The Asset Market Channel of Market Power

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Job Market Paper

This Version: October 28, 2026
First Version: June 30, 2026

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Abstract

The conventional view of the aggregate effects of market power focuses on product markets. We develop a complementary view, where the distributional effects of market power result in novel macroeconomic consequences because they alter supply and demand in asset markets and the long-run equilibrium cost of capital. We develop a tractable model framework with heterogeneous households and identify three forces through which market power affects asset markets: market power (i) reduces firms' demand for productive capital, but also (ii) redistributes income from low-saving workers to high-saving firm owners, and (iii) raises the market value of equity claims on public firms. Together, these forces determine the endogenous long-run response of interest rates, capital accumulation, and output to changes in market power. Using U.S. data, we find that rising markups from 1980 to 2018 lowered interest rates by 1 pp, reduced the labor share by 5.6 pp, and increased the top 1% wealth share by 12 pp in line with empirical estimates. The resulting decline in the cost of capital mitigates half of the 11% long-run output loss implied by a representative-household benchmark. Although output losses are smaller, aggregate utilitarian welfare loss is five times larger, reflecting greater inequality and losses borne by working households with higher marginal utility of consumption. We extend our framework and consider other sources of market power, such as labor market power, and multiple asset classes, relating the rise of market power to a larger equity premium and the decline of risk-free rates.

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Zhang is deeply indebted to his advisors, George-Marios Angeletos, Matthew Rognlie, and Martin Eichenbaum, for their guidance and support. We are grateful to Nicolas Crouzet, Keshav Dogra, Tianyu Fan, Matthieu Gomez, Jacob Toner Gosselin, Evan Majic, Kiminori Matsuyama, Virgiliu Midrigan, Kevin Ren, Kunal Sangani, and Bryan Seegmiller for helpful discussions and valuable comments.

1 Introduction

Market power shapes aggregate production and the distribution of income and profits across households. The conventional analysis of its macroeconomic consequences focuses on distortions in product markets (Blanchard and Kiyotaki, 1987; Atkeson and Burstein, 2008; Baqaee and Farhi, 2020; Peters, 2020; Edmond, Midrigan and Xu, 2023). Firms with market power charge a markup over marginal cost, reduce their demand for factor inputs, and produce below efficient scale. When markups are broadly elevated or vary across firms, this can substantially depress capital accumulation and aggregate output in the long run.

We develop a complementary perspective and show that the effects of market power on the distribution of income and profits shifts supply and demand in asset markets and the equilibrium cost of capital, feeding back into aggregate production and the broader economy. Through this "asset market channel", the distributional effects of market power have novel aggregate consequences. We develop a tractable model framework with heterogeneous households, where market power endogenously determine the long-run equilibrium interest rate and cost of capital. We use this framework to make two main contributions. First, we show that the endogenous decline in the long-run cost of capital due to the asset market channel mitigates roughly half of the aggregate output loss from the estimated rise of U.S. markups since 1980. However, in spite of the smaller output loss, the population welfare loss increases fivefold relative to the representative household benchmark because of the unequal distributional consequences of rising markups. Second, we show that rising markups can quantitatively explain a number of important macroeconomic trends, including the secular decline in interest rates, the divergence in the labor and profit shares, the rise in top wealth concentration, and an increasing equity premium (Figure 1).

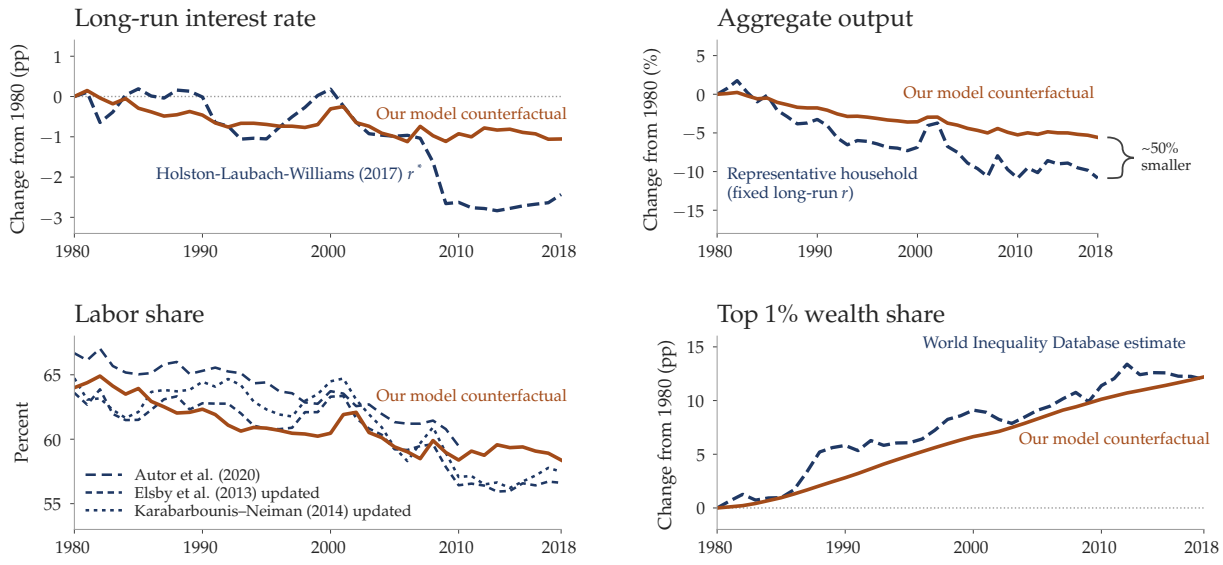


Figure 1: Market power and macroeconomic trends. Orange-colored lines represent counterfactual, model-implied transition paths starting from a steady state calibrated to 1980 and driven by the rising sequence of aggregate cost-weighted markups estimated by Ren and Zhang (2025).

A key insight from our model framework is that market power affects both the income sources that households save out of and the assets they save into. Households are heterogeneous due to risk, and therefore their savings, or *asset demand*, is imperfectly elastic to the long-run interest rate r. As a result, when market power redistributes income across households with different propensities to save, this shifts aggregate asset demand and alters r. This setting contrasts with the conventional representative household benchmark in which redistribution is neutral and the steady state interest rate r is fixed by the discount factor $\beta(1+r)=1$. Market power reduces the quantity of capital used in production but increases the value of firm equity traded in public markets, altering the *asset supply* available for households. The equilibrium interest rate r that clears asset markets then determines the cost of capital in product markets. The asset market effects of market power on equilibrium r are therefore ambiguous and can either mitigate or even amplify the product market distortions on capital accumulation and aggregate output in the long run.

Three forces governing the asset market. To formalize this insight, we propose an equilibrium model of product and asset markets with imperfectly competitive firms and heterogeneous households. Our model framework nests a broad class of heterogeneous-agent models[1] and sheds light on a hidden but crucial aspect of how the distribution of profits affects asset market equilibrium. The production side, including imperfect competition among firms, is standard. The key new ingredient is heterogeneity in households' *means* and *motives* for saving.

Households are either workers or firm owners, facing differential income risk and incomplete markets. Workers earn labor income, which finances their saving and contributes to asset demand. Firm owners play a *dual role* in asset markets: they save out of their business income and create new assets for others to hold. Owners start off by operating private businesses which earn undiversified profit income. In each period, some of them are given the opportunity to sell their businesses to the public, which creates traded assets. Profits and the proceeds from business sales finance the aggregate savings of firm owners and increase asset demand. Firm owners thus influence both asset demand and asset supply.

