The Inequality Multiplier:

Market Inelasticity and the Persistence of Wealth Inequality

C. Christopher Hyland *　　Aditya Khemka †

September 5, 2025

Abstract

We study how recent changes in U.S. equity market macrostructure shape market capitalization, aggregate debt levels, and wealth inequality. Rising income inequality, combined with inelastic markets, drives persistent wealth disparities through asset price revaluation—a mechanism we term the "inequality multiplier." Using a general equilibrium model, we identify two channels: (i) the equity investment channel, where wealthy households' higher propensity to save amplifies equity price booms; and (ii) the borrowing channel, where increased indebtedness raises equity prices via rebalancing demand from financial intermediaries. Calibrating the model to U.S. data, we show that this multiplier makes wealth inequality self-perpetuating and drives a growing wedge between income and wealth inequality. The model replicates observed trends in equity prices, debt levels, and wealth concentration, revealing how asset market frictions drive inequality beyond existing explanations in the literature. The equity investment channel shapes long-run trends, while the borrowing channel explains short-run cycles in wealth inequality. Our findings link recent shifts in financial market structure to macroeconomic outcomes.

Keywords: Macro-Finance, Wealth Inequality, Inelastic Markets.

JEL Classification: E44, D31, E21, G23.

A supplemental appendix to the paper can be accessed at this link.

We thank Andrea Ferrero and Dimitrios Tsomocos for helpful comments and continued support. We also thank Pedro Bordalo, Abhinash Borah, Markus Brunnermeier, David Domeij, Niels Johannesen, Jiri Knesl, Ralph Koijen, Seung Joo Lee, Mingze Ma, Zach Mazlish, Benjamin Moll, Ken Okamura, Shumiao Ouyang, Ricardo Reis, Joel Shapiro, Amir Sufi, Paolo Surico, Oren Sussman, Purnoor Tak, Christoph Trebesch, Florian Trouvain, Gianluca Violante, Mungo Wilson, Kieran Walsh, Tim Willems and other colleagues and conference participants for helpful comments and discussions.

*Christopher Hyland: Saïd Business School and Exeter College, University of Oxford and Oxford-Man Institute of Quantitative Finance, christopher.hyland.dphil@said.oxford.edu

†Aditya Khemka (Corresponding Author): Saïd Business School and New College, University of Oxford aditya.khemka@sbs.ox.ac.uk

1. Introduction

The past 40 years have witnessed a large and simultaneous increase in the value of equities, value of outstanding debt and wealth inequality in the United States. Since 1989, U.S. equity market capitalization has risen roughly twenty-two-fold, outstanding debt about seven-fold, and the top ten percent wealth share by six percentage points. Over the same period, the rise in wealth inequality has far outpaced the rise in income inequality — wealth inequality has widened more than six times faster than income inequality. Simultaneously, the market macro-structure — the structure of financial markets, institutional features and financial frictions — has shifted markedly, most visibly through the growth of passive ownership to about one-third of the equity market. Figure 1 puts the quantitative importance of these trends into perspective.

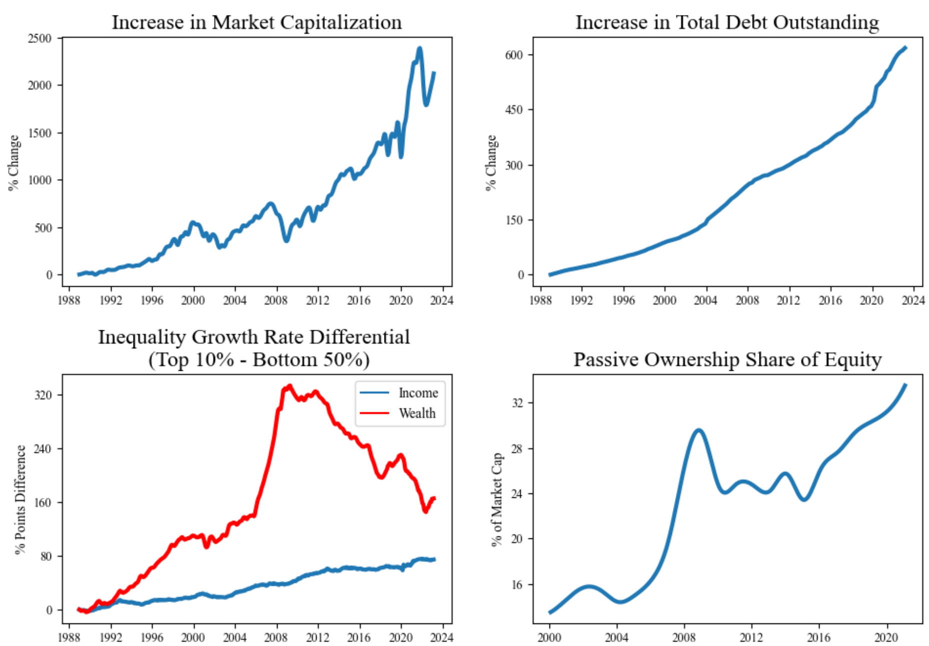


FIGURE 1. Simultaneous and quantitatively large increase in equity market value, total debt value (including household and federal debt), wealth and income inequality, and share of U.S. equities owned by passive investors.

Note: Increase in Wealth (Income) inequality calculated by taking the difference between the growth rate of average wealth (average factor income) of top 10 percentile and growth rate of average wealth (average factor income) of bottom 50 percentile. Wealth (and factor income) in January 1989 used as base year. Debt outstanding includes federal, household and business debt.

Source: Quarterly value of corporate equities (market capitalization) and value of debt from Flow of Funds data. Monthly top 10% and bottom 50% income and wealth growth from Blanchet et al. (2022). Passive ownership share from Chinco and Sammon (2024).

A large literature spanning macroeconomics, public economics and finance has studied these trends in isolation. Yet most theories cannot jointly account for the *simultaneous* and *quantitatively* large increase in equity values, aggregate debt, and wealth inequality — or for the widening wedge between wealth and income inequality [1].

Crucially, these explanations do not take the evolving market macro-structure into account. This is a shortcoming, because over the same time period, the macro-structure of financial markets has shifted substantially — for example, passive investing strategies have become more prominent. Haddad et al. (2024) show that the rise of passive investors has made equity markets more *inelastic*. Inelasticity implies that asset prices are highly sensitive to flows entering or exiting the market. Inelasticity may arise from a number of intermediary-level frictions and constraints, such as fixed mandates, equity capital constraints, preferred habitat, transaction costs or rational inattention. A common implication of market inelasticity, irrespective of its micro-foundation, is that the market's portfolio allocation between equity and debt becomes less responsive to price changes[2], and any change in quantity demanded has outsized price effects.

A natural next step, therefore, is to link these flows to wealthy and non-wealthy households' heterogeneous demand for savings and borrowing, which in turn come from unequal income and wealth positions. In equilibrium, market inelasticity amplifies the effect of households' savings decisions on prices and portfolio values, leading to quantitatively significant changes in wealth inequality which are in line with empirical observations. Put differently, inequality begets inequality under inelastic markets.

In addition to wealth inequality, inelastic equity markets, combined with heterogenous portfolio holdings of households (Figure A1), also helps explain the exponential rise in equity prices and borrowing. A simple thought experiment builds intuition and demonstrates the key mechanism. Consider a wealthy household who can invest in equity and debt through a financial intermediary, and a non-wealthy household who can only borrow in debt markets. There is one aggregate financial

[1] Theories related to return heterogeneity (such as Gomez (2024)) are unable to account for the simultaneous increase in total debt. Equally, theories which link wealth inequality to the increase in indebtedness of households at the bottom of the wealth distribution (such as Kumhof et al. (2015)) do not account for the large increase in equity value. Benhabib et al. (2017) show that models of income inequality cannot explain the much faster and larger increase in wealth inequality.

[2] For inelastic investors, this split has hovered around the 70-30 mark based on our calculations in Supplemental Appendix 1, whereas Gabaix and Koijen (2021) estimate this split to be closer to the 80-20 mark.

intermediary in the market, who has a mandate to hold 80% of its net worth ($100) in equities, and 20% in bonds. Suppose the non-wealthy household is faced with a temporary negative income shock (such as an unemployment shock). In order to smooth consumption, they demand $1 of additional borrowing from the financial market. Increase demand for borrowing pushes up interest rates, incentivizing the intermediary (and in turn the wealthy household) to lend the additional dollar, changing the intermediary's bond position to $21[3]. In order to avoid violating their 80-20 mandate, the financial intermediary bids up the price of equity to $84, given supply of equity is relatively inelastic. As only wealthy household portfolios are exposed to equity, their wealth increases, driving up wealth inequality. We refer to this as the "borrowing channel".

A similar argument is at play when the wealthy household receives a $1 positive income shock. Suppose they invest the dollar into the financial market. As equity issuance is fixed, the market cannot use this dollar to purchase more equity; instead, they invest in $1 worth of bonds. Once again, to avoid violating their mandate, the price of equity is bid up to $84. The increase in the supply of debt in the market reduces interest rates, incentivising the non-wealthy household to take on additional borrowing. We refer to this as the "equity investment channel". Both channels jointly increase equity prices, debt, and wealth inequality, and magnify the wedge between income and wealth inequality through price revaluation.

The effect of inelastic equity markets, common to both channels, is visible through the mechanism of higher household debt explaining higher equity market values. Consider a simple back-of-the-envelope calculation to study if the empirically observed increase in household debt relates to the increase in equity market capitalization. Secured household debt in the U.S. increased by about $11tn between 1989 and 2023 . Over the same period, the U.S. equity market capitalization increased by about $66tn[4]. Using the estimated price multiplier (akin to a summary statistic capturing the relative equity value-debt value ratio of the aggregate market) from Gabaix and Koijen (2021) of 4,

[3]We do not claim that all household debt is *directly* held by financial intermediaries such as mutual funds. However, as demonstrated in Mian et al. (2025), household borrowing can be 'unveiled' back to its original source through layers of intermediation. Based on their analysis, >25% of household debt is intermediated through inelastic intermediaries. Additionally, mutual funds account for the largest increase in demand for household debt as an asset. Quoting directly from Mian et al. (2025), "...the rich are heavy investors in money market and mutual funds. These money market and mutual funds have sizable holdings of Agency Government-Sponsored Enterprise (Agency GSE) debt. Agency GSE debt is ultimately backed by home mortgages."

[4]Source: Financial Accounts of the United States - Z.1, Tables B.101 and L.224

the increase in secured household debt captures 67% of the rise in equity market capitalization[5].

To formalise the argument, we develop an analytical model showing that, when equity-market participation is limited and markets are inelastic owing to constrained intermediaries, income inequality maps into *cross-sectional* wealth inequality via higher equity prices and debt. The model delivers two channels through which equity prices rise. The *equity-investment* channel operates when greater saving by wealthy households generates larger inflows; in more inelastic markets these flows translate into larger price increases, thereby widening wealth inequality. The *borrowing* channel operates when an increase in aggregate debt necessitates a commensurate rise in equity values (market capitalisation) to preserve a stable equity–debt split, which raises wealth inequality by increasing wealthy households' net worth and lowering that of the non-wealthy. Crucially, we endogenise saving by the wealthy and borrowing by the non-wealthy as functions of income.

Motivated by Figure 1, we ask whether rising market inelasticity can explain the *dynamics* of wealth inequality. To that end, we develop a tractable quantitative model that incorporates middle-class households and housing as an asset, alongside limited participation, financial-intermediary frictions, and non-homothetic preferences of the wealthy in the spirit of Mian et al. (2021). In this environment, marginal propensity to save of the wealth rises with their wealth levels, generating endogenously increasing flows into equity even in the absence of shocks. Moreover, the persistence of saving (and borrowing) inherits the persistence of heterogeneous household income shocks. When income shocks are even moderately persistent, equity prices, and thus wealth inequality, rise strongly and persistently. By linking flows to heterogeneous household asset-demand functions, we extend Gabaix and Koijen (2021) and provide a framework to think about the recent debate on the half-life of flows on prices (Fuchs et al. (2023), Koijen and Yogo (2025)). Additionally, we find that wealth inequality is persistent, contrary to the literature (Cioffi (2021)).

In a simulation exercise, we find that our model is able to match the trends visible in Figure 1 — simultaneous increases in equity values, outstanding debt and wealth inequality. Moreover, our model is able to replicate the dynamics of wealth inequality better than existing models, crucially

[5] Using a more conservative, lower-bound estimate of 1.65 from Haddad et al. (2024), this number is still a quantitatively significant 30%. If we include both secured and unsecured household debt along with the price multiplier of 4, the increase in total household debt captures 92% of the rise in equity market capitalization

capturing the increasing divergence between the increase in wealth inequality and the increase in income inequality. We term this the *Inequality Multiplier* — a general equilibrium phenomenon where higher income inequality begets even higher wealth inequality. A decomposition exercise allows us to demonstrate that the equity investment channel matches the *trend* of wealth inequality dynamics, while the borrowing channel matches the *cycle* of wealth inequality dynamics.

We are among the first to offer a parsimonious model to explain the joint increase in equity prices, debt and the widening divergence between income and wealth inequality. Our theoretical contribution is to link market inelasticity with portfolio heterogeneity to give rise to the *inequality multiplier* mechanism. Through our channels, we show that two seemingly opposing sides of the literature on wealth inequality — one which links increasing wealth inequality in the U.S. to return heterogeneity and portfolio decisions of the rich (Hubmer et al. (2021), Kuhn et al. (2020)) and another which links it to increased indebtedness of the poor (Rajan (2011), Mian et al. (2025)) — exist in tandem but explain different features of wealth inequality. The former, akin to our equity investment channel, leads to long-run trend increases in wealth inequality, while the latter, akin to our borrowing channel, leads to large short- to medium-term deviations. We find that while wealth inequality has been rising steadily, the particularly large increase witnessed post-Global Financial Crisis can be explained by increased debt in financial markets.

If the inequality multiplier exists, why should we care? First, it provides a mechanism that deepens our understanding of rising wealth inequality, reconciling income-based explanations with the fast transition dynamics of wealth concentration. Second, it highlights a previously overlooked downside of changes in equity-market structure (such as the rise of passive investing) that has made markets more inelastic. Although passive investing is widely credited with broadening access for less-wealthy households and improving diversification, it may also exacerbate wealth disparities; this counterintuitive trade-off merits further study. Third, if policymakers wish to curb further increases in wealth inequality, they should utilise tools which address frictions related to financial market structure, such as limited equity market participation and overly constrained financial intermediaries. Additionally, the objective of reducing wealth inequality should distinguish between tackling short-term, cyclical inequality versus tackling long-term, trend inequality, given the two distinct channels at play behind each phenomenon.

Outline of the Paper. Section 2 presents a three-period model that delivers the multiplier. Section 3 sets out a quantitative DSGE model. Section 4 calibrates and provides the empirical matching of moments. Section 5 analyses wealth inequality dynamics. Section 6 concludes.

1.1. Positioning in the Literature

Our paper contributes to two strands of literature: market macrostructure and wealth inequality. We propose a novel mechanism linking inelastic equity markets to faster transition dynamics and endogenous price dynamics. Below, we position our work within these literatures and highlight our contributions.

First, our paper builds on the growing literature on market macrostructure. While prior work, comprehensively discussed in Haddad and Muir (2025)[6] has focused on key asset market players and their effects on equilibrium pricing, to the best of our knowledge, we are the first to link market macrostructure to wealth inequality.

