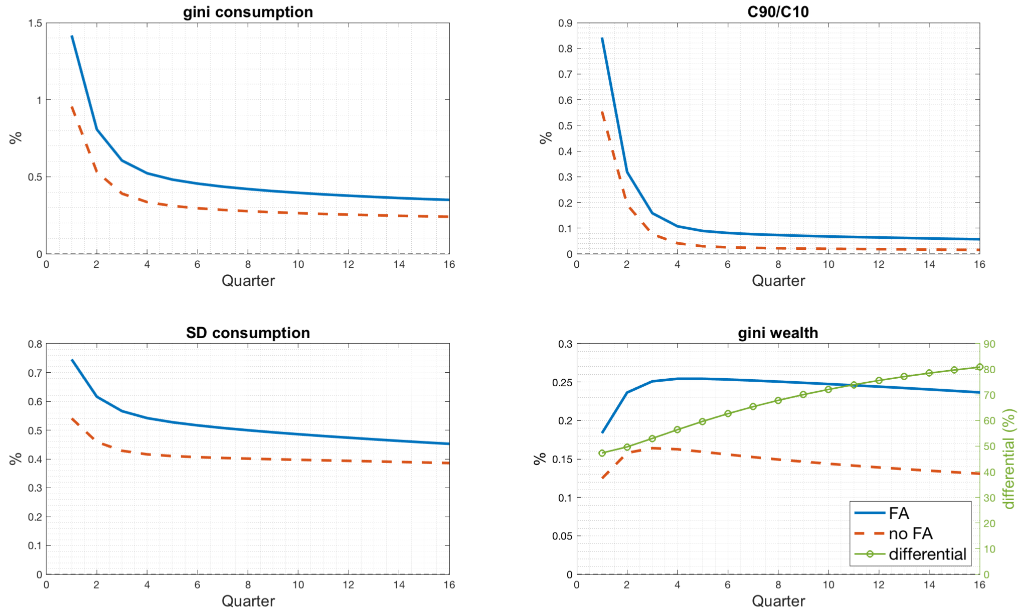

Figure H.4: IRFs for inequality indices, τ adjustment

Monetary shock $\epsilon^R = 25$ b.p. (annualized). The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off. The green line with circles (with values on the right side of the figure) represent the percentage variation from the solid line to the dashed line.