Our main theoretical contribution is an analytical representation of steady state asset market clearing, which characterizes how the distributional effects of market power operate through factor income shares (labor s_W, capital s_K, and profit s_Π), household balance sheets, and firm ownership.

$$\bar{D}(r)\big[\underbrace{s_W+\lambda(r)s_\Pi}_{\text{Redistribution}}\big] = \underbrace{\frac{s_K}{r+\delta_K}}_{\text{Capital Wedge}} + \underbrace{Q(r)\omega s_\Pi}_{\text{Asset Creation}} \tag{1}$$

We identify three effects of market power on asset market clearing: *Redistribution*, which affects asset demand, and the *Capital Wedge* and *Asset Creation*, which affects asset supply. $\bar{D}(r)$ is the worker's asset demand curve given a dollar of labor income, while $\lambda(r)$ measures relative asset

[1] These include the one-asset model of Aiyagari (1994), two-account models as in Auclert, Rognlie and Straub (2024), and overlapping generations models as in Diamond (1965); Blanchard (1985); Yaari (1965).

demand between firm owners and workers. On the supply side, ω is the share of profits capitalized into tradable claims and $Q(r)$ is the valuation multiple for a given dollar of traded profits. We later extend this baseline framework to include fiscal policy, growth, and misallocation.

The Capital Wedge follows from the standard production distortion of market power. Higher market power reduces firms' use of productive capital. Given an initial long-run interest rate r and asset demand by households, capital declines relative to desired saving, which puts downward pressure on the interest rate r. As r falls, capital becomes cheaper for firms, raising their capital demand and partially offsetting the initial capital distortion relative to a fixed interest rate benchmark. The decline in capital and output is therefore partially mitigated by the decline in the interest rate.

However, this intuition is incomplete: key to our framework is the fact that capital is not the only asset in the economy. Market power raises the market value of public firms, a force we refer to as *Asset Creation*. Suppose profits earned by public firms increases due to market power while household income remains unchanged to isolate the change in asset supply. At the initial r, the higher profits raises the market value of public firms. For households to be willing to hold this larger stock of assets, the required return r must rise. Asset Creation is stronger when a larger share of aggregate profits is capitalized into tradable claims, captured by ω, and when those claims receive higher valuations, as captured by $Q(r)$. Notably, even as market power depresses productive capital, it can still increase the total quantity of assets in equilibrium.

Lastly, market power redistributes income from wage-earning workers to profit-earning firm owners, a force we refer to as *Redistribution*. Wealthy firm owners face a large quantity of income risk (DeBacker, Panousi and Ramnath, 2023), one key reason why their savings per dollar of income exceeds that of workers or equivalently $\lambda(r) > 1$. Hence, when the distributional effect of market power takes a dollar away from workers and gives it to firm owners, this raises desired aggregate asset demand and lowers the equilibrium interest rate r.

To summarize, the Capital Wedge and Redistribution push the interest rate down, while Asset Creation pushes the interest rate up. The balance between these three forces in the long run determines whether r rises or falls, and therefore whether the response of the cost of capital mitigates or amplifies the output contraction that would arise under a fixed-r, representative household benchmark.

Quantification. We quantify the effects of rising U.S. aggregate markups from 1980 to 2018 on interest rates, inequality, output, and welfare. To isolate market power from other secular forces, including demographic changes (Eggertsson, Mehrotra and Robbins, 2019; Auclert et al., 2021*b*; Hopenhayn, Neira and Singhania, 2022) and rising government debt, we calibrate the economy to 1980 and hold other conditions fixed. We take annual aggregate cost-weighted markup estimates from Ren and Zhang (2025) and their implied national income shares. The labor share falls by 5.6 percentage points and the profit share rises by 8.4 percentage points, broadly consistent with empirical estimates. We use these shares in our analytical representation to trace the path of

stationary equilibrium rates and validate these predictions against the full transition dynamics under perfect foresight and myopic expectations.

We discipline Redistribution using the 1983 Survey of Consumer Finances, obtaining a calibration target of $\lambda_0 = 3.31$ from the relative financial wealth (excluding private business equity) to income ratios of active business owners with at least \$250K in annual business sales and households earning only labor income. Combined with literature estimates of the idiosyncratic income processes for workers and firm owners (Auclert et al., 2021*a*; DeBacker, Panousi and Ramnath, 2023) we discipline $\bar{D}(r)$ and $\lambda(r)$.

We discipline Asset Creation using IRS, BEA, and Compustat data and related estimates, obtaining $\omega = 0.34$ for the share of profits capitalized into publicly traded equity. Most profits instead are earned by private firms or remain closely held by insiders of public firms (Helwege, Pirinsky and Stulz, 2007; Eisfeldt and Shi, 2025; Peter, 2026). Unlike models that capitalize all profits into publicly traded assets (Eggertsson, Robbins and Wold, 2021; Moll, Rachel and Restrepo, 2022; Del Negro, Giannoni and Patterson, 2023; Auclert et al., 2025), where the incidence of market power only falls on the asset supply side, we find that the asset demand effects of market power through Redistribution plays a dominant role.

Market power and secular macroeconomic trends Our first main finding is that the roughly 10 percentage point increase in aggregate markups over the past forty years has lowered the long-run rate r by approximately one percentage point as shown in the top-left panel of Figure 1. The implied path closely tracks the pre-2008 decline in the neutral rate r^* estimated by Holston, Laubach and Williams (2017), before its sharp decline following the Global Financial Crisis. The model additionally generates a decline in the labor share and an increase in the profit share, tracking closely with empirical estimates. Finally, it generates an increase in the top 1 percent wealth share from 19.28 to 31.48 percent, compared with 23 to 35 percent in the World Inequality Database.

Smaller output loss, larger welfare cost Our second main finding is that the endogenous decline in r mitigates roughly half of the aggregate output loss from rising markups as shown in the top-right panel of Figure 1. By lowering the cost of capital, the decline in r encourages investment and offsets part of the direct production distortion. In contrast, the representative household benchmark fixes steady state r at $\beta(1+r) = 1$, shutting down the asset market channel.

Despite smaller output losses, aggregate utilitarian welfare in our model falls by 1.52 percent consumption equivalent variation (CEV), compared with 0.32 percent in the representative household benchmark. This is explained by the incidence of market power: the decline in the long-run interest rate r mitigates the aggregate output loss. However, income is redistributed away from less wealthy workers, who have higher marginal utility of consumption and make up the vast majority of the population. The median worker experiences a welfare loss of -1.7 percent CEV, whereas the median business owner gains 19.5 percent.

Extensions. We analyze two extensions of our baseline framework in greater detail. First, we introduce safe and risky assets, allowing market power to affect their required returns differentially. Redistribution increases household demand for both types of assets, putting downward pressure on both returns. Asset Creation, however, only expands the supply of risky public equity, putting upward pressure on the risky return relative to the safe return. As a result, the safe return falls more than the risky return, increasing the equity premium by roughly 43.3 basis points.

Second, we extend the framework to labor market power through wage markdowns, motivated by the companion paper Ren and Zhang (2025), which finds that the historical rise in measured market power may largely reflect wage markdowns rather than price markups. Unlike price markups, wage markdowns directly distort only firms' labor demand, leaving capital demand undistorted at a given interest rate. For the same increase in the profit share, this absence of a direct capital distortion leads to even smaller aggregate output losses from labor market power relative to product market power. However, wage markdowns cause larger declines in real wages. This reinforces our central finding that the aggregate output loss can understate the welfare cost of market power.

Related work. This paper contributes to three literatures: (i) determinants of the long-run interest rate r, (ii) drivers of long-run macroeconomic trends, (iii) aggregate consequences of market power.