Second, our paper speaks to the large body of work linking income and wealth inequality with financial markets. We contribute to the discussion on capital-based and debt-based explanations of inequality. Work by Rajan (2011), Kumhof et al. (2015), Mian and Sufi (2015) and Mian et al. (2025) emphasise the role of higher leverage taken by poorer households, financed by richer households, in explaining increases in wealth inequality, and creating financial instability. Meanwhile, work by Piketty (2014), Saez and Zucman (2016), De Nardi and Fella (2017) and Kuhn et al. (2020) instead attribute inequality to higher capital accumulation by rich or higher returns on rich investment. We contribute by demonstrating that both explanations work in tandem. Capital- or investment-based explanations capture low-frequency changes in wealth inequality (i.e., trend) while debt-based explanations explain high-frequency (i.e. cycle) changes in wealth inequality.

On the theoretical side, Gabaix et al. (2016) demonstrate that standard random growth models generate unrealistically slow transition dynamics, while Benhabib et al. (2011) show that wealth distributions exhibit fatter tails than income distributions. Our paper contributes by introducing

[6] Given Haddad and Muir (2025)'s well-thematized review of the literature, we do not cite all the relevant papers here. Our discussion on *Why are Equity Markets Inelastic?* (Supplemental Appendix 2) conducts a review of the relevant literature

market inelasticity as a mechanism that both accelerates wealth transitions and higher wealth concentration to the right of wealth distributions.

Several studies, such as Toda and Walsh (2020), Gomez (2024), Greenwald et al. (2021), Hubmer et al. (2021) and Cioffi (2021) examine the interaction between inequality and asset pricing. While their focus is to explain wealth inequality through abnormal equity returns, declining interest rates or heterogeneity in preferences, we show that market inelasticity can simultaneously generate declining equity premia, lower interest rates, self-reinforcing increases in portfolio revaluation, and higher and more persistent wealth inequality.

An important literature examines how family businesses and private capital markets account for rising wealth concentration at the very top of the distribution (Atkeson and Irie (2020, 2022); Göcmen et al. (2025)). Our paper differs from this work by focusing on the divergence between the top decile and the rest of the population. Public equity typically constitutes a larger share of wealth across the broader top decile, whereas private equity and family-run businesses are disproportionately salient for the top 0.1% of the distribution. Our analysis therefore complements this literature by examining the increase in inequality across the wider wealth distribution, rather than only at the very top.

Our modeling approach is closely related to Gabaix and Koijen (2021), who quantify the inelasticity of equity markets and show how flows (which they treat as exogenous) create large price impacts. We contribute by endogenizing capital flows, demonstrating that income distribution shapes inflows and outflows, thereby linking equity markets to wealth inequality. Additionally, this implies that the persistence of flows inherits the persistence of income shocks, which has implications for the half-life of the price impact of flows. Our assumptions on households' access to different assets are informed by empirical work on inequality, especially Kuhn et al. (2020), which shows that asset price fluctuations significantly impact wealth distribution, creating a wedge between income and wealth inequality.

Our model also builds upon work which emphasises the importance of higher marginal propensities to save among the wealthy (Carroll (1998), Carroll (2000), Dynan et al. (2004)). One modeling technique to match higher marginal propensity to save of the wealthy is to incorporate bequest motives for the wealthy, as argued by Straub (2019) and Gaillard et al. (2023). We contribute by demonstrating that market inelasticity is crucial to capture dynamics of wealth inequality even beyond heterogeneous savings rates.

Overall, our paper bridges the market macrostructure and wealth inequality literatures by introducing inelasticity as a key driver of wealth concentration. Our findings highlight the role of financial frictions in amplifying inequality and challenge the view that wealth dynamics are mean-reverting, suggesting that policy interventions may be necessary to counteract these effects.

2. Three Period Model

We begin by setting up a three-period model that establishes the mechanism and sets out the key channels of interaction. The model is highly stylised, but it serves to isolate the links between inelasticity, asset prices, and inequality. In addition, it provides a set of basic, testable empirical predictions that help validate the framework before we proceed to the fully specified quantitative model.

2.1. Environment and Timing

2.1.1. Environment

In our model, households interact with financial markets through a financial intermediary, whose portfolio-allocation decisions are central to determining asset prices and wealth dynamics. There are two assets: risk-free debt and risky equity in fixed supply, which pays a dividend.[7]

There are two household types. The non-wealthy household receives labour income, which it can supplement by borrowing from a financial intermediary that channels credit. The non-wealthy household is institutionally restricted from investing in equity—for example, because of tastes and preferences, margin requirements, higher risk aversion, or other institutional constraints, as documented in Campbell (2006) and Vissing-Jørgensen (2002). By contrast, the wealthy household

[7] We focus on public equities. While the importance of privately owned businesses (Atkeson and Irie (2022)) and private equity (Göcmen et al. (2025)) for wealth inequality cannot be understated, private capital is more relevant for understanding the Pareto tail of the wealth distribution (the top 1 or 0.1 per cent) than for explaining the dynamics of the top decile.

can invest in both equity and debt, but only indirectly via the financial intermediary, which serves as the conduit for its investments. Put differently, the wealthy household chooses how much to save through the intermediary, which in turn determines the split between equity and debt. This stylised structure captures the empirical regularities of limited participation in equity markets and the growing role of financial intermediation.

The financial intermediary (for example, a mutual fund) is subject to a portfolio constraint that requires it to hold a fixed proportion of equities and bonds. This restriction limits its ability to adjust fully to market conditions, thereby introducing frictions into the transmission of financial flows. Figure 2 illustrates the setup, showing the interactions between the two households and the intermediary.

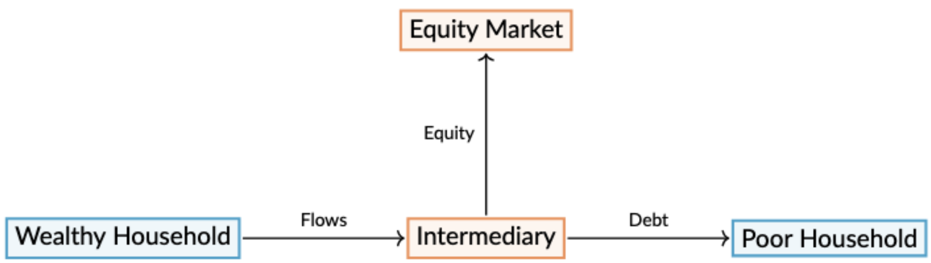


FIGURE 2. Environment

2.1.2. Timing

We analyse the model in a general-equilibrium framework, with decisions and outcomes unfolding over three key periods.

At $t = -1$, the financial intermediary allocates its initial wealth between equities and bonds so as to maximise returns at $t = 1$, which consist of dividend income from equities and interest income from bonds. The intermediary's equity and bond positions are the assets of the wealthy household, while the non-wealthy household holds legacy debt equal to the intermediary's bond holdings. At this stage, the intermediary is not subject to any portfolio constraints or mandates. Asset prices are determined endogenously in a no-trade equilibrium.

At $t = 0$, both wealthy and non-wealthy households solve a standard two-period consumption–saving problem. The wealthy household observes its labour income for the period and chooses how to allocate resources between current consumption and saving, investing indirectly via the intermediary. The non-wealthy household also observes its labour income and decides how much to borrow from the intermediary in order to finance consumption. The initial wealth disparity between the two households arises from a negatively correlated endowment shock received at $t = 0$. As no additional equity is issued, the price of equity adjusts to clear the market at the fixed stock supply. These price movements generate portfolio revaluation effects, influencing the wealth of both households. Because the wealthy household holds a larger share of equities, it benefits disproportionately from equity-price increases, thereby widening the wealth gap.

At $t = 1$, the financial intermediary unwinds its portfolio, rebating all profits from its holdings to the wealthy household, while the non-wealthy household repays its debt. Figure 3 summarises the sequence of events.

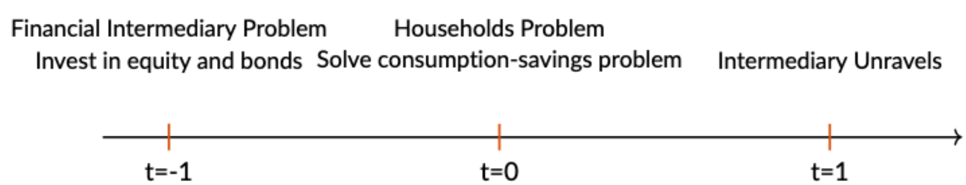


FIGURE 3. Timeline

2.2. Financial Intermediary

At time $t = -1$, given initial wealth W_{-1}, equity dividends D_1, and the two-period annualised interest rate $r_{f,-1}$, the representative financial intermediary chooses the fraction of its portfolio to be held in equity θ in order to maximise returns on final-period wealth:

$$\max_{\theta} \frac{1}{(1 + r_{f,-1})^2} \left[\theta \frac{D_1}{p_{-1}} + (1 - \theta)(1 + r_{f,-1})^2 \right] \tag{1}$$

Taking the first order condition with respect to θ yields the fundamental price of the asset at time $t = -1$:

$$p_{-1} = \frac{D_1}{(1 + r_{f,-1})^2} \tag{2}$$

θ should be interpreted as the aggregate, weighted-average equity share of a continuum of financial intermediaries indexed by $i = 1, 2, \ldots, I$, each of whom may have its own portfolio share θ_i arising from heterogeneous microfoundations. Each intermediary commands a share S_i of total equity holdings in the economy, defined by $S_i \equiv \frac{pQ_i}{\sum_j pQ_j}$. Following Gabaix and Koijen (2021), the aggregate portfolio share of the representative intermediary is defined as the equity-holdings-weighted mean of individual shares:

$$\theta \equiv \sum_i S_i \theta_i. \tag{3}$$

At $t = -1$, the following accounting identities must hold at the aggregate equity-market level:

$$\theta W_{-1} = p_{-1} Q_{-1}, \tag{4}$$

$$(1 - \theta) W_{-1} = B_{-1}. \tag{5}$$

At time $t = 0$, the representative financial intermediary receives an additional inflow F_0 from the wealthy household, and the equilibrium equity price adjusts to p_0. However, it cannot readjust θ owing to frictions discussed below. Its holdings at $t = 0$ are therefore governed by the following accounting identities:

$$\theta\left(p_0 Q_{-1} + B_{-1} + F_0\right) = p_0 Q_0(F_0), \tag{6}$$

$$(1 - \theta)\left(p_0 Q_{-1} + B_{-1} + F_0\right) = B_0(F_0), \tag{7}$$

where $Q_0(F_0)$ is the new quantity of shares and $B_0(F_0)$ is the new quantity of bonds, both functions of flows from the wealthy household. Intermediary wealth at $t = 0$ is given by

$$W_0 = p_0 Q_{-1} + B_{-1} + F_0 = p_0 Q_0 + B_0. \tag{8}$$

In other words, intermediary wealth can be written as (revalued) existing equity holdings plus existing bond holdings plus new inflows, or equivalently as the value of new equity holdings plus new bond holdings. This identity implies that flows must be absorbed as purchases of new equity plus new bonds:

$$F_0 = p_0(Q_0 - Q_{-1}) + (B_0 - B_{-1}). \tag{9}$$

At $t = 0$, the intermediary's portfolio choice is subject to rigidity, capturing institutional mandates or high costs of adjustment. For example, a mutual fund's investment committee may set a target equity allocation at the start of a quarter, with any deviation requiring costly approval. While we do not take a specific stand on the underlying cause, several potential microfoundations for this rigidity are discussed in Supplemental Appendix 2. We revisit and relax this assumption in Section 3, and we consider the effects of adding an arbitrageur in Appendix B.

2.3. Households

Non-Wealthy Household. At time $t = 0$, the non-wealthy household solves a standard two-period consumption–saving problem. It maximises lifetime utility over two periods by choosing consumption $\{c_0^P, c_1^P\}$ and additional borrowing B_0^P. The household receives exogenous endowments $\{e_0^P, e_1^P\}$. It must also repay legacy debt $(1 + r_{f,-1})^2 B_{-1}$, where B_{-1} denotes the intermediary's holdings of bonds at $t = -1$[8], and $r_{f,-1}$ is the annualised two-period interest rate applicable from $t = -1$ to $t = 1$. The household solves

$$\max_{c_0^P, c_1^P, B_0^P} \; u[c_0^P] + \beta u[c_1^P]$$

[8]Without loss of generality, this is assumed to be debt with a two-period maturity and no intermediate coupon payments.

subject to

$$c_0^P \leq e_0^P + B_0^P, \tag{10}$$

$$c_1^P + (1 + r_{f,-1})^2 B_{-1} + (1 + r_{f,0}) B_0^P \leq e_1^P. \tag{11}$$

The Euler equation on borrowing for the non-wealthy household prices the risk-free bond.

Wealthy Household. At time $t = 0$, the wealthy household maximises lifetime utility by choosing consumption $\{c_0^R, c_1^R\}$ and the additional investment placed with the financial intermediary, denoted F_0. We refer to this saving decision as *flows*. The household receives exogenous endowments $\{e_0^R, e_1^R\}$ and, at the end of period 1, obtains from the intermediary the dividends on equities $D_1 Q_0$ and the returns on bonds $(1 + \tilde{r}_{f,0}) B_0$, where $\tilde{r}_{f,0}$ is the effective weighted-average interest rate received. The household solves

$$\max_{c_0^R, c_1^R, F_0} \; u[c_0^R] + \beta u[c_1^R]$$

subject to

$$c_0^R + F_0 \leq e_0^R, \tag{12}$$

$$c_1^R \leq e_1^R + D_1 Q_0(F_0) + (1 + \tilde{r}_{f,0}) B_0(F_0), \tag{13}$$

where

$$1 + \tilde{r}_{f,0} = (1 + r_{f,-1})^2 \frac{B_{-1}}{B_0} + (1 + r_{f,0}) \frac{B_0^P}{B_0}.$$

Importantly, the Euler equation of the wealthy household does not directly price equities; it only prices the returns on investment in the intermediary.

Market Clearing. In equilibrium, the equity market clears at an inelastic supply of stock:

$$Q_{-1} = Q_0 = \bar{Q}. \tag{14}$$

The full definition of equilibrium is standard and deferred to Appendix D.1.

2.4. Qualitative Results

Under inelastic equity markets, what is the fundamental stock-pricing equation? Imposing market clearing in the equity market yields the following proposition, which shows how the stock price evolves from the fundamental value p_{-1} derived in Equation 2:

PROPOSITION 1. *(**Equity-Investment Channel**) The price of equity at time $t = 0$ is given by*

$$p_0 = p_{-1} + \frac{\theta}{1-\theta}\frac{F_0}{Q_0}, \tag{15}$$

where p_{-1} is the fundamental price of equity, and $\frac{\theta}{1-\theta}\frac{F_0}{Q_0}$ represents the non-fundamental component of the price.

PROOF. See Appendix D.2. □

This result shows that for every $1 of inflows into the market, the value of equities must increase by a factor of $\frac{\theta}{1-\theta} = 4$, assuming inelastic supply with $\theta = 0.8$. It is therefore useful to define $\frac{\theta}{1-\theta}$ as the *price impact* of flows for later use.

The initial equity price, p_{-1}, reflects its fundamental value at $t = -1$. At $t = 0$, when capital flows into equity markets, the price is pushed above fundamentals. This follows directly from inelastic supply: the market cannot absorb inflows without price adjustment. This is the equity-investment channel, through which flows from wealthy households raise equity prices.

Another way to see this is to note that inflows generate additional demand for equity from the intermediary's perspective. With fixed supply, no extra equity can be purchased, so the entirety of excess demand is reflected in higher prices.