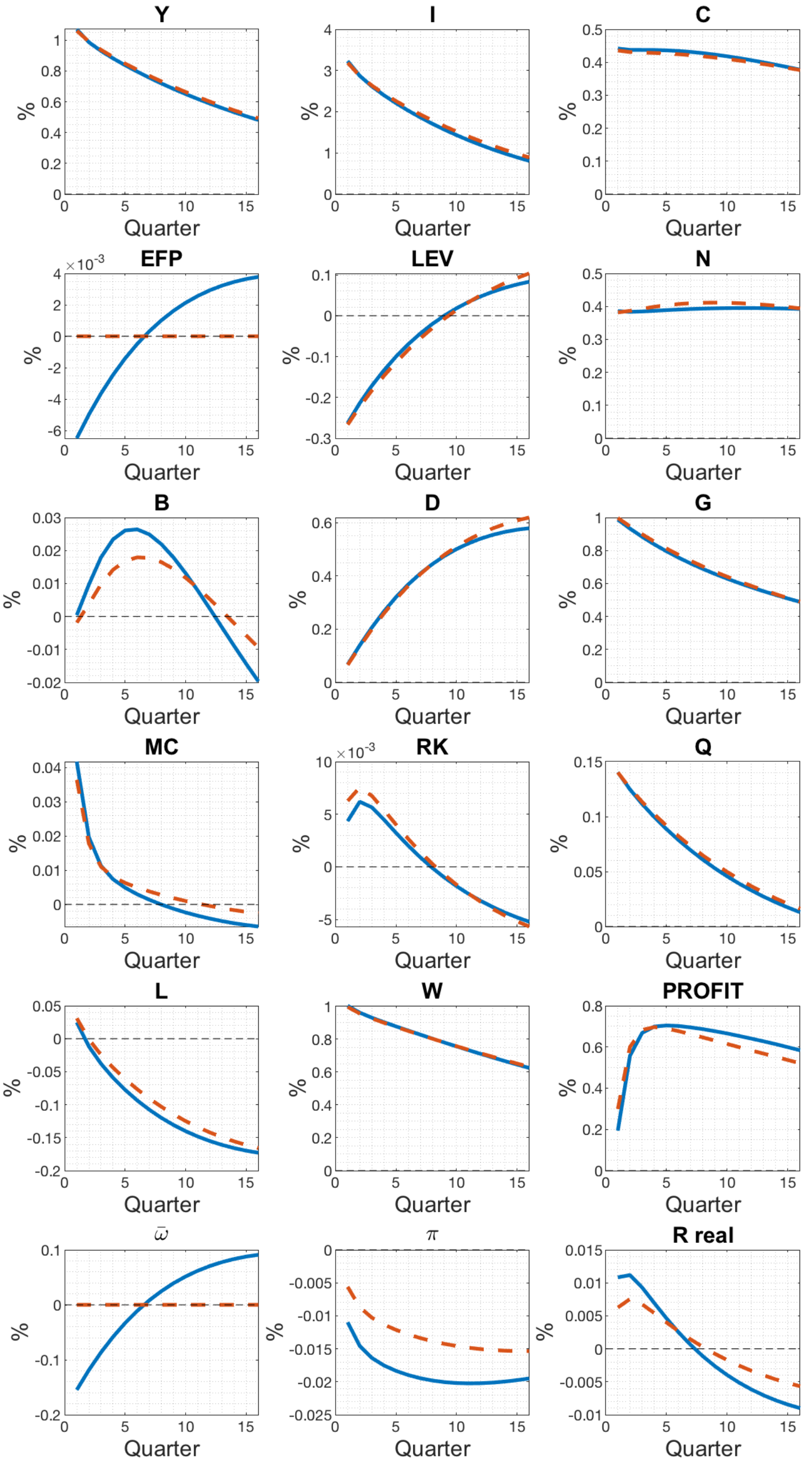

Figure I.1: IRFs for aggregate variables to positive TFP shock

TFP shock $\sigma_z = 0.01$ with $\rho_z = 0.95$. The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off.

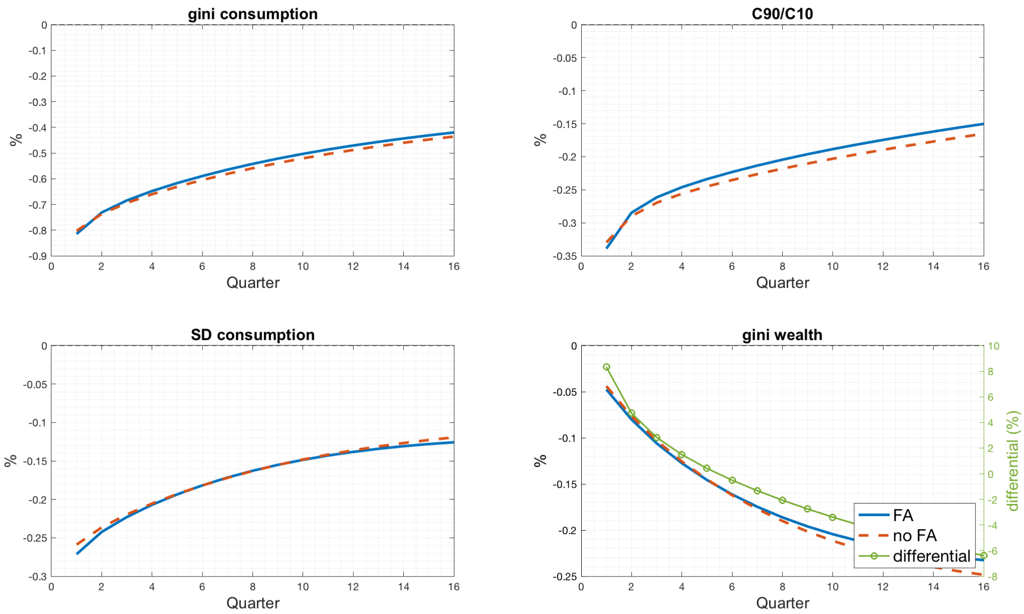

Figure I.2: IRFs for inequality indices to positive TFP shock

TFP shock $\sigma_z = 0.01$ with $\rho_z = 0.95$. The blue solid line refers to an economy with a financial accelerator. The red dashed line refers to the case where financial frictions are shut off. The green line with circles (with values on the right side of the figure) represent the percentage variation from the solid line to the dashed line.