Our analytical framework connects market power, distortionary taxes, and technological change to the long-run equilibrium interest rate r through imperfectly elastic capital and the Capital Wedge. Gomez and Gouin-Bonenfant (2026) show that capital can be inelastic due to scarce, specialized labor used to produce capital goods and find that the effects of capital taxes on capital accumulation is dampened. Moll, Rachel and Restrepo (2022) build a task-based model, where automation raises capital intensity and the capital share, at the expense of the labor share, increasing the return on capital and wealth inequality.

We demonstrate that the distribution of profits across households through market power has additional supply- and demand-side effects on asset market equilibrium. Our framework nests mechanisms in many existing models, some of which assume that firms' earnings are directly paid to firm owners (Quadrini, 2000; Cagetti and De Nardi, 2006) while others assume profits are capitalized into an equity asset and traded in asset markets (Farhi and Gourio, 2018; Auclert and Rognlie, 2020; Eggertsson, Robbins and Wold, 2021), the case which maps into Asset Creation in our framework. When all profits are traded as opposed to directly paid out, the resulting increase in total asset supply from market power is typically so large that rising market power increases equilibrium r and asset quantities—the opposite prediction of the Capital Wedge effect in isolation.

In reality, only a fraction of aggregate profits are earned by public firms and issued as dividends from publicly traded equity. As publicly traded firms turnover and new firms go public, a substantial quantity of liquid wealth is created and only slowly drawn down by public founders (Eisfeldt and Shi, 2025). Our framework captures this effect through the dual role of firm owners,

who create new assets through firm sales and who save out of the wealth generated by these sales.

More broadly on the asset demand-side, we show that market power acts as a form of Redistribution of permanent income between lower-saving workers to higher-saving, wealthier firm owners, which drives the equilibrium interest rate downward. This redistributive effect is closely related to work that documents the effects of changes in the distribution of income on savings due to non-homothetic preferences (Straub, 2019; Morrison, 2026) and can be seen as a microfoundation for the increasing permanent income inequality associated with the trend decline in interest rates, as in Mian, Straub and Sufi (2021*a*)[2].

This paper provides a unified explanation for long-run trends in interest rates, output growth, public firm valuation and the equity premium, and wealth inequality as a result of rising market power. Rachel (2025) and Auclert et al. (2025) decompose the causes of the long-run decline in interest rates (Holston, Laubach and Williams, 2017; Del Negro et al., 2019) into its constituent components, which include demographic change (Eggertsson, Mehrotra and Robbins, 2019; Auclert et al., 2021*b*) and market power (Farhi and Gourio, 2018; Eggertsson, Robbins and Wold, 2021), with inequality playing an important mediating role (Mian, Straub and Sufi, 2021*b*). In contrast with Rachel (2025); Auclert et al. (2025), we show that Redistribution and its contribution to asset demand quantitatively outweighs the effects of market power on asset supply.

There are numerous channels through which trends in asset returns and wealth inequality have been connected. Piketty (2015) provides a foundational argument for why returns in excess of economic growth $r - g > 0$ leads to faster compounding and a divergence of household wealth. Moll, Rachel and Restrepo (2022) connects changes in capital income shares from greater automation in production to this compounding channel, providing a technology-driven microfoundation for rising wealth inequality. Fernández-Villaverde and Levintal (2024); Gomez (2025) highlight an alternative mechanism, where falling returns r and asset price revaluation lead to rising inequality. Other mechanisms include the effect of declining costs of entrepreneurial finance Gomez and Gouin-Bonenfant (2024), heterogeneity in returns Smith, Zidar and Zwick (2023); Hubmer, Krusell and Smith (2021), and portfolio duration Greenwald et al. (2025); Catherine et al. (2026). Our paper provides a complementary channel through which rising market power profits and unequal firm ownership endogneously alters returns, which can feed back into wealth inequality.

In our multi-asset extension, we analyze the effects of market power on return trends across asset classes and the cost of capital (Reis, 2022; Moll, Rachel and Restrepo, 2022) and propose an explanation for why the equity premium has risen since 1980 (Farhi and Gourio, 2018): rising market power increased the relative supply of risky equity to risk-free assets because of the rising market power profits that capitalize equity. Given evidence on inelastic substitution in portfolio choice across assets (Gabaix and Koijen, 2021; Gabaix et al., 2023) even in the long-run (Fagereng,

[2]In Straub (2019); Mian, Straub and Sufi (2021*a*) savings rates increase at the household-level as they become wealthier, which would typically imply an increase in the national saving rate. In contrast, while wealthy firm owners save more than working households, the Capital Wedge reduces the national savings rate (Bernanke, 2005) in our model even while total assets increase due to Asset Creation.

Guiso and Ring, 2026), this mechanism increases the equity premium[3].

This paper contributes to an extensive literature studying the macroeconomic consequences of market power. The primary production distortion from market power is an inefficient reduction, or "wedge", in the use of aggregate factor inputs (Blanchard and Kiyotaki, 1987). For a fixed quantity of aggregate factor—labor and capital—there are additional misallocation effects that result from dispersion in markups across firms which reduce aggregate total factor productivity (Hsieh and Klenow, 2009; Baqaee and Farhi, 2020). Models with endogenous aggregate factor supply that account for these two mechanisms (Atkeson and Burstein, 2008; Edmond, Midrigan and Xu, 2023; Berger, Herkenhoff and Mongey, 2022; Baqaee and Malmberg, 2026; De Loecker, Eeckhout and Mongey, 2026) show that both are important in quantitatively accounting for the aggregate distortions from market power. Our framework demonstrates that much of the aggregate output distortion from market power comes from the aggregate production wedge and its effect on perfectly elastic capital implied by the steady-state representative household benchmark. Quantitatively, we show that once capital is imperfectly elastic and the distributional effect of market power on the declining equilibrium cost of capital is accounted for, aggregate output loss from higher market power is significantly mitigated.

Our paper also relates to an emerging literature that studies the distributional consequence of distortions, such as market power, taxes, and financial frictions (Atkin et al., 2025; Hsieh et al., 2026). Although aggregate output loss is mitigated in our model due to a lower cost of capital, population welfare losses are amplified due to the distributional incidence of market power. Boar and Midrigan (2025) studies optimal product market policy in a model with heterogeneous markups and workers and find that optimal policy prescribes more inequality because of the efficiency benefits of assortative matching between productive firms and workers. Boar, Gorea and Midrigan (2026) highlight a production externality due to idiosyncratic entrepreneurial risk that resembles a markup and reduces firms' production. Di Tella, Malgieri and Tonetti (2025) study the normative implications of this idiosyncratic production risk and find that it is optimal to tax labor to offset a competing production externality from precautionary savings.

Outline. Section 2 connects firm level market power to aggregate production distortions, shows when misallocation leaves the interest rate unchanged, and derives how the interest rate response changes output. Section 3 develops the incorporation economy and the sufficient-statistic characterization of asset market clearing. Section 4 measures its inputs and quantifies the markup counterfactual, including the nonlinear transition. Section 5 studies household welfare and its sources. Section 6 examines multiple assets and wage markdowns, and Section 7 concludes.

[3]It is likely the case that a significant share of the rise in market power was not foreseen, and hence resulted in large ex-post returns on equity assets that did not necessarily result from a high ex-ante expected returns, see discussion in Farhi and Gourio (2018). This observation connects to a literature that documents how changes in asset prices (Greenwald, Lettau and Ludvigson, 2025) and the net foreign asset position of the US (Atkeson, Heathcote and Perri, 2025) were driven in part by unanticipated shocks that affected returns and the value of risky assets.