The borrowing channel links debt markets and equity prices. Flows of saving by wealthy households equal borrowing by non-wealthy households. This gives the next proposition:

PROPOSITION 2. *(**Borrowing Channel**) Flows are related to borrowing by*

$$F_0 = B_0 - B_{-1}. \tag{16}$$

The equity price is related to debt by

$$p_0 = p_{-1} + \frac{\theta}{1-\theta}\frac{B_0^P}{Q_0}. \tag{17}$$

PROOF. Start from

$$F_0 = p_0(Q_0 - Q_{-1}) + (B_0 - B_{-1}),$$

and impose market clearing for equity: $Q_0 = Q_{-1} = \overline{Q}$. □

Flows and household indebtedness are two sides of the same coin. In equilibrium, saving by wealthy households must equal borrowing by non-wealthy households. Each additional dollar of flows cannot purchase more equity, so must instead be absorbed by bond purchases. New bond purchases equal the non-wealthy household's demand for borrowing. Yet because the bond position increases by a dollar, the equity position p_0Q_0 must also rise by the price multiplier. Hence, borrowing by non-wealthy households directly affects equity prices. The intermediary's portfolio constraint, and more generally inelastic markets, create this novel link: higher household indebtedness leads to higher equity prices.

Since equity prices depend on endogenously determined flows (or borrowing), what determines flows? With log utility, saving flows and borrowing are pinned down by endowments:

$$F_0 = B_0^P = \frac{e_1^P - \beta(1+r_{f,0})e_0^P - (1+r_{f,-1})^2 B_{-1}}{(1+\beta)(1+r_{f,0})}. \tag{18}$$

Thus borrowing (and flows) are positive whenever future endowments of the non-wealthy exceed repayment of legacy debt and desired consumption. This matches empirical evidence: although the *share* of income of the non-wealthy has declined, their absolute income *levels* have risen, allowing more borrowing.

Supplemental Appendix 3.1 makes the dependence of equity prices on endowments explicit, derives conditions under which prices rise without changes in fundamentals (dividends), and shows how the model generates downward-sloping equity demand. Supplemental Appendix 3.2 derives the expression for demand elasticity for equities and shows its dependence on θ.

Would relaxing fixed equity supply remove the flow effect? Appendix C.2 shows that allowing exogenous increases in supply dampens the price impact somewhat, but given empirically observed growth in supply and flows, the impact does not vanish.

Finally, consider wealth inequality. At $t = 0$, the wealthy household's position is its mutual-fund holding:

$$W_0^R = p_0 Q_0 + B_0.$$

This makes clear that increases in equity prices and borrowing increase the wealthy's net worth and, therefore, their share of aggregate wealth. Definitions of wealth shares and comparative statics with respect to equity prices are given in Supplemental Appendix 3.3. Appendix 3.4 further shows how changes in income endowments affect equity prices and wealth inequality, with equity prices rising when the current-period wealthy income share rises.

Our highly stylised yet tractable framework thus demonstrates how inelastic equity markets generate a disconnect between income inequality and wealth inequality.

2.5. Reconciling Theoretical Predictions with Empirical Estimates

In this section, we use our stylised framework to derive an empirically testable prediction and examine whether our mechanism is borne out in the data. Recognising that $Q_0 = Q_{-1}$ and $B_0^P = B_0 - B_{-1}$, we can restate Equation 17 as

$$\frac{\Delta pQ}{\Delta B} = \frac{\text{Change in Market Value of Equity Holdings}}{\text{Change in Market Value of Bond Holdings}} = \underbrace{\frac{\theta}{1-\theta}}_{\text{Price Multiplier}}. \tag{19}$$

We now evaluate how the model-implied price multiplier, representing the relative change in the market values of equity and bond holdings for inelastic investors, compares with estimates in the existing literature.

We collect quarterly data on the nominal value of equity and bond holdings for inelastic investors (mutual funds, closed-end funds, ETFs, government retirement funds, and insurance companies)[9]

[9] We adopt a deliberately broad definition of inelastic investors to obtain a conservative estimate. A narrower focus,

from the Federal Reserve's *Financial Accounts of the United States* Levels Tables (L.224 for Corporate Equities; L.208 for Debt Securities). We take first differences of both series and construct the ratio $\frac{\Delta pQ}{\Delta B}$. Because this measure is noisy, we winsorise the top and bottom deciles, then apply a Hodrick–Prescott filter. We plot the trend component in blue in Figure 4. This is equivalent to plotting the trend analogue of the price multiplier in the data.[10]

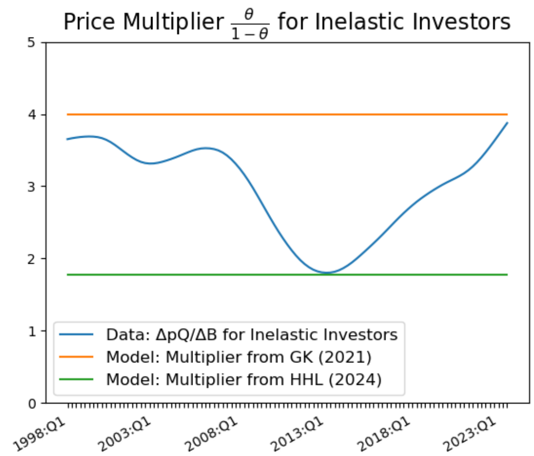


FIGURE 4. Comparison of the price multiplier derived from empirical data and the model, incorporating estimates from previous studies.

The empirical price multiplier aligns closely with the model-implied multipliers shown in Figure 4. Gabaix and Koijen (2021) estimate $\theta = 0.8$ (orange line), implying a price multiplier of 4. In contrast, Haddad et al. (2024) estimate $\theta = 0.64$ (green line), corresponding to a price multiplier of 1.78. The empirical estimate of the price multiplier for inelastic investors between 1998 and 2023 lies neatly between these two benchmarks, despite the very different empirical strategies used to obtain them.

Notably, Haddad et al. (2024) provide a lower bound, since their measure of micro-elasticity is based on substitution *within* equities. Our focus, however, is on substitution *between* bonds and equities—that is, macro-elasticity. Because bonds and equities are less substitutable than two equities within the same asset class, macro-elasticity must be lower than micro-elasticity, implying a higher price multiplier. Consequently, Haddad et al. (2024)'s estimate should be viewed as an empirically grounded lower bound.

excluding—for example—mutual funds with predominantly active mandates, would yield mechanically stronger results, as it would concentrate on investors with explicitly stable equity–bond shares.

[10]The direct analogue of the expression above would be a horizontal line at the average empirical price multiplier, $\frac{\theta}{1-\theta} \approx 3$, implying $\theta \approx 0.75$.

This establishes two key points. First, there exists a non-zero price multiplier for inelastic investors, confirming that markets are indeed inelastic: demand curves for equities are downward sloping and prices respond to borrowing and flows. Second, our stylised setup appears empirically relevant.

3. Quantitative Model

In this section, we develop a tractable dynamic stochastic general equilibrium model to analyse the dynamics of wealth inequality over the long run. To match empirical evidence on heterogeneous marginal propensities to save, we incorporate non-homothetic preferences for the wealthy household. We also relax the assumption of exogenous portfolio mandates by allowing financial intermediaries to deviate from their target allocations at a cost, thereby making their optimisation problem more flexible. To capture quantitative properties consistent with the data, we introduce housing as a third asset class. In addition, we add a third type of household—the middle class—which, like the non-wealthy, is excluded from equity markets but is allowed to participate in the housing and bond markets.[11] To keep the analysis simple, we assume that households are fixed within their wealth groups and cannot transition across groups.[12]

In the dynamic setting, the divergence in income between the top 10% of households and the rest of the economy generates pronounced differences in portfolio choices over time, further exacerbating inequality. Non-homothetic preferences play a central role: as wealthier agents receive higher income endowments, they allocate a greater share of resources to risky assets. This, in turn, amplifies portfolio revaluation effects, to which wealthy agents are more exposed than non-wealthy agents. Owing to the inelasticity of markets, this mechanism embeds a persistent component in wealth inequality.

[11] The importance of housing in the study of asset prices and inequality has been emphasised by Kuhn et al. (2020), Piazzesi and Schneider (2016), and Cioffi (2021), among others. Beyond being qualitatively different from equities and bonds, housing plays a central role in the portfolios of the middle class, defined as households in the 50th–90th percentile of the wealth distribution. Indeed, Kuhn et al. (2020) show that housing is *the* asset of the middle class.

[12] Kuhn et al. (2020) show using the Panel Study of Income Dynamics (PSID) that a high share of households (over 80%) remain in the same wealth group across time. Thus, the 'synthetic' assumption of keeping households fixed within wealth groups provides a good approximation of aggregate wealth dynamics.

3.1. Environment

The framework employs a perpetual-youth model in which agents face a probability of death δ each period (Yaari (1965); Blanchard (1985); Farhi and Werning (2019)). Top-10% households discount future utility at rate ρ, while middle-class households discount at ρ^M, with $\rho^M > \rho$. Households face uncertainty in their per-period earnings, as well as in dividends from equity and from housing (rental returns).

There are three assets: risky equity, risky housing, and risk-free debt. We maintain the assumption that non-wealthy households cannot participate in equity markets, but they may borrow in debt markets. In addition, we restrict non-wealthy households from investing in housing.[13] Wealthy households may invest in equity and bonds through the financial intermediary. For tractability—and because housing is a minor component of wealthy household portfolios—we assume that wealthy households do not invest in housing.[14]

The middle class can invest in housing and save (or borrow) in bonds, but cannot access equity markets. The financial intermediary continues to invest only in equity and bonds, but is now subject to a less rigid version of portfolio constraints relative to the three-period setup. This preserves equity-market inelasticity, but allows the degree of inelasticity to vary over time. As noted previously, incorporating an arbitrageur into the model does not materially alter the results (see Appendix B).

3.2. Financial Intermediary

The financial intermediary purchases bonds (or provides loans) to the non-wealthy household and buys equity on behalf of the wealthy household. Each period, it pays dividend and interest income back to the wealthy household and receives flows (savings) from the wealthy household. The intermediary's objective is to maximise the return on its assets under management (wealth),

[13] Allowing bottom-50% households to invest in housing would not alter the central mechanisms of the model.

[14] Our model does not feature private equity. Although private equity now constitutes a quantitatively significant share of wealthy portfolios, and the rise of private capital markets has amplified inequality, the results of Göcmen et al. (2025) (Figure 10) show that accounting for private capital is most relevant for studying inequalities *within* the top 10 per cent (especially the top 1 or 0.1 per cent), rather than between the top 10 and bottom 50, which is our focus.

net of the cost of deviating from its target equity share θ^*:

$$\max_{\theta_t} \mathbb{E}_t \left[\beta(1 + r_t^{MF}) - \frac{\chi^{MF}}{2} \left(\frac{\theta_t - \theta^*}{\theta^*} \right)^2 \theta^* \right],$$

where β is the financial intermediary's discount factor, χ^{MF} parameterises the cost of deviating from the target, r_t is the risk-free return on bonds, and the return on the intermediary's wealth (equivalently, the return on equity) is given by

$$1 + r_t^{MF} = \theta_t(1 + r_t^e) + (1 - \theta_t)(1 + r_t), \tag{20}$$

$$1 + r_t^e = \frac{D_{t+1} + p_{t+1}}{p_t}. \tag{21}$$

The financial intermediary faces a quadratic adjustment cost when deviating from its target equity share. This is analogous to the standard modelling assumption in the monetary economics literature on firm price-setting behaviour, à la Rotemberg (1982) adjustment costs. Up to a first-order approximation, the same results would arise if we instead assumed that the intermediary adjusts its portfolio at a Poisson arrival rate, following the framework of Calvo (1983). The intermediary's end-of-period t wealth is

$$\tilde{W}_t = p_t Q_{t-1} + B_{t-1} + F_t = p_t Q_t + B_t, \tag{22}$$

and beginning-of-period $t + 1$ wealth is

$$W_{t+1} = (1 + r_t^{MF})\tilde{W}_t = \underbrace{\frac{D_{t+1} + p_{t+1}}{p_t}}_{1+r_t^e} \theta_t \tilde{W}_t + (1 + r_t)(1 - \theta_t)\tilde{W}_t. \tag{23}$$

Equation 22 also implies the following identity for flows:

$$F_t = p_t(Q_t - Q_{t-1}) + (B_t - B_{t-1}). \tag{24}$$

Maximising with respect to θ_t yields the intermediary's portfolio choice:

$$\theta_t = \theta^* \, \mathbb{E}_t \left[1 + \frac{\beta}{\chi^{MF}} (r_t^e - r_t) \right]. \tag{25}$$

The intermediary's equity allocation is thus proportional to its target θ^* and positively related to the equity premium. When the equity premium is high, the intermediary may choose to hold more equity, albeit at the cost of adjustment. This mechanism allows for time-varying market inelasticity.

3.3. Non-Wealthy Households

The representative non-wealthy household chooses a stream of consumption and borrowing to maximise lifetime utility, subject to its budget constraint:

$$\max_{\{c_t^P, B_t^P\}_{t=0}^{\infty}} \mathbb{E}_0 \sum_{t=0}^{\infty} \left[\frac{1}{1+\rho+\delta} \right]^t u[c_t^P]$$

subject to

$$c_t^P + (1 + r_{t-1}) B_{t-1}^P = e_t^P + B_t^P + T_t, \tag{26}$$

where T_t denotes government transfers. We do not assume non-homotheticity in the preferences of non-wealthy households, since saving behaviour at the lower end of the wealth distribution is well approximated by homothetic preferences.

3.4. Wealthy Households

We incorporate non-homothetic preferences for wealthy households by introducing utility from bequests in addition to utility from consumption. Bequests play a quantitatively significant role in the aggregate economy and are central to explaining wealth inequality (De Nardi and Fella 2017). A robust empirical finding is that the saving rate of the rich exceeds that of the poor (Straub 2019; Mian et al. 2025). We model bequests in line with the seminal frameworks of De Nardi (2004) and Straub (2019), treating them as a luxury good. Non-homothetic preferences thus capture the observation that wealthier households save a larger fraction of income, either for bequests or for high-cost future expenditures such as education, medical care, or charitable giving (Benhabib and Bisin 2018).

The wealthy household chooses a stream of consumption and asset flows to maximise lifetime utility (consumption utility plus the expected utility of bequests conditional on death), subject to its budget constraint:

$$\max_{\{c_t^R, F_t\}_{t=0}^{\infty}} \mathbb{E}_0 \sum_{t=0}^{\infty} \left[\frac{1}{1+\rho+\delta}\right]^t \left\{u[c_t^R] + \delta \nu[a_t^R]\right\} \tag{27}$$

subject to

$$c_t^R + F_t = e_t^R + D_t Q_{t-1}(F_{t-1}) + r_{t-1} B_{t-1}(F_{t-1}), \tag{28}$$

$$a_t^R = p_t Q_t + B_t. \tag{29}$$

As in the stylised model, the Euler equation for wealthy households (see Appendix E.1) does not directly price equities. Instead, it features an additional non-standard term that captures the effect of non-homothetic preferences.

3.5. Middle-Class Households

The representative middle-class household chooses consumption, housing purchases, and borrowing to maximise lifetime utility (consumption utility plus the expected utility of bequests conditional on death), subject to its budget constraint and a borrowing constraint limiting debt against housing collateral, in the spirit of Justiniano et al. (2019):

$$\max_{\{c_t^M, H_t^M, B_t^M\}_{t=0}^{\infty}} \mathbb{E}_0 \sum_{t=0}^{\infty} \left[\frac{1}{1+\rho^M+\delta}\right]^t \left\{u[c_t^M] + \delta \nu[a_t^M]\right\} \tag{30}$$

subject to

$$c_t^M + p_t^H H_t^M + (1+r_{t-1}) B_{t-1}^M = e_t^M + (D_t^H + p_t^H) H_{t-1}^M + B_t^M, \tag{31}$$

$$a_t^M = p_t^H H_t^M - B_t^M + \mho^M, \tag{32}$$

$$B_t^M \leq \tau p_t^H H_t^M, \tag{33}$$

where $\tau \in R^{+}$ is the loan-to-value ratio. In equilibrium, housing is supplied inelastically at $\overline{H}$, and we assume the borrowing constraint binds with equality in the steady state.