2 Market Power and the Asset Market Channel

We begin by characterizing how firm level market power affects aggregate production and the division of national income. Changes in technology, firm conduct, or market structure affect these outcomes through the aggregate markup μ and effective productivity A. While both affect output, we show that under our baseline assumptions only the aggregate markup changes the stationary equilibrium interest rate. We then characterize how the resulting change in the cost of capital mitigates or amplifies the production distortions of market power. Section 3 develops the household and ownership structure that determines this interest rate response.

2.1 From firm-level market power to aggregate wedges

Market power can arise under different forms of competition, including monopolistic and oligopolistic competition, or other environments. Rather than specifying the underlying market conduct that determines firm-level markups, we take them as given, building on the aggregation approach of Edmond, Midrigan and Xu (2023). Under our maintained production assumptions, the heterogeneity across firms admits a simple aggregate representation governed by two objects: the aggregate markup μ and effective productivity A. The aggregate markup distorts firms' demand for capital and labor and determines how output is divided between factor payments and profits. Differences in firm-level markups can also generate misallocation across firms, reducing effective productivity. Changes in competition, entry, and innovation may affect both aggregate markups and effective productivity. We study their consequences conditional on these aggregate objects, abstracting from the endogenous determination of market structure and innovation.

Our main focus will turn out to be the aggregate markup, which affects asset markets by changing the distribution of income and profits. Under our baseline assumptions, changes in effective productivity affect aggregate output but leave the long run equilibrium interest rate unchanged. We therefore first derive how firm-level market power maps into these aggregate objects, and then characterize their implications for the long run interest rate and output.

Firms indexed by i produce differentiated goods using $y_i = z_i F(k_i, \ell_i)$, where F is a common constant returns technology. Final output is a homothetic aggregate of firm outputs, with its price normalized to one. Capital and labor are competitively supplied at rental rate r^k and wage w. The product markup $\mu_i \geq 1$ is the ratio of price to marginal cost, so the firm optimality conditions are

$$r^k = \frac{p_i z_i}{\mu_i} F_K(k_i, \ell_i), \qquad w = \frac{p_i z_i}{\mu_i} F_L(k_i, \ell_i). \tag{2}$$

Taking their ratio eliminates the markup, price, and productivity. The common relative factor price therefore determines a common capital labor ratio across firms.

Let $s_i = p_i y_i / Y$ denote firm i's revenue share. The aggregate markup is

$$\frac{1}{\mu} = \int s_i \frac{1}{\mu_i} \, di, \tag{3}$$

the sales weighted harmonic mean of firm level markups, equivalently their cost weighted arithmetic mean (Edmond, Midrigan and Xu, 2023). The common input mix allows the firm conditions to aggregate to

$$Y = AF(K, L), \qquad r^k = \frac{A}{\mu} F_K(K, L), \qquad w = \frac{A}{\mu} F_L(K, L), \tag{4}$$

where A is effective productivity. Define the income shares $s_K = r^k K / Y$, $s_W = W / Y$, and $s_\Pi = \Pi / Y$, with aggregate labor income $W = wL$ and aggregate profit income $\Pi = Y - W - r^k K$. Writing the production elasticities as $\varepsilon_K = F_K K / F$ and $\varepsilon_L = F_L L / F$, evaluated at (K, L), gives

$$s_K = \frac{\varepsilon_K}{\mu}, \qquad s_W = \frac{\varepsilon_L}{\mu}, \qquad s_\Pi = 1 - \frac{1}{\mu}, \tag{5}$$

where constant returns implies $\varepsilon_K + \varepsilon_L = 1$. Write effective productivity as $A = \Omega \mathcal{Z}^*$, where $\mathcal{Z}^*$ is frontier productivity and $0 < \Omega \leq 1$ measures the productivity consequences of misallocation across firms (Hsieh and Klenow, 2009; Restuccia and Rogerson, 2013; Edmond, Midrigan and Xu, 2023). Within the maintained production and demand environment, changes in technology, conduct, or market structure can move μ, Ω, and $\mathcal{Z}^*$. The aggregate production wedge μ distorts factor payments relative to marginal products, while Ω and $\mathcal{Z}^*$ jointly determine effective productivity A. Given μ and A, (4) summarizes the production conditions. For example, among the mechanisms studied by De Loecker, Eeckhout and Mongey (2026) is a decline in the number of potential competitors. This change weakens competition and alters both aggregate markups and the allocation of production across heterogeneous firms.

In the homothetic product market environments we consider[4], a change in aggregate factor prices scales the common component of firms' costs while leaving relative costs unchanged. The interest rate therefore changes aggregate inputs without changing the relative allocation of production. Section 6.2 considers labor market power, which adds a wedge to the labor condition in (4).

2.2 Productivity, misallocation, and long run interest rate

To characterize the asset market channel through μ, we must account for accompanying changes in effective productivity $A = \Omega \mathcal{Z}^*$. Such changes leave the stationary interest rate unchanged when asset demand and asset supply scale together. At each candidate interest rate r, the production

[4]These environments encompass many commonly used models of product demand and competition. Examples include the HSA and HDIA classes characterized by Matsuyama and Ushchev (2017), which contain familiar demand systems such as translog and generalized Kimball, as well as standard oligopolistic environments such as Atkeson and Burstein (2008). Entry, heterogeneous financing costs, or other scale-dependent forces can break this separation.

conditions (4), capital rental rate $r^k = r + \delta_K$ with capital depreciation δ_K, and labor supply determines productive capital K and the associated income flows W and Π. Given these income flows, the household and ownership blocks determine desired asset holdings and the value of tradable profit claims. Let $D(r; \mu, A)$ and $S(r; \mu, A)$ denote the resulting stationary asset demand and asset supply, with supply including physical capital and tradable equity. Next, we show that, under our baseline environment, the asset market condition is invariant to changes in effective TFP.

Proposition 1 (Effective productivity and the interest rate)**.** *Hold μ, the production function F, the labor supply schedule, and household and ownership primitives fixed. If $D(r; \mu, A)$ and $S(r; \mu, A)$ are homogeneous of the same degree in A, changes in effective productivity leave the set of stationary equilibrium interest rates unchanged. If the equilibrium interest rate is unique, it is independent of A.*

Our baseline environment satisfies this condition. With Cobb–Douglas production, and standard preference specifications governing labor supply, including separable CRRA and GHH preferences, aggregate labor income W, aggregate profit income Π, and productive capital K all scale with A. Section 3 establishes that stationary household asset demand is homogeneous in income, including proceeds from incorporation, building on Straub (2019). Tradable profit claims inherit the same scaling. Asset demand and asset supply are therefore homogeneous of the same degree in A.

Therefore, changes in misallocation that operate through Ω, or changes in frontier technology that operate through Hicks–neutral productivity $\mathcal{Z}^*$, affect output without generating a stationary interest-rate response. More generally, for primitive changes whose relevant aggregate effects are summarized by (μ, A), only the induced change in μ affects the stationary interest rate. This separation holds conditional on normalized income risk and the ownership structure, as shown in Section 3. If changes in effective TFP directly affect factor shares, however, this homogeneity property need not hold exactly. Appendix A.2 illustrates one such departure under CES production and shows that the resulting deviation from the homogeneous benchmark is quantitatively very small.

2.3 Output and the asset market channel

The previous subsection showed that, under our baseline environment, changes in effective productivity A affect output but do not generate a long run interest rate response. We now show how A, the aggregate production wedge μ, and the equilibrium interest rate jointly determine output. This makes clear why the interest rate response is central to the long run aggregate consequences of market power. For the output mapping, we specialize the labor supply to the GHH preferences used in our framework and specified formally in Section 3. Let φ denote the associated Frisch elasticity, so that

$$\varphi \equiv \frac{d \log L(w)}{d \log w}.$$

Let $\xi \equiv -\frac{\partial \log Y}{\partial \log r^k} > 0$ be the local output response to the capital user cost. The production conditions then imply

$$d\log Y = \underbrace{d\log A}_{\text{direct productivity}} + \underbrace{\varphi\left(d\log A - d\log \mu\right)}_{\text{labor adjustment}} + \underbrace{\xi\left(d\log A - d\log \mu - d\log r^k\right)}_{\text{capital adjustment}}, \tag{6}$$

where user cost of capital is $r^k = r + \delta_K$[5]. Equation (6) separates three margins. Higher effective productivity raises output directly and induces greater use of labor and capital. At a fixed interest rate, a higher markup works in the opposite direction: it lowers the wage and desired capital, reducing labor input and capital intensity. The asset market matters through the last term. If the equilibrium interest rate falls, the capital rental rate falls and firms use more capital than they would at a fixed interest rate, mitigating the output loss from the production distortion. If the interest rate rises, the same feedback amplifies the loss. Since $r^k = r + \delta_K$,

$$d\log r^k = \frac{r}{r+\delta_K} d\log r.$$

Thus, once (A, μ) are given, the remaining equilibrium object needed to determine the output response is the response of the interest rate.

The two roles of the markup. The aggregate markup enters the economy in two conceptually distinct ways. First, it distorts firms' factor demand: from (4), a higher μ lowers factor payments relative to marginal products and therefore depresses labor and capital use at a given interest rate. Second, the same markup determines how much output accrues as profits. Under constant returns,

$$s_K + s_W = \frac{1}{\mu}, \qquad s_\Pi = 1 - \frac{1}{\mu}.$$

A higher markup therefore not only creates a production distortion, but also shifts income away from factor payments and toward profits.

In the representative-household benchmark, these two roles largely separate. Because factor payments and profits ultimately accrue to the same household, only the production-wedge role matters for aggregate output. With heterogeneous ownership and imperfectly elastic asset demand, however, this separation breaks down. Who receives the profits affects household asset demand, while their capitalization into tradable claims affects asset supply. The incidence and capitalization of profits therefore determine the equilibrium interest rate that enters (6), and hence how strongly the production distortion translates into lower capital and output. Section 3 turns to this asset-market determination of the interest rate.

[5]Here φ is the Frisch elasticity of labor supply. $\xi \equiv -\partial \log Y / \partial \log r^k = (\sigma_{KL} + \varphi) s_K / s_W > 0$ is the elasticity of output with respect to the capital user cost, where σ_{KL} is the local elasticity of substitution between capital and labor. It captures both the direct adjustment in capital intensity and the induced labor response through wages.

3 Households, Firm Ownership, and Asset Market Equilibrium

Section 2 characterizes the production distortions of market power and its effects on the division of national income. With inelastic asset demand, the distribution of income affects the equilibrium interest rate through both the savings of households receiving profits and the capitalization of those profits into tradable equity. Models of business owner saving emphasize profits received directly as income (Quadrini, 2000; Cagetti and De Nardi, 2006; Mian, Straub and Sufi, 2021*a*), while other models assume that future profits are capitalized into publicly traded equity (Eggertsson, Robbins and Wold, 2021; Auclert et al., 2025). Our framework connects these mechanisms by allowing private businesses to go public, or to create tradable assets for others to hold. Workers earn labor income, while business owners initially receive profits directly from their private businesses. When a business goes public, its owner sells a share of future profits as tradable equity and retains the remaining share. The sale increases asset supply while providing the owner with liquid financial wealth that supports asset demand. Our framework therefore accounts for both effects when characterizing how the distribution of factor income and profits affects the equilibrium interest rate.

Household problem There are two household types, workers and business owners, who take aggregate labor income W, aggregate profit income Π, and the interest rate r as given. We use the subscript O to denote business owners.

Workers consume, save, and supply labor. They have GHH preferences over the composite $c - v(\ell)$, with isoelastic labor disutility

$$v(\ell) = \frac{\psi_\ell}{1 + 1/\varphi} \ell^{1+1/\varphi}.$$

With wage per efficiency unit w, idiosyncratic efficiency e, and $R = 1 + r$, a worker solves

$$\begin{aligned} V^W(a, e) = &\max_{c,\, a',\, \ell} \left\{ u(c - v(\ell)) + \beta_W \, \mathbb{E}\left[V^W(a', e') \mid e \right] \right\}, \\ c + a' = &Ra + we\ell, \qquad a' \geq 0. \end{aligned}$$

The GHH structure makes the intratemporal labor choice independent of wealth: $v'(\ell^*(w, e)) = we$. Define the maximized labor surplus

$$y^W(w, e) := \max_{\ell} \{ we\ell - v(\ell) \}.$$

With the isoelastic v, both $y^W(w, e)$ and aggregate labor compensation W scale with $w^{1+\varphi}$. Hence $y^W(w, e) = W\tilde{e}$ for a normalized Markov state $\tilde{e}$ independent of the aggregate scale[6]. This scaling

[6] Aggregate output is divided into labor income W, capital payments $r^k K$, and profits $\Pi = Y - W - r^k K$, where

property allows us to express worker asset demand per dollar of aggregate labor income, as we show below.

Owners initially hold private businesses. A private business generates profit income Πz, where z is the owner's share of aggregate profits. An owner with share z receives Πz, and the distribution of z determines the distribution of profits across owners without changing aggregate profits:

$$\pi = \Pi z, \qquad \int z \, di = 1.$$

The state z is stochastic with mean normalized to one[7]. Appendix A.3 derives this process from relative demand shocks that change the owner's share of aggregate profits. A private business goes public at an iid rate κ, and publicly incorporated businesses exit at an iid rate δ_C. Upon public incorporation, the owner sells the fraction $1 - \theta_F$ of future profits at an equilibrium price $q(z; \Pi, r)$ and retains a nontradable claim to the remaining fraction θ_F. While the business remains private, the owner's problem is

$$\begin{aligned} V^P(a, z) = &\max_{c,\, a'} \Big\{ u(c) + \beta_O \Big[(1-\kappa) \mathbb{E}\big[V^P(a', z') \mid z \big] + \kappa V^L\big(q(z; \Pi, r), a', z\big) \Big] \Big\}, \\ c + a' = &Ra + \Pi z, \qquad a' \geq 0 \end{aligned}$$

Private business ownership corresponds to the closely held equity studied by Bhandari and McGrattan (2021). The owner retains nontradable equity after public incorporation, consistent with the insider equity holdings studied by Peter (2026). We use $V^L(\mathcal{T}, a, z)$ for the state after public incorporation, where $\mathcal{T}$ records the one-period sale proceeds. In the period of public incorporation $\mathcal{T} = q(z; \Pi, r)$; thereafter $\mathcal{T} = 0$. While the publicly incorporated business survives, the owner receives retained profits $\theta_F \Pi z$ and the business continues to face idiosyncratic profit risk:

$$\begin{aligned} V^L(\mathcal{T}, a, z) = &\max_{c,\, a' \geq 0} \Big\{ u(c) + \beta_O \big[\delta_C \, \mathbb{E}_\pi V^P(a', z') + (1 - \delta_C) \mathbb{E}\big[V^L(0, a', z') \mid z \big] \big] \Big\}, \\ c + a' = &Ra + \mathcal{T} + \theta_F \Pi z, \qquad a' \geq 0. \end{aligned}$$

Upon exit, the retained claim disappears and the owner draws a new private business opportunity. Setting $\theta_F = 0$ eliminates retained equity and makes z irrelevant in the state after public incorporation. In our baseline model, business owner status, the profit share process, and public incorporation are exogenous. These assumptions allow us to isolate how profits contribute to asset demand and asset supply. Allowing for endogenous entry, financing, or public incorporation would affect the distribution of profits and the household saving responses that enter our analytical representation.