3.6. Government

The government issues (exogenously determined) bonds to fund transfers to the non-wealthy household. Each period it maintains a balanced budget, such that new borrowing covers the cost of repaying interest on the previous period's borrowing plus transfers:

$$T_t = B_t^G - (1 + r_{t-1})B_{t-1}^G. \tag{34}$$

In the absence of household credit risk, bonds issued by the government and by households are qualitatively equivalent. Accordingly, government bonds are also purchased by the financial intermediary. Finally, the definition of equilibrium is standard and mirrors that in the three-period model.

DEFINITION 1. *An equilibrium consists of choices* $\{c_t^R, c_t^P, c_t^M, F_t, B_t^P, B_t^M, B_t^G, H_t^M, \theta_t\}_{t=0}^{\infty}$, *quantities* $\{Q_t, B_t\}_{t=0}^{\infty}$, *prices* $\{p_t, p_t^H, r_t\}_{t=0}^{\infty}$, *and endowments* $\{\overline{Q}, \overline{H}, e_t^P, e_t^R, e_t^M, D_t, D_t^H\}_{t=0}^{\infty}$, *such that households optimise, the financial intermediary optimises, and all markets clear.*

3.7. Qualitative Results

Imposing equity-market clearing yields the following proposition for the price of equity. As in the three-period model, the price of equity is influenced by flows from wealthy households and borrowing by non-wealthy households:

PROPOSITION 3 (Price of Equity). *The price of equity depends on flows and borrowing:*

$$p_t = \frac{\theta_t}{1-\theta_t}\frac{F_t + B_{t-1}}{Q_t}. \tag{35}$$

PROOF. See Appendix D.4. □

We can re-write the equilibrium pricing equation by recursive substitution as

$$p_t = \frac{\theta_t}{1-\theta_t} \frac{\sum_{s=0}^{t} F_s}{Q_t}. \tag{36}$$

This is a *backward-looking* expression for equity prices, depending on the history of flows from wealthy households and the current portfolio allocations made by the intermediary. A complementary *forward-looking* pricing expression makes explicit the dependence of equity prices on dividends and discount rates:

$$p_t = \mathbb{E}_t\left[\sum_{s=1}^{\infty} \frac{D_{t+s}}{\prod_{j=s-1}^{\infty}(1+r^e_{t+j})}\right], \tag{37}$$

where

$$1 + r^e_t \equiv 1 + r_t + \frac{\chi^{MF}}{\beta}\left(\frac{\theta_t - \theta^*}{\theta^*}\right)$$

is the return on equity, which incorporates a time-varying equity premium. Proofs of these results are given in Appendix D.5.

The backward-looking expression highlights how past flows continue to affect present equity prices. Consider a flow occurring at time 0. At time t, the price impact of that flow is $\frac{\theta_t}{1-\theta_t}\frac{1}{Q_t}$. At time $t+1$, the price impact is $\frac{\theta_{t+1}}{1-\theta_{t+1}}\frac{1}{Q_{t+1}}$. In equilibrium, with $Q_t = Q_{t+1}$, the relative impact depends on $\theta_{t+1} - \theta_t$, itself determined by changes in the equity premium. If the premium at $t+1$ exceeds that at t, the impact of past flows strengthens. This implies that a positive income shock to wealthy households that generates a flow at $t = 0$ can become more salient when later positive dividend shocks occur, as they both generate new flows and amplify the effect of past ones.[15]

The elasticity of demand for equities is no longer time-invariant: intermediary equity demand responds endogenously to the evolving equity premium. In Appendix C.1 we derive the expression for time-varying Hicksian elasticity. In Supplemental Appendix 3.5 we show that the model also generates a negative relationship between changes in the top-10% wealth share and changes in market elasticity over time.

[15] It is straightforward to extend the model to include a 'half-life' for flows, but we omit this to preserve tractability.

4. Quantitative Analysis

4.1. Calibration

Having set up the model and characterised the equilibrium, we are now in a position to specify functional forms and calibrate parameter values according to data.

4.1.1. Functional Forms

First, we follow Straub (2019) in specifying the functional form for utility.

ASSUMPTION 1 (Functional form for utility). *We assume the following functional forms for utility over consumption and bequests:*

$$u[c] = \frac{c^{1-\sigma} - 1}{1 - \sigma}, \tag{38}$$

$$\nu[a] = \frac{a^{1-\Sigma} - 1}{1 - \Sigma}. \tag{39}$$

We impose $\Sigma < \sigma$, which implies non-homothetic preferences.

We assume that middle-class households have a lower income-elasticity parameter, $\sigma^M < \sigma$, and a lower marginal utility of bequests, such that $\Sigma^M < \Sigma$. Appendix E discusses how these functional forms generate non-homothetic preferences. We assume that earnings of the non-wealthy, wealthy, and middle-class households, along with equity and housing dividends, follow AR(1) processes with given persistence, steady-state values, and standard deviations. Details are provided in Appendix E.

4.1.2. Parameters

We report the calibrated values for exogenous parameters in Table 1. Our main exercise simulates how the economy evolves from 1989 to 2023, assuming that both start and end points represent steady states. Accordingly, we report two values for parameters that vary over time.

We choose the household discount rate ρ such that the steady-state interest rate r matches the yield on 10-year U.S. Treasury bonds in January 1989 and March 2023. The mortality rate δ is calibrated to match the U.S. mortality rate of 984.1 deaths per 100,000 population in 2022, sourced from the Center

TABLE 1. Calibration of quantitative model.

Parameter	Description	Value	Source
Consumption			
δ	Mortality rate	0.00984	CDC report
ρ^{1989}, ρ^{2023}	Household discount	0.0802, 0.0251	Target 10Y Treasury Yields
$\rho^{M,1989}, \rho^{M,2023}$	Middle-class discount	0.1402, 0.0752	Regularity conditions
σ	Income elasticity	4.1	Straub (2019)
σ^M	Income elasticity	1.6	Straub (2019)
Σ	Non-homotheticity	2.87	Straub (2019)
Σ^M	Non-homotheticity	1.50	Regularity conditions
Intermediary			
θ^*	Fund mandate target	0.84	Gabaix and Koijen (2021)
χ^{MF}	Fund adjustment cost	171	Empirical regressions
Equity & Housing			
$\bar{D}^{1989}, \bar{D}^{2023}$	Steady-state dividend	0.256, 0.714	Match Shiller dividend level
σ^D	Std. dev. of dividend process	0.15	Match Shiller dividend volatility
$D^{H,\bar{1}989}, D^{H,\bar{2}023}$	Steady-state housing rents	0.001, 0.002	Match price–rent ratio
σ^{D^H}	Std. dev. of rental process	0.01	Match price–rent ratio volatility
τ	Housing LTV ratio	0.25	Match price–rent ratio
Income Processes			
$\{\bar{e}^P, \bar{e}^M, \bar{e}^R\}^{1989}$	1989 labour-income shares	10.1, 46.3, 43.5	Blanchet et al. (2023)
$\{\bar{e}^P, \bar{e}^M, \bar{e}^R\}^{2023}$	2023 labour-income shares	7.9, 39.0, 53.0	Blanchet et al. (2023)
$\sigma^P, \sigma^M, \sigma^R$	Std. dev. of income processes	2.2, 7.3, 9.5	Δ Income Share (BSZ 2023)
Asset Holdings			
$\{\mho^M, \mho^P\}^{1989}$	Other assets	9, 18	Match 1989 wealth share (BSZ 2023)
$\{\mho^M, \mho^P\}^{2023}$	Other assets	8.5, 16	Match 2023 wealth share (BSZ 2023)
Govt. Borrowing			
$\bar{\alpha}^{1989}, \bar{\alpha}^{2023}$	Share of government borrowing	0.512, 0.609	Fed Flow of Funds

for Disease Control's National Vital Statistics System and reported in their FastStats publication.

We calibrate the permanent-income elasticity parameters σ and σ^M, together with the elasticity parameter on bequests Σ, following Straub (2019). Specifically, σ is chosen to match the average elasticity across all age groups, while σ^M is set to match the elasticity of the 65+ cohort. The bequest parameter Σ is calibrated such that $\Sigma = \phi\sigma$, with $\phi = 0.699$ from Straub (2019). Finally, Σ^M and ρ^M are chosen to satisfy the regularity condition for equilibrium existence discussed in Appendix F.

The fund-mandate target θ^* is set to replicate the price multiplier estimate in Gabaix and Koijen (2021), who use a granular instrumental-variables strategy to estimate a multiplier of 5.3, implying an equity share of 84%.

No calibrated value for χ^{MF} is available in the literature, so we rely on empirical estimates. From the intermediary's portfolio choice condition (Equation 25), we assume a discount factor $\beta = 0.99$ and

$\theta^* = 0.84$. We then collect quarterly data on the U.S. equity premium ($r^e_t - r_t$) and the time-varying equity share of inelastic investors' portfolios (θ_t). We regress the empirical equity share relative to the target (θ_t/θ^*) on the equity premium and a constant. The coefficient on the risk premium yields an implied χ^{MF}, which we calibrate to 171.

The dividend parameter $\bar{D}$ is calibrated to match dividend levels in 1989 and 2023 (in hundreds of dollars) from Shiller's online repository of stock market data used in Irrational Exuberance (Shiller 2023). Housing dividend parameters $\bar{D^H}$ and σ^{D^H} are calibrated to match a house price-to-rent ratio of 20, as reported by Piazzesi and Schneider (2016).

Labour-income endowments $\bar{e}^P, \bar{e}^M, \bar{e}^R$ are calibrated to match the 1989 and 2023 income shares of the bottom 50%, middle 40%, and top 10%, respectively, using Blanchet et al. (2022). Importantly, $\bar{e}^R$ and $\bar{e}^M$ are net of dividend incomes, $\bar{D}\bar{Q}$ and $\bar{D^H}\bar{H}$. The volatility parameters $\sigma^P, \sigma^M, \sigma^R$, which govern the size of one-off shocks, are calibrated to match the observed changes in income shares between 1989 and 2023: –2.2 p.p. for the bottom 50%, –7.3 p.p. for the middle 40%, and +9.5 p.p. for the top 10%.

Other asset holdings $\mathcal{O}^M$ and $\mathcal{O}^P$ represent residual holdings of the middle class and non-wealthy that ensure a positive net-asset position. While a richer model allowing all household types to optimise portfolios across three asset classes subject to positive-net-wealth constraints would endogenise these holdings, such an extension would unnecessarily complicate the analysis and preclude analytical solutions. Crucially, this assumption affects only the levels of wealth shares, not their dynamics, ensuring that the model's results are not a product of this assumption. These parameters are calibrated to match the 1989 and 2023 wealth shares of the top 10% and the middle 50–90% from Blanchet et al. (2022).

Finally, we construct the government bond series by calibrating the share α_t of government borrowing as a fraction of total household and government borrowing in the U.S. over 1989–2023, i.e. $B^G_t = \alpha_t(B^P_t + B^M_t + B^G_t)$. The steady-state values $\bar{\alpha}$ are chosen to match the observed shares in 1989 and 2023, using data from the Federal Reserve's Flow of Funds Nonfinancial Debt series.

4.2. Can the model replicate observed trends?

Can the model, when subjected to income-share and dividend shocks, replicate the simultaneous trends shown in Figure 1? We focus on the responses of equity prices (market capitalisation), borrowing (total debt outstanding), and wealth versus income inequality. The full set of impulse response functions (IRFs) for other macroeconomic variables is presented in Supplemental Appendix 4.

We show that the model is able to generate, simultaneously, higher equity prices, greater borrowing, higher wealth inequality, and a persistent divergence between wealth and income inequality.

We construct IRFs using a first-order perturbation approach. First, we identify the deterministic steady state. We then construct a local approximation by linearising the system around this point. This approach translates each endogenous variable's response into a linear function of its past values and the exogenous shocks. By introducing a one-time shock, we track how each variable evolves over time relative to the steady state. This procedure reveals the model's core transmission mechanisms and the persistence of shocks.

4.2.1. Equity Prices: Inelastic vs. Elastic Markets

How do equity price responses to shocks differ under inelastic markets relative to an elastic-pricing benchmark? To establish the benchmark, we consider a version of the model in which the financial intermediary faces no cost of deviating from its target equity share. In this case (derived in Appendix D.3.2), the pricing function collapses to the standard form in Lucas (1978), depending only on the discounted stream of future dividends. To isolate the effect of equity investment, borrowing, and dividend flows on equity prices, we consider a simplified case of our model without a middle class or housing.[16]

We compare equity prices in our baseline model with those in a Lucas-style benchmark, considering three shocks: (i) a positive income shock to wealthy households, (ii) a negative income shock to non-wealthy households, and (iii) a positive dividend shock. Figure 5 shows how price responses

[16]This ensures that the interest-rate response is free from confounding factors such as the middle class's borrowing constraint and their non-homothetic preferences. Supplemental Appendix 4.2 reports results from the full model. We find that price responses to non-wealthy and dividend shocks are qualitatively similar, but in the elastic benchmark equity prices respond much more sharply on impact to wealthy shocks. By contrast, inelastic markets generate far more persistent effects, lasting over 20 periods as opposed to 8.

differ between the two economies. Each panel plots the impulse response of equity prices in both models. Increases in the inelastic model relative to the benchmark are shaded in green; decreases are shaded in red.

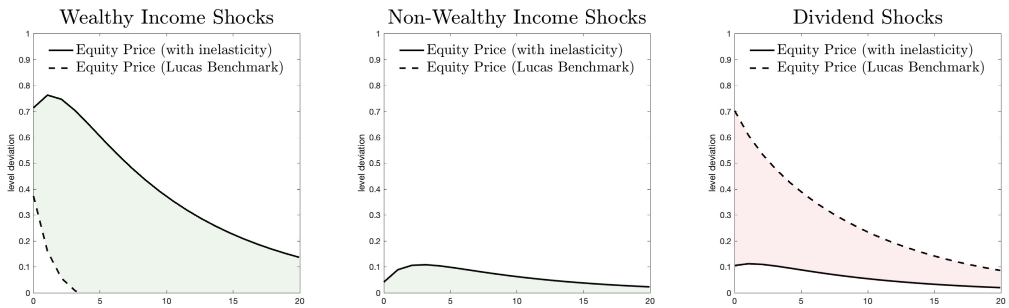


FIGURE 5. Panel A shows equity price IRF in response to a positive labour share shock to the top 10%. Panel B shows equity price IRF in response to a negative labour share shock to the bottom 50%. Panel C shows equity price IRF in response to a positive equity dividend shock.

In the elastic benchmark, equity prices do not respond to non-wealthy income shocks and deviate only slightly following wealthy income shocks (via interest-rate effects). By contrast, inelastic markets feature strong price responses to wealthy shocks (the equity-investment channel) and to non-wealthy shocks (the borrowing channel). Thus, the distribution of income shocks matters for equity prices.

While inelasticity in equity markets results in highly magnified price responses to distributional shocks in the economy, it dampens the sensitivity of equity prices to dividend changes. This suggests that excess volatility in equity prices may reflect fluctuations in income and endowments, even absent large movements in dividends.

4.2.2. Debt: Inelastic vs. Elastic Markets

We next compare borrowing responses under inelastic and elastic markets. The relevant elastic benchmark is a version of the model in which wealthy households invest directly in equities and bonds, bypassing the intermediary. In this benchmark, both assets are priced using the wealthy household's Euler equation, with an adjustment cost of holding bonds. We return to this benchmark in Section 5.

Figure 6 plots impulse responses of total debt in both models, with green shading where borrowing in the inelastic model exceeds the benchmark and red shading where it falls short.