$r^k = r + \delta_K$ is the rental cost of capital.

[7] One interpretation of z is the size of the firm's customer base, in the spirit of recent work on customer acquisition and investment in demand (Gosselin and Zhang, 2026; Hubmer and Nord, 2026; Afrouzi, Drenik and Kim, 2025).

3.1 From private business income to publicly traded equity

Profits from private businesses and retained equity are received directly as income by business owners. When a firm goes public, the owner also receives the proceeds from the sale of equity, while the equity purchased by other households enters asset supply. The market value of this tradable equity determines the contribution of Asset Creation to aggregate asset supply.

Let $q(z;\Pi,r)$ denote the ex dividend value of tradable equity in a publicly incorporated business with business profit share z. It satisfies

$$(1+r)\,q(z;\Pi,r) = \mathbb{E}\big[(1-\theta_F)\Pi z' + (1-\delta_C)\,q(z';\Pi,r) \mid z\big]. \tag{7}$$

The equity value reflects the next dividend payment and the expected continuation value, accounting for the probability of firm exit. Averaging over the stationary distribution of z, which has mean one, gives the market value of tradable equity per dollar of publicly traded profit income (for $1-\theta_F > 0$):

$$Q(r) \equiv \frac{\mathbb{E}_\pi\, q(z;\Pi,r)}{(1-\theta_F)\Pi} = \frac{1}{r+\delta_C}. \tag{8}$$

Thus $Q(r)$ values each dollar of publicly traded profit income at the capitalization rate $r+\delta_C$. We use $Q(r) = 1/(r+\delta_C)$ also when no equity is marketed, in which case the publicly traded profit share is zero. A constant risk premium or expected cash flow growth would enter through the corresponding $Q(r)$; the baseline sets those terms to zero (Farhi and Gourio, 2018). We allow for a risk premium in the two asset extension below, which is developed further in Appendix H.

Let ω^{inc} denote the share of aggregate profits generated by publicly incorporated businesses. We assume that a firm's probability of public incorporation is independent of its business profit share z. Under this assumption, the publicly incorporated profit share equals the stationary share of publicly incorporated businesses derived in Appendix A.4. The publicly traded equity share of aggregate profits is

$$\omega = (1-\theta_F)\omega^{\text{inc}}, \qquad \omega^{\text{inc}} = \frac{\kappa}{\kappa+\delta_C}. \tag{9}$$

Without independence, ω^{inc} is the profit-weighted share of publicly incorporated businesses. Aggregate profits divide into private, retained, and publicly traded flows:

$$1 = (1-\omega^{\text{inc}}) + \theta_F\omega^{\text{inc}} + \omega.$$

Tradable claims add $Q(r)\omega\Pi$ to asset supply. Retained profits are received directly as income by the owner and do not create an additional tradable asset.

3.2 Aggregate asset demand and analytical characterization

We next characterize aggregate asset demand for workers and business owners. Despite idiosyncratic income risk, borrowing constraints, and changes in firm ownership, household asset demand remains linear in each group's aggregate income. We can therefore express asset demand per dollar of aggregate labor income for workers and aggregate profit income for business owners. This property also extends to environments with aggregate risk, multiple assets, and balanced growth, which we discuss below.

Proposition 2 (Linearity of household asset demand)**.** *Suppose household preferences are homothetic and the normalized worker and business owner problems admit stationary distributions with finite mean asset holdings. Then stationary group asset demands are linear in their respective income scales:*

$$D_W(r, W) = \bar{D}(r)W, \qquad D_O(r, \Pi) = \bar{D}_O(r)\Pi \equiv \lambda(r)\bar{D}(r)\Pi.$$

Here $\bar{D}(r)$ and $\bar{D}_O(r)$ are asset demand per dollar of worker labor compensation and business owner profit income, respectively, and

$$\lambda(r) \equiv \frac{\bar{D}_O(r)}{\bar{D}(r)}$$

is the relative wealth-to-income ratio of owners to workers.

Idiosyncratic income risk, borrowing constraints, retained profits, IPO proceeds, entry, and exit affect household saving without changing the linearity of asset demand in aggregate income. Worker asset demand per dollar of income is summarized by $\bar{D}(r)$, while $\lambda(r)$ is the relative wealth-to-income ratio of owners to workers. This result builds on the homothetic linearity results used in the wealth distribution literature (Constantinides and Duffie, 1996; Angeletos, 2007; Straub, 2019; Gomez, 2023). Appendix C states the broader homogeneity principle and shows how the same structure arises in Aiyagari, perpetual youth OLG, and asset in utility economies. Our analytical representation therefore applies beyond the particular household and ownership structure of our baseline model.

Aggregating asset demand. Aggregating worker and business owner asset demand gives:

$$D(r, W, \Pi) = \bar{D}(r)\big[W + \lambda(r)\Pi\big].$$

Asset supply consists of physical capital and tradable equity:

$$S(r) = K + \underbrace{Q(r)\,\omega\,\Pi}_{\text{tradable equity}}. \tag{10}$$

Private and retained profits, together with the proceeds from going public, provide resources that business owners can save and therefore contribute to asset demand. Profits capitalized

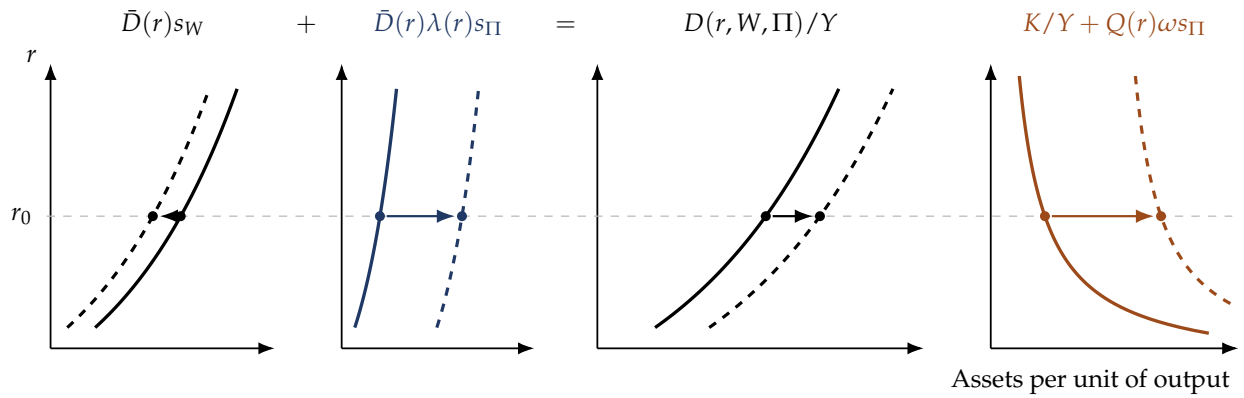


Figure 2: Redistribution and Asset Creation. Worker and owner asset demand add horizontally to aggregate asset demand. The fourth panel shows total asset supply. Solid and dashed curves denote the initial and higher markup schedules. Parallel shifts illustrate an increase in markup that redistributes resources available for workers and firm owners to save out of.

into tradable equity instead contribute to asset supply. Combining these expressions yields our analytical representation of asset market clearing.

Theorem 1 (Asset Market Clearing). *In a stationary equilibrium, asset market clearing per unit of output is*

$$\underbrace{\bar{D}(r)\left[s_W + \lambda(r)s_\Pi\right]}_{\text{asset demand}} = \underbrace{\frac{1}{r+\delta_K}s_K + Q(r)\omega s_\Pi}_{\text{asset supply}}, \tag{11}$$

(s_K, s_W, s_Π) are the capital, labor, and profit shares. $Q(r) = \frac{1}{r+\delta_C}$ is the valuation multiple for traded equity.