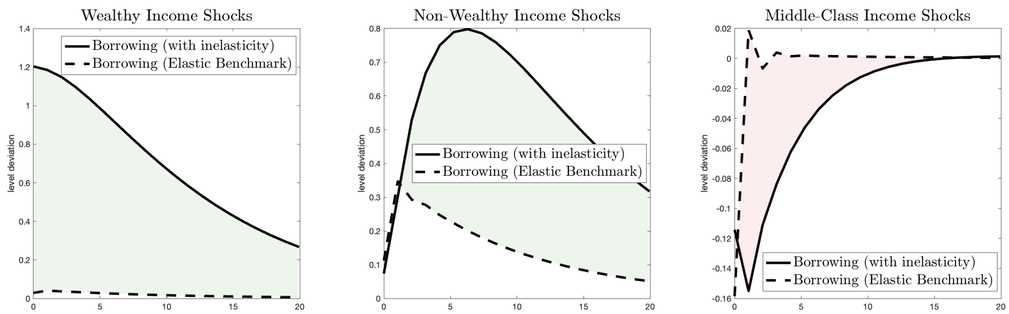


FIGURE 6. Panel A shows total bonds IRF in response to a positive labour share shock to the top 10%. Panel B shows total bonds IRF in response to a negative labour share shock to the bottom 50%. Panel C shows total bonds IRF in response to a negative middle-class household income shock.

Clearly, inelasticity implies that the effects of wealthy and non-wealthy income shocks on borrowing are significantly larger and more persistent. In an elastic markets model, a positive wealthy income shock will result in a (very small) increase in demand for bonds, with a higher proportion being invested in equity. A negative non-wealthy shock will generate more borrowing from the non-wealthy, but this mean reverts quickly as there is no intermediary having to hold increased bonds in order to maintain its mandate. In the case of a negative middle class income shock, the binding borrowing constraint of the household forces lower borrowing. In an inelastic market, however, this lower borrowing persists for longer as the financial intermediary's bond portfolio takes longer to recover its steady state value.

Therefore, inelasticity generates magnified borrowing responses at the same time as it generates magnified equity price responses.

4.2.3. The Inequality Multiplier

As argued by Benhabib et al. (2017); Gaillard et al. (2023) and others, standard models of earnings inequality cannot replicate the dynamics of top wealth inequality. In workhorse Aiyagari–Bewley models, the properties of the labour earnings distribution that are fed into the model are inherited one-to-one by the wealth distribution. Yet in the data wealth inequality has risen far more than income inequality (see Figure 1). What explains this wedge? Do inelastic markets generate a divergence between top-10% income and wealth shares? In this exercise, we consider the effect of a one-off household income shock on income and wealth inequality, measured by top 10% shares.

We find that inelastic markets amplify the effect of increases in income inequality, causing much larger increases in wealth inequality. We term this magnifying effect of inelastic markets as the *Inequality Multiplier*.

Figure 7 plots impulse responses of top-10% income and wealth shares to labour-income shocks across household types. To ensure comparability, we consider equal-sized shocks: positive for the top 10%, negative for the middle 40%, and negative for the bottom 50%. Where the wealth-share response exceeds the income-share response, we shade the difference in red; where the reverse holds, we shade it in green.

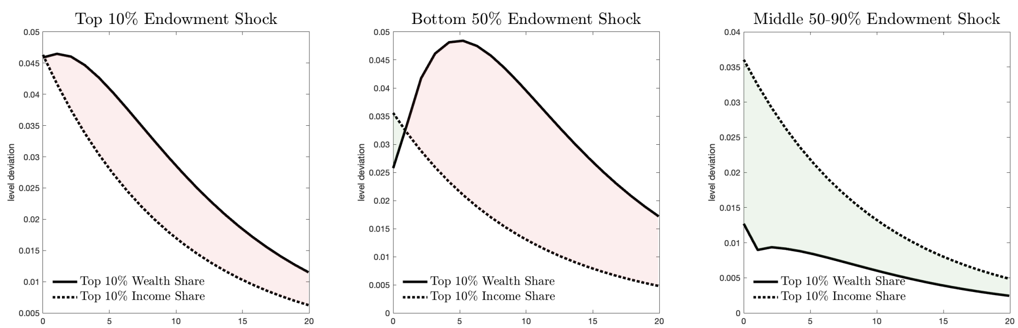


FIGURE 7. Panel A shows the income and wealth share IRFs in response to a positive labour share shock to the top 10%. Panel B shows income and wealth share IRFs in response to a negative labour share shock to the bottom 50%. Panel C shows income and wealth share IRFs in response to a negative labour share shock to the middle class, 50-90%.

When the income share of the wealthy increases, their wealth share rises more relative to steady state and remains persistently high, driven by the portfolio revaluation channel. Initially, the gap between the income share and wealth share widens during the first few periods. This is because the initial increase in wealth for the top 10% households prompts them to save a larger fraction of their wealth, consistent with non-homothetic preferences. This additional saving triggers further rounds of portfolio revaluation effects, ultimately amplifying the wealth share of the top 10%.

The effect of a drop in income share of the non-wealthy on wealth share of the wealthy is larger in magnitude and more persistent. Even though the response of wealth inequality is relatively muted on impact, the additional borrowing demanded by non-wealthy households over subsequent periods to smooth consumption in the face of an endowment shock pushes up the portfolio value of the wealthy through the borrowing channel.

In the case of a negative middle class income share shock, however, wealth inequality effects are not as pronounced, and remains lower than the income share response. This is consistent with our findings in Supplemental Appendix 4, where middle class shocks have a more muted response on equity prices due to aggregate borrowing not responding much.

We conclude that the Inequality Multiplier provides a compelling explanation for the wedge between top income and wealth shares. Changes in income shares induce larger and more persistent changes in wealthy households' portfolio values—a channel absent from canonical heterogeneous-agent models.

In sum, relative to the elastic benchmark, our model better reproduces the joint rise in market capitalisation, total debt, and the divergence between wealth and income inequality. In Supplemental Appendix 5, we extend the one-time shock analysis to a fully simulated perfect-foresight model with expectation errors (Section 5.2), showing that the model also performs well in matching long-run trends.

5. Dynamics of Wealth Inequality

One of the key contributions of Straub (2019), Benhabib et al. (2017), and Mian et al. (2025), among others, is to highlight the importance of incorporating non-homothetic, wealth-dependent preferences in order to match the dynamics of top wealth inequality. Our model extends this approach by including inelasticity in asset markets. Does introducing inelastic markets improve our ability to match the dynamics of wealth inequality? And what is the relative importance of the equity-investment and borrowing channels?

5.1. Counterfactual Simulations under Perfect Foresight

We begin with deterministic simulations under perfect foresight. We initialise the economy in January 1989 and feed in the realised income shares of the top 10%, middle 50–90%, and bottom 50%, together with realised equity dividends, housing dividends, and government borrowing. We assume that agents perfectly anticipate the entire path of labour and dividend income up to March 2023, at which point the economy reaches steady state. We then trace the evolution of wealth inequality—measured by the top-10% and middle-40% wealth shares, both untargeted moments—under our model.

With agents correctly anticipating all future shocks to their income, we numerically solve for the sequence of endogenous variables that satisfies the model's non-linear equations at every point in time, employing a Newton algorithm. By imposing terminal conditions (the steady state at March 2023), the solver enforces consistency between the start and end of the simulation horizon. As a result, we can analyze how the economy's variables evolve under fully anticipated shocks.[17]

To assess the role of inelastic asset markets in shaping wealth inequality, we conduct two counterfactual exercises. In the first, we switch off inelasticity and impose homothetic preferences. Practically, this allows wealthy households to invest directly in equities and bonds, bypassing the intermediary's constraints,[18] and we set the marginal utility of bequests equal to the marginal utility of consumption. In the second exercise, we add back non-homothetic preferences but retain elastic markets. Given the findings of Straub (2019), Mian et al. (2021), and Gaillard et al. (2023), who show the importance of non-homotheticity in matching wealth-inequality dynamics, we treat this second case as the benchmark against which to compare the inelastic-markets model.

Figure 8 plots empirical wealth shares against simulated wealth shares under three specifications: (i) elastic markets with homothetic preferences; (ii) elastic markets with non-homothetic preferences; and (iii) inelastic markets with non-homothetic preferences.

Under perfect foresight, our model replicates the paths of top-10% and middle-40% wealth shares with greater accuracy than the elastic-markets benchmark. First, as shown in the literature, when preferences are homothetic the marginal propensity to save is invariant to wealth, and wealth inequality does not evolve.

[17] The alternative approach we could have taken is to use the extended path algorithm proposed by Fair and Taylor (1983) and utilised in Afrouzi et al. (2024), among others. Here, we solve the model under rational expectations. We start with an initial guess for the path of future shocks and endogenous variables, solve forward using a perfect foresight solver, and then updates the guess based on those results. This procedure continues until the path of shocks and variables is consistent with the rational expectations equilibrium. Consequently, it can capture non-linear dynamics without relying on approximate linearization methods.

[18] We pin down portfolio shares by assuming a quadratic adjustment cost parameterised by $\chi^R = 1$ for the wealthy household's bond holdings. Thus, the only modifications are the removal of the intermediary's portfolio problem and pricing function, and the introduction of the wealthy household's Euler equation for equities and bonds.

FIGURE 8. Dynamics of Wealth Inequality: Perfect Foresight

Note: The perfect foresight simulation initalises the economy at the January 1989 level of labour income shares and dividends. Then, agents are provided with the full realisation of income shares from January 1989 to March 2023, and the model is simulated in a deterministic simulation. The figure plots percentage deviation of wealth shares relative to its 1989 level. Empirical income and wealth share data is taken from Realtime Inequality at the Household level (Blanchet, Saez and Zucman).

Second, the elastic-markets benchmark with non-homothetic preferences matches the directional change in wealth inequality noted in earlier studies but overshoots (or undershoots) 2023 levels. Its adjustment dynamics are also too abrupt, with most of the movement occurring in a large jump at $t = 1$.

On the other hand, the inelastic markets model performs much better in matching the dynamics of wealth inequality. Why does inelasticity prevent the model from experiencing a large jump at the beginning? When the wealthy foresee higher future endowments, their demand for saving increases (due to higher substitution effect), augmented further by their bequest motive. However, non-wealthy and middle class households foresee falling income, implying that rates need to adjust downwards to incentivise borrowing. This can happen freely in elastic markets, leading to the large first period jump. However, inelasticity adds market frictions which make rate adjustments more sluggish, and not all demand for additional bonds can be cleared. Therefore, the increase in portfolio values of the wealthy is more gradual. Therefore, the modelling of inelasticity in asset markets is crucial to matching wealth inequality dynamics, beyond non-homothetic preferences.

That said, the inelastic-markets model struggles to match the sharp rise (and subsequent fall) in top-10% wealth shares observed in the post-Global Financial Crisis (2008–2015) and reversal after 2016. We turn next to potential explanations for this phenomenon.

5.2. What drives the wealth inequality increase post-GFC?

Why does our model fit the data well from 1989 to 2008, but struggle thereafter? Our hypothesis is that the simulation in its current form fails to capture the sharp post-2008 increase in debt (largely government borrowing), which amplifies wealth inequality through the borrowing channel.

The perfect-foresight simulation suffers from the drawback that it eliminates incentives for middle-class and non-wealthy households to increase leverage. Because households perfectly observe their stream of falling income shares, they substitute consumption for borrowing. Therefore, while perfect foresight captures the equity investment channel, it does not account for the borrowing channel.

To address this limitation, we simulate an economy in which agents have perfect foresight over the *trend* in their income shares, but make expectation errors about *cyclical* deviations. Specifically, we continue to assume that from 1989-2008, households perfectly foresee their income share realisations. The 2008 GFC acts as an unexpected shock. Post-2008, households cannot perfectly foresee income share realisations. Instead, they expect their income shares will be equal to a smoothed trend which captures low-frequency movements.[19] Then, each period, the actual income share realises, causing households to be shocked. In other words, households receive a series of MIT shocks relative to the expected trend of income shares. Households continue to fully foresee the paths of equity and housing dividends, as well as government borrowing.

Figure 9 plots the empirical wealth shares and simulated wealth shares. The simulation without MIT shocks reproduces the dynamics obtained in Figure 8. The simulation with MIT shocks features households getting hit with MIT shocks post-2008.

The model is now able to match the large increase in wealth inequality observed post-2008. This is

[19] We fit a smooth, non-linear trend to the series using a penalized smoothing technique, with a large smoothing parameter to ensure that the trend reflects the broader, long-term evolution of the series. Technically, the procedure follows a standard approach of penalizing the second difference of the fitted trend, as in Hodrick and Prescott (1997). We implement this procedure using a higher-than-usual smoothing parameter ($\lambda = 1,000,000$) to focus on long-run behaviour rather than business-cycle variation.

FIGURE 9. Dynamics of Wealth Inequality: Perfect Foresight with Expectation Errors post-2008

Note: The perfect foresight simulation initalises the economy at the January 1989 level of labour income shares and dividends. Then, agents are provided with the full realisation of income shares from January 1989 to December 2007. From January 2008, agents expect income shares to follow a smoothed trend. Each period, they make expectation 'errors' equivalent to the deviation of the actual income share relative to the trend. The figure plots percentage deviation of wealth shares relative to its 1989 level.

because of the borrowing channel being re-activated — middle class and non-wealthy households are constantly shocked on the downside, which motivates them to increase borrowing, because they expect labour income shares to revert to a higher trend level next period. Moreover, government borrowing in this period also rises rapidly, pushing up the supply of bonds. This pushes up borrowing and equity prices, leading to larger increases in wealth inequality. The model also manages to replicate the large drop in interest rates when the crisis hits, as well as large deleveraging by bottom 50% households in the years following the crisis.

We conclude that the post-GFC surge in wealth inequality can be largely attributed to higher borrowing feeding through into higher equity prices via the borrowing channel. The assumption of what information sets are available to households is critical to determine saving and borrowing dynamics — perfect foresight leads to long-term movements, while period-by-period uncertainty (rational expectations) creates short-term fluctuations. This naturally leads us to the question — what is the relative importance of the equity investment channel versus the borrowing channel? Our hypothesis from visually observing Figure 8 is that the equity investment channel explains low-frequency, trend movements, while the borrowing channel explains high-frequency, cyclical movements.

5.3. Equity Investment vs. Borrowing Channel

In the previous exercise, we demonstrated that the borrowing channel is particularly important in explaining the large, off-trend increase in wealth inequality following the Global Financial Crisis. In our next exercise, we dive deeper into the channels which drive wealth inequality. Quantitatively, which channel is more important? Which aspect of wealth inequality dynamics does each channel capture?

To answer this question, we consider the following two counterfactual exercises, which decompose the total increase in wealth inequality into components related to the equity investment channel and the borrowing channel. To isolate the equity investment channel, we simulate a version of the model (with MIT shocks) where the income share of top 10% households and equity dividends continue to follow the empirical paths, but income shares of middle 40% and bottom 50% as well as housing dividends are set to remain constant and equal to their 1989 levels. Then, to isolate the borrowing channel, we simulate a model where incomes shares of middle 40% and bottom 50% and housing dividends follow their respective empirical paths, but top 10% income share and equity dividends remain at their 1989 levels.

Figure 10 plots the simulation with MIT shocks from Figure 9, the simulation with only top 10% income and equity dividend shocks active (only equity investment channel), and the simulation with only middle 40%, bottom 50% income and housing dividend shocks active (only borrowing channel).

A stark picture emerges from the decomposition exercise — the equity investment channel explains the *trend* component of wealth inequality, while the borrowing channel explains the *cyclical* component of wealth inequality.