Capital Wedge, Redistribution, and Asset Creation Equation (11) groups the asset market effects of market power into three forces. The Capital Wedge operates through the physical capital supply term $s_K/(r+\delta_K)$: a lower capital share reduces the supply of physical capital and lowers the equilibrium interest rate. Redistribution operates through aggregate asset demand $\bar{D}(r)[s_W + \lambda(r)s_\Pi]$, so the lower labor share and higher profit share enter jointly on the demand side. Asset Creation operates through $Q(r)\omega s_\Pi$: higher profits raise the value of tradable equity and shift asset supply outward. The equilibrium interest rate therefore depends on the balance of these three forces.

Figure 2 visualizes the decomposition in our analytical equation. Aggregate asset demand per unit of output is a weighted sum of workers' and business owners' asset demand per dollar of income. The weights are exactly their shares of national income: the labor share for workers and the profit share for owners. Asset supply consists of physical capital and tradable equity. A higher markup redistributes income by changing these weights: it lowers the labor share and raises the profit share. At a given interest rate, taking a dollar of income from workers and giving it to business owners increases aggregate asset demand, since owners hold more assets per dollar of

income[8]. On the supply side, the same increase in markups lowers the capital share but raises the profit share. The additional profits come from both labor and capital. In the figure, the resulting increase in tradable equity outweighs the decline in physical capital, so total asset supply rises.

Once the asset demand schedule $\bar{D}(r)$, the factor shares (s_W, s_K, s_Π), and the relative wealth-to-income ratio, ownership share, and valuation multiple (λ, ω, Q) are known, equation (11) determines the long run equilibrium interest rate. Section 3.3 uses this characterization to explain how these forces determine the direction of the interest rate response.

3.3 Asset Market Equilibrium: Redistribution and Asset Creation

The existing literature makes different predictions about the effects of profits, or of an increase in market power, on the interest rate. Why can the same increase in market power produce opposite interest rate responses across models? We show that the existing literature corresponds to two limiting cases of our model, which isolate the Redistribution and Asset Creation mechanisms. By considering these two limiting cases, we can see how the balance of these forces determines the interest rate response to an increase in market power.

In the *pure Redistribution limit*, profits are received directly as income by business owners and support asset demand. In the *pure Asset Creation limit*, all profits are capitalized into tradable equity, which entails some implicit but important assumptions. With inelastic asset demand, these cases imply opposite interest rate responses to the same increase in market power.

Assumption 1 (A transparent benchmark)**.** *(i) There is no depreciation: $\delta_K = 0$. (ii) Claims are priced at $Q(r) = 1/r$, with $r > 0$. (iii) Technology is Cobb–Douglas with capital elasticity $\alpha \in (0, 1)$. (iv) Worker asset demand satisfies $d[r\bar{D}(r)]/dr > 0$ over the relevant range of returns.*

Under Assumption 1, asset market clearing per unit of output is

$$\underbrace{\bar{D}(r)\,(s_W + \lambda\, s_\Pi)}_{\text{asset demand per unit of output}} \quad = \quad \underbrace{\frac{s_K + \omega\, s_\Pi}{r}}_{\text{asset supply per unit of output}} .$$

Workers' aggregate saving, or demand for assets, is supported by aggregate wage income, whose share of output is s_W. Profits support firm owners' asset demand through both income from closely held businesses and the proceeds from equity sales, as captured by λs_Π. Higher profits also raise the value of tradable equity in public firms, contributing to asset supply through $\omega s_\Pi / r$. With Cobb–Douglas production, the response of the income shares to a product markup takes a simple form:

$$s_K = \frac{\alpha}{\mu}, \qquad s_W = \frac{1-\alpha}{\mu}, \tag{12}$$

[8]There is a more subtle force that will become transparent in the next section: with an increase in the markup, the increase in the profit share exceeds the decline in the labor share, since the markup is a wedge on both inputs. Thus, even if $\lambda(r) = 1$, Redistribution increases asset demand.

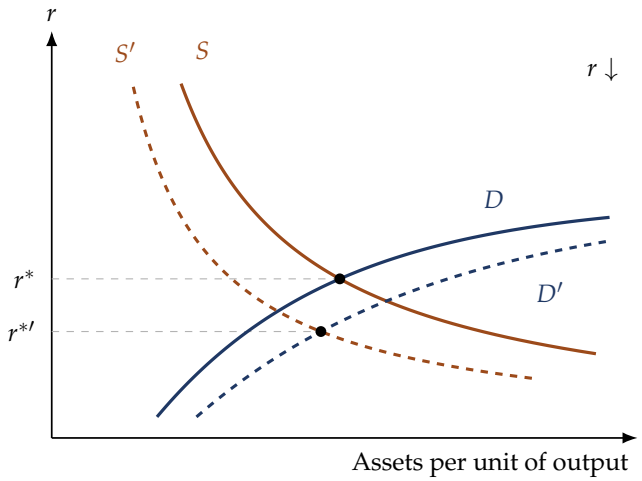


Figure 3: Pure Redistribution. A higher markup lowers the capital share s_K and raises the noncapital income share $s_W + s_\Pi$. Redistribution shifts asset demand outward, the lower capital share reduces asset supply from productive capital, and the equilibrium interest rate falls from r^* to $r^{*\prime}$. In the diagram, D and S denote asset demand and asset supply per unit of output. Primes denote a higher markup.

with profits accounting for the remaining share of output. A higher markup reduces both factor shares and raises the profit share.

Pure Redistribution limit ($\omega = 0$, $\lambda = 1$). In this limit, profits remain as private income, and owners and workers demand the same assets per dollar of income. Treating profits as private business income connects this case to models of entrepreneurship and household wealth accumulation (Quadrini, 2000; Cagetti and De Nardi, 2006). These models emphasize how business income and entrepreneurial saving motives shape owners' asset holdings. We set $\lambda = 1$ to show that Redistribution operates even when owners and workers demand the same amount of assets per dollar of income.

$$\bar{D}(r)(s_W + s_\Pi) = \frac{s_K}{r} \quad \Rightarrow \quad r\bar{D}(r) = \frac{s_K}{1 - s_K} = \frac{\alpha}{\mu - \alpha}. \tag{13}$$

We visualize this scenario in Figure 3. On the demand side, the combination of labor and profit share, $s_W + s_\Pi = 1 - s_K$, supports both workers and firm owner's asset demand. A higher markup lowers s_K and increases resources available for aggregate saving. Redistribution therefore shifts asset demand outward. On the supply side, the lower capital share reduces asset supply from physical capital. At the initial interest rate, asset demand therefore exceeds asset supply and the equilibrium interest rate falls unambiguously.

Pure Asset Creation limit ($\omega = 1$, $\lambda = 0$). In this limit, profits are fully capitalized into tradable equity and contribute to asset supply. This treatment of profits connects our framework to a

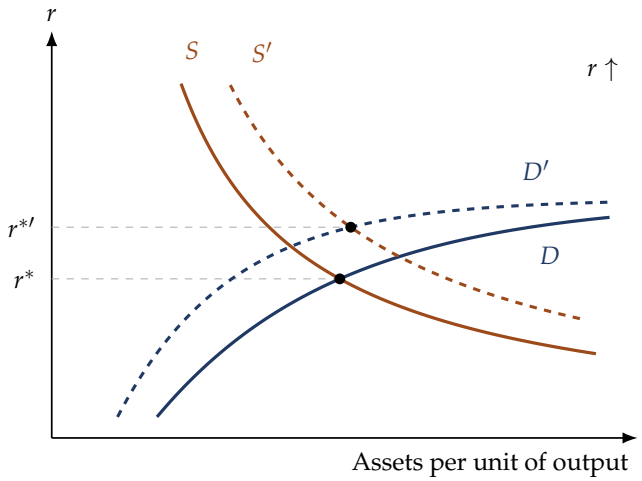


Figure 4: Pure Asset Creation. A higher markup lowers the labor share that supports asset demand and raises asset supply from tradable equity. Asset demand shifts inward, asset supply shifts outward, and the equilibrium interest rate rises from r^* to $r^{*\prime}$. In the diagram, D and S denote asset demand and asset supply per unit of output. Primes denote a higher markup.

large strand of literature that consider the effects of profits as being capitalized into traded equity (e.g., Farhi and Gourio (2018), Auclert and Rognlie (2020), Eggertsson, Robbins and Wold (2021), Impullitti and Rendahl (2025) Auclert et al. (2025)).