The equity investment series closely matches the perfect foresight simulation from Figure 8, once again indicating that when agents have perfect foresight, they are disincentivised to borrow, so all equity price increase comes from higher savings by the rich. The equity investment channel replicates the low-frequency component of wealth inequality with remarkable precision, but misses the large off-trend increase (and subsequent decrease) post-2008. This is where the borrowing

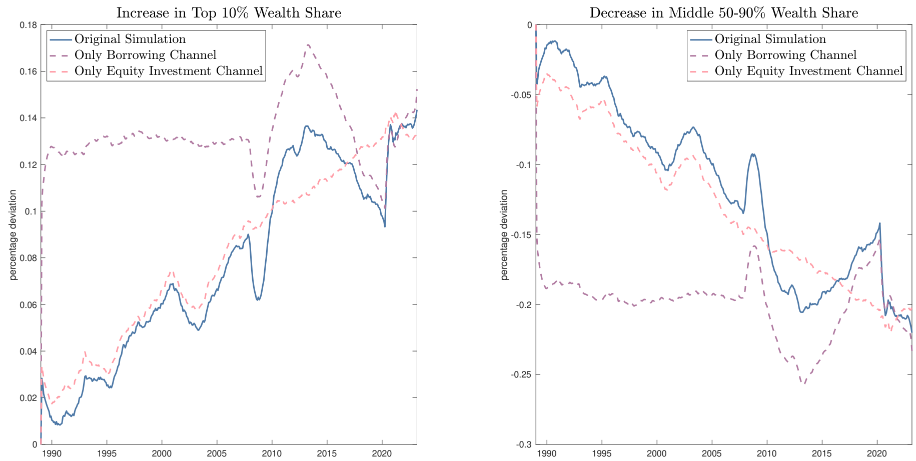


FIGURE 10. Dynamics of Wealth Inequality: Decomposition into Channels

Note: The figure plots percentage deviation of wealth shares relative to its 1989 level.

channel comes in. On its own, and absent MIT shocks, the borrowing channel would predict a constant path for wealth inequality. However, in the post-2008 era, the large build-up in government and household debt translates into a large increase in wealth inequality on the business cycle frequency. Jointly, both channels can successfully replicate the full dynamics of wealth inequality, including low-frequency and high-frequency components.

What is the implication of this result? It suggests that both debt-based explanations of wealth inequality (which posit that a build-up in household debt exacerbates inequality)[20] and investment-based explanations (which attribute inequality to higher capital accumulation by rich or higher returns on rich investments)[21] work in tandem. From a policymaker's perspective, it suggests that the policy prerogative differs based on if the objective is to tackle long-run increase in inequality, short-to medium-run implications of inequality (such as on financial stability), or both[22].

[20] Examples include Rajan (2011), Kumhof et al. (2015), Mian and Sufi (2015), Mian et al. (2025)

[21] Examples include Piketty (2014), Saez and Zucman (2016), De Nardi and Fella (2017), Kuhn et al. (2020)

[22] If the long-run increase in inequality is the concern, it is more crucial for policy to target the investment-based channel, such as through higher asset market participation or taxes on unrealised capital gains. If the short- to medium-run implications of inequality on financial stability is the concern, policy should target borrowing-based channels, such as through leverage restrictions on households, higher loan-to-value ratios, or reduced bond demand from intermediaries. If both effects are a concern, policymakers should look to regulate inelastic financial intermediaries better to alleviate the effects of higher inelasticity, through, for example, ensuring that financial regulation does not impose a high degree of portfolio rigidity.

6. Conclusion

This paper examines how changes in the macrostructure of equity markets interact with rising income inequality to produce persistent shifts in wealth distribution. We develop a quantitative general equilibrium model with heterogeneous households and constrained financial intermediaries. In this environment, even transitory income shocks induce lasting asset-price responses that disproportionately benefit wealthier households—an amplification mechanism we call the *inequality multiplier*. It operates through two channels: the *equity investment* channel, where high-income households' greater saving rates generate sustained equity inflows and price appreciation; and the *borrowing channel*, where increased debt compels intermediaries to rebalance toward equities, further raising prices. Calibrated to U.S. data from 1989–2023, the model replicates the concurrent rise in equity valuations, aggregate debt, and wealth inequality—improving on benchmarks relying only on return heterogeneity or non-homothetic preferences. The investment channel explains long-run trend inequality, while the borrowing channel drives short-run cycles, suggesting that policy must target both structural and cyclical forces. A further contribution is to endogenize capital flows via household saving and borrowing decisions, rather than imposing them exogenously. This feature implies that flow persistence is inherited from income shocks, generating durable price and distributional effects even when fundamentals revert. Overall, the model links asset market frictions to macro-distributional dynamics and highlights new avenues for financial and fiscal policy design.

Implications and Open Questions. Our findings challenge the canonical view that wealth inequality dynamics are primarily driven by stochastic income or return processes and are inherently mean-reverting. Instead, we show that frictions in financial market structure—especially reduced market elasticity arising from passive investing and intermediary mandates—play a central role in propagating and amplifying inequality over both short and long horizons. This has first-order implications for policy design. Our results suggest that increasing equity participation among lower-wealth households, regulating leverage and portfolio rigidity among intermediaries, or directly targeting asset revaluation through taxation may be effective tools to mitigate inequality. Moreover, the framework highlights a novel trade-off in financial innovation: while passive investing improves access and lowers costs, it also reduces price responsiveness, thereby exacerbating wealth concentration. Ongoing work will extend the model to incorporate heterogeneous arbitrage capacity, cross-country market structures, and optimal fiscal instruments—including dynamic redistribution via transfers, taxes, and public debt issuance.

References

Afrouzi, Hassan, Andres Blanco, Andres Drenik, and Erik Hurst. 2024. "A Theory of How Workers Keep Up with Inflation.", National Bureau of Economic Research.

Atkeson, Andrew G., and Magnus Irie. 2020. "Understanding 100 Years of the Evolution of Top Wealth Shares in the U.S.: What is the Role of Family Firms?" NBER Working Paper 27465, National Bureau of Economic Research. Cambridge, MA. https://www.nber.org/papers/w27465.

Atkeson, Andrew G., and Magnus Irie. 2022. "Rapid Dynamics of Top Wealth Shares and Self-Made Fortunes: What Is the Role of Family Firms?" *American Economic Review: Insights* 4 (4): 409–424. https://www.aeaweb.org/articles?id=10.1257/aeri.20210560.

Benhabib, Jess, and Alberto Bisin. 2018. "Skewed Wealth Distributions: Theory and Empirics." *Journal of Economic Literature* 56 (4): 1261–1291. https://ideas.repec.org/a/aea/jeclit/v56y2018i4p1261-91.html.

Benhabib, Jess, Alberto Bisin, and Mi Luo. 2017. "Earnings inequality and other determinants of wealth inequality." *American Economic Review* 107 (5): 593–597.

Benhabib, Jess, Alberto Bisin, and Shenghao Zhu. 2011. "The Distribution of Wealth and Fiscal Policy in Economies With Finitely Lived Agents." *Econometrica* 79 (1). https://doi.org/10.3982/ECTA8416.

Blanchard, Olivier J. 1985. "Debt, deficits, and finite horizons." *Journal of Political Economy* 93 (2): 223–247.

Blanchet, Thomas, Emmanuel Saez, and Gabriel Zucman. 2022. "Real-time inequality.", National Bureau of Economic Research.

Calvo, Guillermo A. 1983. "Staggered Prices in a Utility-Maximizing Framework." *Journal of Monetary Economics* 12 (3): 383–398.

Campbell, John. 2006. "Household Finance.". https://EconPapers.repec.org/RePEc:hrv:faseco:3157877.

Carroll, Christopher D. 1998. "Why Do the Rich Save So Much?" NBER Working Paper 6549, National Bureau of Economic Research. Cambridge, MA. https://www.nber.org/papers/w6549.

Carroll, Christopher D. 2000. "Portfolios of the Rich." NBER Working Paper 7826, National Bureau of Economic Research. Cambridge, MA. https://www.nber.org/papers/w7826.

Chinco, Alex, and Marco Sammon. 2024. "The passive ownership share is double what you think it is." *Journal of Financial Economics* 157 (C). https://ideas.repec.org/a/eee/jfinec/v157y2024ics0304405x24000837.html.

Cioffi, Riccardo A. 2021. "Heterogeneous Risk Exposure and the Dynamics of Wealth Inequality." *Working paper*.

De Nardi, Mariacristina. 2004. "Wealth Inequality and Intergenerational Links." *The Review of Economic Studies* 71 (3): 743–768. https://EconPapers.repec.org/RePEc:oup:restud:v:71:y:2004:i:3:p:743-768.

De Nardi, Mariacristina, and Giulio Fella. 2017. "Saving and Wealth Inequality." *Review of Economic Dynamics* 26: 280–300. https://ideas.repec.org/a/red/issued/16-340.html.

Dynan, Karen E., Jonathan Skinner, and Stephen Zeldes. 2004. "Do the Rich Save More?" *Journal of Political Economy* 112 (2): 397–444.

Fair, Ray, and John Taylor. 1983. "Solution and Maximum Likelihood Estimation of Dynamic Nonlinear Rational Expectations Models." *Econometrica* 51 (4): 1169–85. https://EconPapers.repec.org/RePEc:ecm:emetrp:v:51:y:1983:i:4:p:1169-85.

Farhi, Emmanuel, and Iván Werning. 2019. "Monetary Policy, Bounded Rationality, and Incomplete Markets." *American Economic Review* 109 (11): 3887–3928.

Fuchs, William, Satoshi Fukuda, and Daniel Neuhann. 2023. "Demand-system asset pricing: Theoretical foundations." *Available at SSRN 4672473*.

Gabaix, Xavier, and Ralph S. J. Koijen. 2021. "In Search of the Origins of Financial Fluctuations: The Inelastic Markets Hypothesis." *Working paper*. https://doi.org/10.3386/w28967.

Gabaix, Xavier, Jean-Michel Lasry, Pierre-Louis Lions, and Benjamin Moll. 2016. "The Dynamics of Inequality." *Econometrica* 84 (6). https://doi.org/10.3982/ECTA13569.

Gaillard, Alexandre, Christian Hellwig, Philipp Wangner, and Nicolas Werquin. 2023. "Consumption, wealth, and income inequality: A tale of tails."

Göcmen, Ararat, Clara Martínez-Toledano, and Vrinda Mittal. 2025. "Private Capital Markets and Inequality.". https://ssrn.com/abstract=5166981. Working paper; available at SSRN.

Gomez, Matthieu. 2024. "Wealth Inequality and Asset Prices.", Columbia University working paper.

Greenwald, Daniel L, Matteo Leombroni, Hanno Lustig, and Stijn Van Nieuwerburgh. 2021. "Financial and total wealth inequality with declining interest rates.", National Bureau of Economic Research.

Haddad, Valentin, Paul Huebner, and Erik Loualiche. 2024. "How Competitive is the Stock Market? Theory, Evidence from Portfolios, and Implications for the Rise of Passive Investing." *Working paper*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3821263.

Haddad, Valentin, and Tyler Muir. 2025. "Market Macrostructure: Institutions and Asset Prices.", National Bureau of Economic Research.

Hubmer, Joachim, Per Krusell, and Anthony A Smith Jr. 2021. "Sources of US wealth inequality: Past, present, and future." *NBER Macroeconomics Annual* 35 (1): 391–455.

Justiniano, Alejandro, Giorgio E Primiceri, and Andrea Tambalotti. 2019. "Credit supply and the housing boom." *Journal of political economy* 127 (3): 1317–1350.

Koijen, Ralph SJ, and Motohiro Yogo. 2025. "On the Theory and Econometrics of (Demand System) Asset Pricing." *Available at SSRN 5274709*.

Kuhn, Moritz, Moritz Schularick, and Ulrike I. Steins. 2020. "Income and Wealth Inequality in America, 1949–2016." *Journal of Political Economy* 128: 3469—-3519. https://doi.org/10.1086/708815.

Kumhof, Michael, Romain Rancière, and Pablo Winant. 2015. "Inequality, leverage, and crises." *American economic review* 105 (3): 1217–1245.

Lucas, Robert. 1978. "Asset Prices in an Exchange Economy." *Econometrica* 46 (6): 1429–45. https://EconPapers.repec.org/RePEc:ecm:emetrp:v:46:y:1978:i:6:p:1429-45.

Mian, Atif R, Ludwig Straub, and Amir Sufi. 2025. "The Saving Glut of the Rich." Working Paper 26941, National Bureau of Economic Research. http://www.nber.org/papers/w26941.

Mian, Atif, Ludwig Straub, and Amir Sufi. 2021. "Indebted demand." *The Quarterly Journal of Economics* 136 (4): 2243–2307.

Mian, Atif, and Amir Sufi. 2015. *House of debt: How they (and you) caused the Great Recession, and how we can prevent it from happening again.*: University of Chicago Press.

Piazzesi, Monika, and Martin Schneider. 2016. "Housing and macroeconomics." *Handbook of macroeconomics* 2: 1547–1640.

Piketty, Thomas. 2014. *Capital in the twenty-first century.*: Harvard University Press.

Rajan, Raghuram G. 2011. "Fault lines: How hidden fractures still threaten the world economy." *Princeton University press.*

Rotemberg, Julio J. 1982. "Sticky Prices in the United States." *Journal of Political Economy* 90 (6): 1187–1211.

Saez, Emmanuel, and Gabriel Zucman. 2016. "Wealth Inequality in the United States since 1913: Evidence from Capitalized Income Tax Data." *The Quarterly Journal of Economics* 131 (2): 519–578. https://doi.org/10.1093/qje/qjw004.

Shiller, Robert J. 2023. "Online Data: Stock Market Data Used in Irrational Exuberance." http://www.econ.yale.edu/~shiller/data.htm. Accessed: 2025-08-26.

Straub, Luwdig. 2019. "Consumption, Savings, and the Distribution of Permanent Income." *Working paper*. https://scholar.harvard.edu/files/straub/files/cons_ineq_rates.pdf.

Toda, Alexis Akira, and Kieran James Walsh. 2020. "The equity premium and the one percent." *The Review of Financial Studies* 33 (8): 3583–3623.

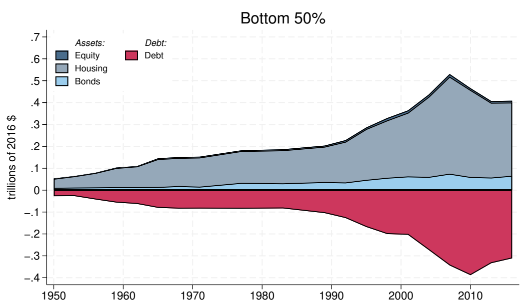
Vissing-Jørgensen, Annette. 2002. "Limited asset market participation and the elasticity of intertemporal substitution." *Journal of political Economy* 110 (4): 825–853.

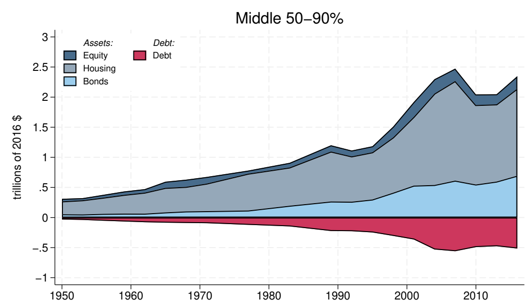
Yaari, Menahem E. 1965. "Uncertain lifetime, life insurance, and the theory of the consumer." *The Review of Economic Studies* 32 (2): 137–150.

Appendix

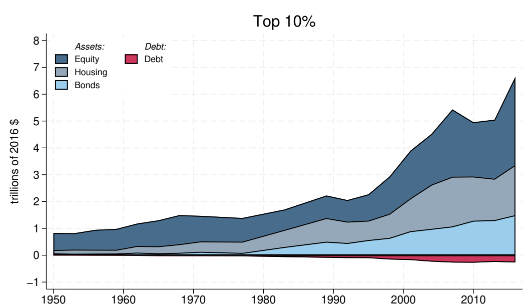
Appendix A. Portfolio Heterogeneity

Ex-ante, why should equity market inelasticity matter for wealth inequality? The link is portfolio heterogeneity. The composition of household portfolios (including the amount of borrowing) differs systematically along the wealth distribution, with wealthy (top 10%) household portfolios dominated by equity (Figure A1C), and non-wealthy (bottom 50%) household portfolios by borrowing (Figure A1A). Due to this portfolio heterogeneity, equity price increases (induced by higher inelasticity) cause large increases in the share of wealth held by wealthy households.





A. Aggregate Bottom 50% Portfolio Positions **B.** Aggregate Middle 50-90% Portfolio Positions



C. Aggregate Top 10% Portfolio Positions

FIGURE A1. Panel A shows bottom 50% households' aggregate portfolio holdings, with large increases in indebtedness. Panel B shows aggregate portfolio holdings of the middle 50-90% — housing is *the* asset of the middle class. Panel C shows aggregate portfolio holdings of the top 10%, dominated by equity holdings.

Source: Authors' calculation using Kuhn, Schularick and Steins, JPE 2020 and FRED. All portfolio components and wealth levels are shown in trillions of dollars (2016 dollars).

Appendix B. Model with Arbitrageur

In the baseline model, we have assumed that there is no unrestricted arbitrageur in the model to drive prices back towards fundamental prices. In this section, we relax this assumption to note how the presence of an arbitrageur modifies results. As we shall see, the unrestricted arbitrageur attenuates but does not remove the inelasticity channel unless its risk capacity is implausibly large.

At time period t, the financial intermediary is restricted in its portfolio choice. Assume that there exists an arbitrageur at t with wealth W_t^A who can invest in equities and bonds. It chooses the number of equity shares to invest, q_t^A (and corresponding bond holdings $W_t^A - q_t A$) to maximise CARA utility on next-period wealth:

$$\max_{q_t^A} \Big[- \exp(-\gamma W_{t+1}^A) \Big],$$

where γ is the arbitrageur's risk preference parameter, and next-period wealth is:

$$W_{t+1}^A = q_t^A (D_{t+1} + p_{t+1}) + (W_t^A - q_t^A)(1 + r_t) - [q_t^A p_t + (W_t^A - q_t^A)](1 + r_t),$$

where the last bracket represents the cost of financing the position at the risk-free rate. Re-arranging, this gives us next period wealth:

$$W_{t+1}^A = q_t^A (D_{t+1} + p_{t+1} - (1 + r_t) p_t).$$

Write the equity premium as:

$$\pi_{t+1} \equiv r_t^e - r_t = \frac{D_{t+1} + p_{t+1}}{p_t} - (1 + r_t).$$

Note that the equity premium is a function of the model's state variables, defined by the vector $S_t = (D_t, e_t^R, e_t^P)$, which are all normally distributed. Therefore, equity premium is conditionally normal,

$$(\pi_{t+1} | \mathcal{F}_t) \sim \mathcal{N}(\mu_t(S_t), \sigma_t^2(S_t)),$$

where $\mathcal{F}_t$ is the σ-algebra generated the history of state vectors, and where we make the dependence of the conditional mean and variance of the equity premium on the state vector explicit.

Given CARA utility and normality of returns, the arbitrageur's maximisation function can be re-written as:

$$\max_{q_t^A} q_t^A p_t \mu_t - \frac{1}{2}\gamma (q_t^A)^2 p_t^2 \sigma_t^2,$$

resulting in the familiar first-order condition:

$$q_t^A = \frac{\mu_t}{\gamma p_t \sigma_t^2}.$$

In general, the expected equity premium $\mu_t = \mathbb{E}(\pi_{t+1})$ is non-zero because prices deviate from their Lucas benchmark levels (see D.3). Call the Lucas price as fundamental price, denoted by $p_t^f \equiv \mathbb{E}\left[\frac{D_{t+1}+p_{t+1}^f}{1+r_t}\right]$. Then, expected equity premium is:

$$\mu_t = (1+r_t)\left(\frac{p_t^f - p_t}{p_t}\right) + \underbrace{\mathbb{E}\left[\frac{p_{t+1} - p_{t+1}^f}{p_t}\right]}_{\lambda_t(\text{Expected Future Mis-pricing})},$$

and the arbitrageur's demand is:

$$q_t^A = \frac{(1+r_t)(p_t^f - p_t) + \lambda_t p_t}{\gamma p_t^2 \sigma_t^2}.$$

Meanwhile, the constrained financial intermediary's demand is (as before):

$$q_t^{MF} = \frac{\theta_t W_t}{p_t}.$$

Imposing market clearing:

$$Q = q_t^{MF} + q_t^A = \frac{\theta_t W_t}{p_t} + q_t^A \implies p_t = \frac{\theta_t W_t}{Q - q_t^A}.$$

Without first explicitly solving for p_t after plugging in for q_t^A, we can immediately see that price in this model is:

$$p_t = \underbrace{\frac{\theta_t}{1-\theta_t}\frac{B_{t-1}+F_t}{Q_t}}_{\text{Price with no arbitrageur}} \frac{1}{1-\kappa_t},$$

where we have used that $W_t = \frac{B_t}{1-\theta_t}$ and $F_t = B_t - B_{t-1}$, and define κ_t to be the *arbitrage capacity share* of the arbitrageur:

$$\kappa_t \equiv \frac{q_t^A}{Q_t} = \frac{(1+r_t)(p_t^f - p_t) + \lambda_t p_t}{\gamma Q p_t^2 \sigma_t^2}.$$

Contrast this to the pricing function in the original model (Equation 35). Intuitively, the sign of κ_t is the opposite of current mis-pricing (assuming for simplicity that $\lambda_t \approx 0$). When positive flows push prices beyond fundamentals, arbitrageurs should sell, yielding $\kappa_t < 0$, which dampens the effect of flows on price (and vice-versa). The degree of the arbitrageur's stabilization capability depends upon the size of κ_t. As $|\kappa_t| \uparrow$, any price deviations are aggresively corrected. As $\kappa \to 0$, we recover the restricted intermediary model. In general, therefore, as long as κ is relatively small (for example, Gabaix and Koijen (2021) suggest that natural arbitrageurs such as hedge funds hold c.5% of the equity market, implying $\kappa \approx 0.05$), the effect of flows should be attenuated but not fully removed. Moreover, κ_t is inversely proportional to γ; as the arbitrageur's risk aversion increases, their arbitrage capacity falls. Only if the arbitrageur's risk-bearing capacity is implausibly large (very small γ) does κ become large enough to remove the effect of flows on prices — this does not seem to be empirically valid.

Let us also derive a closed-form solution for price which makes the link between κ_t and the arbitrageur's risk-bearing capacity clear. Rewriting the market clearing condition:

$$Q = \frac{\theta_t W_t}{p_t} + \frac{(1+r_t)(p_t^f - p_t) + \lambda_t p_t}{\gamma p_t^2 \sigma_t^2}.$$

Cross-multiplying, applying the quadratic formula and considering the positive root gives us the following pricing function:

$$p_t = \frac{\gamma \sigma_t^2 \theta_t W_t - \left(1 + r_t - \lambda_t\right) + \sqrt{\left[\gamma \sigma_t^2 \theta_t W_t - (1 + r_t - \lambda_t)\right]^2 + 4\gamma \sigma_t^2 Q (1 + r_t)\, p_t^f}}{2\gamma \sigma_t^2 Q}.$$

When there is no arbitrageur, $\gamma \to \infty$, and $p_t = \frac{\theta_t W_t}{Q}$, exactly as in the original model. When there is unlimited arbitrage, $\gamma \to 0$, and $p_t = \frac{(1+r_t)p_t^f}{1+r_t-\lambda_t}$, which, for $\lambda_t \approx 0$, gives $p_t = p_t^f$; arbitrageurs drive prices to fundamentals. However, it requires implausibly high risk-bearing capacity in arbitrageurs to fully attenuate the affects of flows on price. With realistic calibrations of arbitrageur's capacity ($\kappa = 5\%$), the model and our qualitative findings continue to hold, while our quantitative findings are dampened very slightly.

Appendix C. Additional Qualitative Results

C.1. Elasticity in Infinite-Period Model

In the quantitative model, elasticity of demand for the stock is time-varying. We can derive the aggregate (signed) time-varying Hicksian elasticity of demand for stock as follows:

$$\xi_t = (1-\theta^*) - \frac{\beta}{\chi^{MF}}\left[\theta^* \underbrace{(r^e_{t-1} - r_{t-1})}_{\text{Equity Premium}} - \left\{\frac{D}{p} - 1\right\}\right]. \tag{A1}$$

where $\frac{D}{p}$ is the average dividend-price ratio.

PROOF. Start with an inverted version of financial intermediary's portfolio choice, Equation 25:

$$\frac{\theta_t - \theta^*}{\theta^*} = \frac{\beta}{\chi^{MF}}\left(\frac{D_{t+1} + p_{t+1} - p_t}{p_t} - r_t\right) = \Delta \ln \theta_t$$

This is equivalent to the first-order Taylor expansion of θ_t around θ^*. Consider the term on the right-hand side within brackets, i.e. the equity premium π_t, which can be rewritten as:

$$\pi_t = \frac{D_{t+1}}{p_t} + \Delta \ln p_t - r_t$$

Consider the percentage change in the dividend-price ratio, i.e. $\Delta \ln \frac{D_{t+1}}{p_t}$. Express the percentage log deviation of dividends as $\tilde{d}$ and the percentage log deviation of prices as $\tilde{p}$. Then, $\Delta \ln \frac{D_{t+1}}{p_t} = \tilde{d} - \tilde{p}$. Next, consider a first-order Taylor approximation of $\Delta \ln \frac{D_{t+1}}{p_t}$ around some baseline dividend-price ratio $\frac{D}{p}$:

$$\Delta \ln \frac{D_{t+1}}{p_t} = \frac{\frac{D_{t+1}}{p_t} - \frac{D}{p}}{\frac{D}{p}}$$
$$\tilde{d} - \tilde{p} = \frac{\frac{D_{t+1}}{p_t}}{\frac{D}{p}} - 1$$
$$\frac{D_{t+1}}{p_t} = (\tilde{d} - \tilde{p} + 1)\frac{D}{p}$$

Substituting into π_t:

$$\pi_t = (1 + \tilde{d})\frac{D}{p} + \tilde{p}(1 - \frac{D}{p}) - r_t$$

Go back to the mandate equation and invert to find quantity demanded:

$$Q_t = \frac{\theta_t W_t}{p_t}$$

Taking logs and first differencing:

$$\Delta \ln Q_t = \Delta \ln \theta_t + \Delta \ln W_t - \Delta \ln p_t$$
$$q_t = \Delta \ln \theta_t + \left(\frac{p_{t-1} Q_{t-1}}{W_{t-1}} \frac{\Delta p_t}{p_{t-1}} + \underbrace{\frac{F_t}{W_{t-1}}}_{f_t} \right) - \tilde{p}$$
$$q_t = \Delta \ln \theta_t + \theta_{t-1}\tilde{p} + f_t - \tilde{p}$$

Substituting from π_t and $\Delta \ln \theta_t$:

$$q_t = \frac{\beta}{\chi^{MF}} \left((1 + \tilde{d})\frac{D}{p} + \tilde{p}(1 - \frac{D}{p}) - r_t \right) + \tilde{p}(\theta_{t-1} - 1) + f_t$$

Finally, to find the elasticity, take the derivative of q_t with respect to $\tilde{p}$:

$$\xi_t \equiv \frac{\partial q_t}{\partial \tilde{p}} = \frac{\beta}{\chi^{MF}}(1 - \frac{D}{p}) + (\theta_{t-1} - 1)$$

Substituting in the value of θ_{t-1} yields the desired proposition for unsigned elasticity:

$$\xi_t = (\theta^* - 1) + \frac{\beta}{\chi^{MF}}\left[\theta^*(r^e_{t-1} - r_{t-1}) - \left\{\frac{D}{p} - 1\right\}\right].$$

□

As the equity premium increases, the intermediary demands more equity, driving unsigned elasticity up in the subsequent period. Similarly, as the cost of adjustment χ^{MF} increases, the unsigned elasticity decreases with the intermediary finding it more costly to deviate from target. The limiting case of $\chi^{MF} \to \infty$ (or $\beta \to 0$) gets us back to the tight mandate condition and corresponding elasticity of the three-period model.

C.2. Exogenous Increase in Equity Supply

In our baseline model, we have assumed that the supply of equities remains constant at $\bar{Q}$ in both time periods $t = -1$ and $t = 0$. What happens when we relax this assumption, and allow the supply of stock at $t = 0$ to exogenously differ from $t = -1$? Formally, assume that supply of stock changes exogenously by δ_q%. What happens to price of the stock, and how does price depend upon the change in supply? This is formalised in the following proposition:

PROPOSITION A1. *The price of the stock at time $t = 0$, when quantity supplied is $Q_0 = Q_{-1}(1 + \delta_q)$, is given by:*

$$p_0 = \left(\frac{1-\theta}{1-\theta+\delta_q}\right)\left[p_{-1} + \frac{\theta}{1-\theta}\frac{F_0}{Q_{-1}}\right], \tag{A2}$$

PROOF. The market clearing condition for equities at $t = 0$ (in deviations) is:

$$\frac{Q_0 - Q_{-1}}{Q_{-1}} = \delta_q$$

Substituting from 6, $Q_0 = \frac{\theta}{p_0}(p_0 Q_{-1} + B_{-1} + F_0)$.

$$\frac{\theta}{p_0 Q_{-1}}(p_0 Q_{-1} + B_{-1} + F_0) = 1 + \delta_q$$

$$\theta + \frac{\theta B_{-1}}{p_0 Q_{-1}} + \frac{\theta F_0}{p_0 Q_{-1}} = 1 + \delta_q$$

Using $B_{-1} = (1-\theta)W_{-1}$ and $Q_{-1} = \frac{\theta W_{-1}}{p_{-1}}$,

$$\theta + \frac{(1-\theta)p_{-1}}{p_0} + \frac{\theta F_0}{p_0 Q_{-1}} = 1 + \delta_q$$
$$\theta p_0 + (1-\theta)p_{-1} + \frac{\theta F_0}{Q_{-1}} = p_0(1+\delta_q)$$
$$(1-\theta)p_{-1} + \frac{\theta F_0}{Q_{-1}} = p_0(1-\theta+\delta_q)$$
$$\frac{1-\theta}{1-\theta+\delta_q}p_{-1} + \frac{\theta}{1-\theta+\delta_q}\frac{F_0}{Q_{-1}} = p_0$$

□

Clearly, $\frac{\partial p_0}{\partial \delta_q} < 0$; when exogenous supply of stock increases, equity prices are lower and vice versa. Simultaneously, the price multiplier $\frac{\theta}{1-\theta+\delta_q}$ is dampened (for $\delta_q > 0$) relative to the constant supply case. However, short of setting $\theta = 0$, equity prices continue to remain sensitive to flows. Moreover, we can derive the condition on share issuance which ensures that the effect of flows is not fully negated, and do a brief back-of-the-envelope calculation to verify that this condition holds. Together, this suggests that the assumption of constant supply of stock is without loss of generality and does not drive our qualitative results.

Under exogenous share issuance, the percentage change in prices is:

$$\frac{p_0 - p_{-1}}{p_{-1}} = \frac{\frac{\theta F_0}{p_{-1}Q_{-1}} - \delta_q}{1-\theta+\delta_q}$$

Therefore the condition for $\Delta p > 0$ is:

$$\frac{p_0 - p_{-1}}{p_{-1}} > 0 \iff \delta_q < \frac{\theta F_0}{p_{-1}Q_{-1}}$$

From 4, we know that $p_{-1}Q_{-1} = \theta W_{-1}$. Hence, writing flows as a proportion of total AuM of the financial intermediary as f, the condition is:

$$\delta_q < f$$

The condition states that as long as the percentage increase in equity issuance is less than flows as as percentage of wealth, equity prices rise in response to positive flows. Using flow of funds data, we find that $f \approx 2\%$ per quarter. Using data on U.S. Equity issuances from SIFMA, we find that $\delta_q \approx 0.2\%$ per quarter. We conclude, therefore, that share issuances are not high enough to negate the effect of positive flows on equity prices.

Note that Proposition 2 no longer holds with equality. Intuitively, when the supply of stock increases, a part of every additional dollar of flows into the financial intermediary must now go towards financing the purchase of new stocks, and the rest towards the purchase of new bonds. As bonds do not need to accommodate all flows any longer, the tight link between B_0^P and F_0 is broken. Some of the financial intermediary's excess demand for equities can be fulfilled through an adjustment in quantities, hence the impact on prices is lower. The following corollary re-derives the link between equity prices and borrowing:

COROLLARY A1. *The relationship between the price of equity and the amount of debt when quantity supplied of equities changes by* δ_q *is:*

$$p_0 = \left(\frac{1}{1+\delta_q}\right)\left[p_{-1} + \frac{\theta}{1-\theta}\frac{B_0^P}{Q_{-1}}\right]. \tag{A3}$$

PROOF. Substitute

$$F_0 = p_0(Q_0 - Q_{-1}) + (B_0 - B_{-1})$$

into Equation A2 and solve for p_0. □

Hence, as δ_q rises, the equity price impact of higher household indebtedness is lower.

Appendix D. Omitted Proofs

D.1. Equilibrium Definition

Formal equilibrium in the three-period model is defined as:

DEFINITION A1. *An equilibrium are choices* $\{c_0^R, c_1^R, F_0, c_0^P, c_1^P, B_0^P, \theta\}$, *quantities* $\{Q_0, B_0\}$, *prices* $\{p_{-1}, p_0, r_{f,-1}, r_{f,0}\}$, *and endowments* $\{Q_{-1}, B_{-1}, W_{-1}, e_0^R, e_1^R, e_0^P, e_1^P, D_1\}$, *such that households are optimising, the financial intermediary is optimising, and all markets clear:*

- Equity market clears at an inelastically supplied amount of stocks:

$$Q_{-1} = Q_0 = \bar{Q}. \tag{A4}$$

- Bond market clears:

$$B_0 = B_0^P + B_{-1}. \tag{A5}$$

- Consumption market clears at $t = 0$ and $t = 1$:

$$c_0^R + c_0^P = e_0^R + e_0^P, \tag{A6}$$

$$c_1^R + c_1^P = e_1^R + e_1^P + D_1 Q_0. \tag{A7}$$

D.2. Proposition 1

PROOF. The market clearing condition for equities at $t = 0$ (in deviations) is:

$$\frac{Q_0 - Q_{-1}}{Q_{-1}} = 0$$

Substituting from 6, $Q_0 = \frac{\theta}{p_0}(p_0 Q_{-1} + B_{-1} + F_0)$.

$$\frac{\theta}{p_0 Q_{-1}}(p_0 Q_{-1} + B_{-1} + F_0) = 1$$

$$\theta + \frac{\theta B_{-1}}{p_0 Q_{-1}} + \frac{\theta F_0}{p_0 Q_{-1}} = 1$$

Using $B_{-1} = (1-\theta)W_{-1}$ and $Q_{-1} = \frac{\theta W_{-1}}{p_{-1}}$,

$$\begin{aligned}
\theta + \frac{(1-\theta)p_{-1}}{p_0} + \frac{\theta F_0}{p_0 Q_{-1}} &= 1 \\
\theta p_0 + (1-\theta)p_{-1} + \frac{\theta F_0}{Q_{-1}} &= p_0 \\
(1-\theta)p_{-1} + \frac{\theta F_0}{Q_{-1}} &= p_0(1-\theta) \\
p_{-1} + \frac{\theta}{1-\theta}\frac{F_0}{Q_{-1}} &= p_0
\end{aligned}$$

Imposing market clearing $Q_{-1} = Q_0$ yields the desired result. □

D.3. Derivation of the Lucas Model

D.3.1. Three-Period Lucas Model

At time $t = 0$, let the financial intermediary chooses its fraction of portfolio to be held in stock θ in order to maximise returns on final period wealth. The financial intermediary solves:

$$\max_{\theta} \frac{1}{(1+r_{f,0})}\left[\theta\frac{D_1}{p_0} + (1-\theta)(1+r_{f,0})\right] \tag{A8}$$

Taking the first-order condition and imposing market clearing (no trade), the fundamental price of the stock is:

$$p_0 = \frac{D_1}{(1+r_{f,0})} \tag{A9}$$

Hence, the Lucas model is nested in our model as a special case, where the financial intermediary is allowed to readjust its portfolio holdings at $t = 0$.

D.3.2. Elastic Benchmark in the Quantitative Model

The appropriate elastic markets benchmark of our inelastic quantitiative model is a version of our model in which the financial intermediary is not subject to costs of deviating from its target equity share. The intermediary now solves:

$$\max_{\theta_t} \beta \mathbb{E}_0 \left[\theta_t \left\{ \frac{D_{t+1} + p_{t+1}}{p_t} \right\} + (1 - \theta_t)(1 + r_t) \right]$$

The first-order condition with respect to θ yields the following price function:

$$p_t = \mathbb{E}\left[\frac{D_{t+1} + p_{t+1}}{1 + r_t} \right]$$

This is the well-established Lucas (1978) result, where price of an asset depends upon its future discounted stream of dividends. Note that this is the only change compared to the baseline model.

D.4. Proposition 3

PROOF. The mandate condition states that:

$$p_t = \frac{\theta_t W_t}{Q_t}$$

Utilising the mandate condition on bonds, i.e. $(1 - \theta_t)W_t = B_t$, we get:

$$p_t = \frac{\theta_t}{1 - \theta_t} \frac{B_t}{Q_t}$$

Finally, flows are given by Equation 24. Imposing market clearing in equities, $Q_t = \overline{Q}$, yields:

$$F_t = B_t - B_{t-1}$$

Substituting for B_t, we get the desired result:

$$p_t = \frac{\theta_t}{1 - \theta_t} \frac{F_t + B_{t-1}}{Q_t}$$

□

D.5. Backward and Forward-Looking Pricing Function

In the following, we show how to derive the backward-looking version of the pricing function:

PROOF. Start with the expression for equity prices:

$$p_t = \frac{\theta_t}{1-\theta_t}\frac{F_t + B_{t-1}}{Q_t}$$

Flows are given by Equation 24. Imposing market clearing in equities, $Q_t = \overline{Q}$, yields:

$$F_t + B_{t-1} = B_t$$

Moving back one period yields:

$$F_{t-1} + B_{t-2} = B_{t-1}$$

Substitute B_{t-1} from the second expression into the first:

$$F_t + F_{t-1} + B_{t-2} = B_t$$

In the limit as t goes to 0, B_t is simply the sum of all flows from 0 to t. Hence, price is:

$$p_t = \frac{\theta_t}{1-\theta_t}\frac{\sum_{s=0}^{t} F_t}{Q_t}$$

□

Next, we derive the forward-looking version of the pricing function:

PROOF. Begin with the portfolio choice for the financial intermediary, Equation 25:

$$\theta_t = \theta^*\left(1 + \frac{\beta}{\chi^{MF}}(r_t^e - r_t)\right).$$

Substitute in the definition of r_t^e, and invert:

$$\frac{\chi^{MF}}{\beta}\frac{\theta_t - \theta^*}{\theta^*} = \frac{D_{t+1} + p_{t+1}}{p_t} - 1 - r_t$$

$$\frac{\chi^{MF}}{\beta}\frac{\theta_t - \theta^*}{\theta^*} + (1 + r_t) = \frac{D_{t+1} + p_{t+1}}{p_t}$$

$$p_t = \frac{D_{t+1} + p_{t+1}}{1 + r_t + \frac{\chi^{MF}}{\beta}\frac{\theta_t - \theta^*}{\theta^*}}$$

Similarly, for $t+1$:

$$p_{t+1} = \frac{D_{t+2} + p_{t+2}}{1 + r_{t+1} + \frac{\chi^{MF}}{\beta}\frac{\theta_{t+1} - \theta^*}{\theta^*}}$$

Note that the discount rate $1 + r_t + \frac{\chi^{MF}}{\beta}\frac{\theta_{t+1} - \theta^*}{\theta^*}$ is nothing but the return on equity, $1 + r^e_t$. Then, substituting in the expression for p_{t+1} into p_t, we get:

$$\begin{aligned} p_t &= \frac{D_{t+1} + \frac{D_{t+2} + p_{t+2}}{1 + r^e_{t+1}}}{1 + r^e_t} \\ &= \frac{D_{t+1}}{1 + r^e_t} + \frac{D_{t+2}}{(1 + r^e_t)(1 + r^e_{t+1})} + \cdots + \frac{D_{t+n}}{(1 + r^e_t)(1 + r^e_{t+1}) \cdots (1 + r^e_{t+n})} + \cdots \\ &= \sum_{s=1}^{\infty} \frac{D_{t+s}}{\prod_{j=s-1}^{\infty}(1 + r^e_{t+j})} \end{aligned}$$

□

Appendix E. Non-Homothetic Preferences and Calibration of Exogenous Processes

E.1. Euler Equations

The Euler equation for the non-wealthy household with respect to borrowing B^P_t is:

(A10)
$$\mathbb{E}_t\left[\frac{1}{1 + \rho + \delta}\frac{u'(c^P_{t+1})}{u'(c^P_t)}\right] = \frac{1}{1 + r_t}.$$

The Euler equation for the wealthy household with respect to flows F_t is given by:

(A11)
$$\mathbb{E}_t\left[\delta\frac{v'(a^R_t)}{u'(c^R_t)} + \frac{1}{1 + \rho + \delta}\frac{u'(c^R_{t+1})}{u'(c^R_t)}\left(\frac{D_{t+1}}{p_t} + r_t\right)\right] = 1.$$

Denoting the Lagrangian multiplier on the borrowing constraint with μ_t, the Euler equation with respect to housing investment H_t^M is given by:

$$\mathbb{E}_t\left[\delta\frac{\nu'(a_t^M)}{u'(c_t^M)} + \frac{1}{1+\rho^M+\delta}\frac{u'(c_{t+1}^M)}{u'(c_t^M)}\left(\frac{D_{t+1}^H + p_{t+1}^H}{p_t^H}\right) + \frac{\tau\mu_t}{u'(c_t^M)}\right] = 1. \tag{A12}$$

The Euler equation with respect to borrowing B_t^M is given by:

$$\mathbb{E}_t\left[\delta\frac{\nu'(a_t^M)}{u'(c_t^M)} + \frac{1}{1+\rho^M+\delta}\frac{u'(c_{t+1}^M)}{u'(c_t^M)}(1+r_t) + \frac{\mu_t}{u'(c_t^M)}\right] = 1. \tag{A13}$$

E.2. Non-Homothetic Preferences

In our calibration, we choose the following functional forms to represent non-homothetic preferences:

$$u[c] = \frac{c^{1-\sigma}-1}{1-\sigma}$$
$$\nu[a] = \frac{a^{1-\Sigma}-1}{1-\Sigma}.$$

To observe how the above functional forms translate into non-homothetic preferences, define $\zeta(a)$ to be the marginal utility of function ν relative to the marginal utility of function u:

$$\zeta(a) = \frac{\nu'(a)}{u'(a)} = a^{\sigma-\Sigma}, \tag{A14}$$

As explained in Mian et al. (2025), when $\Sigma = \sigma$ (as in the case for log utility), $\zeta(a)$ is constant and utility is homothetic as the marginal utility of bequests and marginal utility of consumption are proportional. When $\zeta(a)$ is increasing, the marginal utility of bequests decays more slowly compared to the marginal utility of consumption, implying that wealthier agents have a stronger desire to save. This gives rise to non-homothetic preferences.

E.3. Exogenous Processes

Earnings of the non-wealthy, wealthy, middle class, equity and housing dividends follow AR(1) processes with persistence $\rho^P, \rho^R, \rho^M, \rho^D, \rho^{D^H}$ respectively, with i.i.d. normal errors whose standard deviations are $\sigma^P, \sigma^R, \sigma^M, \sigma^D, \sigma^{D^H}$ respectively:

$$e_t^P = (1 - \rho^P)\bar{e}^P + \rho^P e_{t-1}^P + \epsilon_t^P, \tag{A15}$$

$$e_t^R = (1 - \rho^R)\bar{e}^R + \rho^R e_{t-1}^R + \epsilon_t^R, \tag{A16}$$

$$e_t^M = (1 - \rho^M)\bar{e}^M + \rho^M e_{t-1}^M + \epsilon_t^M, \tag{A17}$$

$$D_t = (1 - \rho^D)\overline{D} + \rho^D D_{t-1} + \epsilon_t^D, \tag{A18}$$

$$D_t^H = (1 - \rho^{D^H})\overline{D^H} + \rho^{D^H} D_{t-1}^H + \epsilon_t^{D^H}. \tag{A19}$$

where $\bar{e}^P, \bar{e}^R, \bar{e}^M, \bar{D}, \bar{D^H}$ represent steady state values for each series.

Appendix F. Regularity Condition on Middle-Class Elasticities

In this section, we briefly detail the conditions we need to lay down on σ^M, Σ^M and ρ^M to ensure the existence of steady-state equilibrium.

In steady state, the Euler equation of the middle class household on bonds can be written as the following, inverting for μ^M:

$$\mu^M = (c^M)^{-\sigma^M}\left(1 - \frac{1+r}{1+\rho^M+\delta}\right) - \delta(a^M)^{-\Sigma^M}$$

Under the Kuhn-Tucker conditions, equilibrium requires that the Lagrangian multiplier $\mu^M \geq 0$, and the complementary slackness condition on the borrowing constraint holds, i.e. $\mu^M(B^M - \tau p^H H^M) = 0$. We need to ensure that $\mu^M \geq 0$ for equilibrium to exist. Therefore:

$$\mu^M \geq 0$$

$$\left(1 - \frac{1+r}{1+\rho^M+\delta}\right) \geq \delta\frac{(c^M)^{\sigma^M}}{(a^M)^{\Sigma^M}}$$

$$\frac{(c^M)^{\sigma^M}}{(a^M)^{\Sigma^M}} \leq \frac{\rho^M - \rho}{\delta(1+\rho^M+\delta)}$$

where the final step follows from the steady state value of $r = \rho + \delta$. Taking logs:

$$\sigma^M \log(c^M) - \Sigma^M \log(a^M) \leq \log\left(\frac{\rho^M - \rho}{\delta(1 + \rho^M + \delta)}\right)$$
$$\sigma^M \log(c^M) - \log\left(\frac{\rho^M - \rho}{\delta(1 + \rho^M + \delta)}\right) \leq \Sigma^M \log(a^M)$$
$$\frac{1}{\log(a^M)}\left[\sigma^M \log(c^M) - \log\left(\frac{\rho^M - \rho}{\delta(1 + \rho^M + \delta)}\right)\right] \leq \Sigma^M$$

In order to ensure non-homothetic behaviour where marginal utility on bequests increases with increasing wealth, we must also impose $\Sigma^M < \sigma^M$. Hence, the full regularity condition reads:

$$\frac{1}{\log(a^M)}\left[\sigma^M \log(c^M) - \log\left(\frac{\rho^M - \rho}{\delta(1 + \rho^M + \delta)}\right)\right] \leq \Sigma^M < \sigma^M$$

Therefore, we calibrate parameters $\rho^M, \sigma^M, \Sigma^M$ to ensure this condition is satisfied, which requires choosing ρ^M to be significantly different than ρ.