But what happens to the proceeds received by the original firm owners that bought those firms to the public? When an owner sells equity to the public, firms owner receives the proceeds from the sale and will contributes to their asset demand. Capitalizing profits therefore does not, by itself, eliminate owners' asset demand. To obtain the pure Asset Creation limit, it is then required that (1) there is no new firm entering into the public traded stock market, (2) founders don't hold any inside equity, and (3) owners drop down these proceeds over time so that it doesn't contribute to their asset demand in the long run. The equity they sold, however, remains permanently tradable and continues to contribute to asset supply.

Formally, set $\theta_F = \delta_C = 0$ and maintain $\kappa > 0$. Every business eventually incorporates into a publicly traded business, its owner sells the entire claim once, and the claim remains permanently tradable. With $\beta_O(1+r) < 1$, owners draw down their assets, yielding $\lambda = 0$ at the endpoint (Lemma 1). Asset market clearing becomes

$$\bar{D}(r)\, s_W = \frac{s_K + s_\Pi}{r} \quad \Rightarrow \quad r\bar{D}(r) = \frac{s_K + s_\Pi}{s_W} = \frac{1 - s_W}{s_W} = \frac{\mu - 1 + \alpha}{1 - \alpha}. \tag{14}$$

Profits now contribute to asset supply only through tradable equity. A higher markup lowers the labor share supporting asset demand and raises total asset supply, $s_K + s_\Pi = 1 - s_W$. At the initial interest rate, asset supply therefore exceeds asset demand, so the equilibrium interest rate rises unambiguously. Figure 4 shows the increase from r^* to $r^{*\prime}$.

In general, our economy lies between these special cases: private profits, retained equity, and

equity sale proceeds support owners' asset demand, while tradable profit claims contribute to asset supply.

The relative wealth-to-income ratio of owners to workers. The two special cases set λ at one and at zero. In the data, wealthy business owners hold substantially more assets per dollar of income than workers (Straub, 2019; Mian, Straub and Sufi, 2021*a*). We capture this difference with the relative wealth-to-income ratio of owners to workers, $\lambda(r)$: when $\lambda(r) > 1$, a dollar of business owner profit income generates more asset demand than a dollar of worker labor income. A larger $\lambda(r)$ therefore strengthens Redistribution. On the supply side, the publicly traded equity share of profits ω and the valuation multiple $Q(r)$ govern Asset Creation.

A higher markup lowers the labor and capital shares and raises the profit share. The additional profit income enters asset demand with weight $\lambda(r)$, while tradable equity enters asset supply with weight $Q(r)\omega$. Naturally, the balance between these two terms determines the sign of the equilibrium interest rate response.[9] The asset demand semi elasticities of workers and owners then govern the size of the interest rate response.

Labor market power. We will discuss the case of labor market power in Section 6. To preview, a wage markdown would allows us to isolate the role of the relative wealth-to-income ratio of owners to workers. Since markdown leaves the capital share unchanged and redistributes income from labor to profits, dollar for dollar. In the Redistribution benchmark with $\lambda(r) = 1$ this redistribution has no effect on asset demand: workers and owners save the same amount per dollar, so aggregate asset demand and the interest rate do not move. With $\lambda(r) > 1$ the same transfer raises asset demand and lowers the interest rate, and the Capital Wedge does not contribute to the interest rate response. Section 6.2 quantifies this mechanism by comparing price markups and wage markdowns at the same profit shares.

3.4 Beyond the baseline

Our analytical representation extends to environments with fiscal policy, more general production technologies, growth, and multiple assets. In each case, market power affects the distribution of income supporting asset demand and the assets available for households to hold. The extensions modify the income shares, household saving responses, or asset valuations that enter the representation. Section 4 examines their quantitative implications, while the appendices provide the derivations.

[9] With a product markup and the local stability condition in Appendix A.8, the interest rate falls when $\lambda > (1-\alpha)Q(r)\omega(r+\delta_K)/\alpha$. In our standard calibration, the threshold is 0.79, well below the measured value $\lambda = 3.31$.

Fiscal policy. With taxes on labor, capital, and profits, together with government debt, asset market clearing becomes

$$\underbrace{\bar{D}(r)\left[\widetilde{s}_W + \lambda(r)\widetilde{s}_\Pi\right]}_{\text{asset demand}} = \underbrace{\frac{\widetilde{s}_K}{r} + Q(r)\omega\widetilde{s}_\Pi + b}_{\text{asset supply}}.$$

Here $\widetilde{s}_W$ and $\widetilde{s}_\Pi$ are after tax labor and profit income shares, $\widetilde{s}_K = rK/Y$ is net capital income paid to savers, and $b = B/Y$ is government debt relative to output. Taxes change the income supporting asset demand, while government debt adds asset supply. Debt service links the two sides through the government budget. Appendix G.2 derives this fiscal sufficient statistic.

Balanced growth. On a balanced growth path, asset market clearing is

$$\underbrace{\bar{D}(r,g)\left[s_W + \lambda(r,g)s_\Pi\right]}_{\text{asset demand}} = \underbrace{\frac{s_K}{r+\delta_K} + \omega Q^g(r,g)s_\Pi}_{\text{asset supply}}.$$

Here g is trend growth and $Q^g(r,g)$ is the valuation multiple for growing publicly traded profit income. Growth changes household asset demand and the duration and value of tradable equity. Appendix G.3 derives $\bar{D}(r,g)$ and $Q^g(r,g)$.

CES production. For the markup experiment with CES production, the corresponding equation at date t is

$$\underbrace{\bar{D}(r)\left[s_{W,t}(r) + \lambda(r)s_{\Pi,t}\right]}_{\text{asset demand}} = \underbrace{\frac{s_{K,t}(r)}{r+\delta_K} + Q(r)\omega s_{\Pi,t}}_{\text{asset supply}}.$$

The labor and capital shares now depend on the equilibrium interest rate. Appendix G.4 gives the exact share functions.

Misallocation. When misallocation affects factor shares, asset market clearing becomes

$$\underbrace{\bar{D}(r)\left[s_W(\Omega,r) + \lambda(r)s_\Pi(\Omega,r)\right]}_{\text{asset demand}} = \underbrace{\frac{s_K(\Omega,r)}{r+\delta_K} + Q(r)\omega s_\Pi(\Omega,r)}_{\text{asset supply}}.$$

In our baseline model, misallocation changes effective TFP without changing factor shares. When factor shares also respond to misallocation, these changes can shift asset demand and asset supply. Appendix A.2 derives this interaction.

Multiple assets. With several assets, the scalar sufficient statistic becomes a vector system:

$$\underbrace{\mathbf{D}(\mathbf{r})}_{\text{asset demand}} = \underbrace{\mathbf{S}(\mathbf{r})}_{\text{asset supply}}.$$

The distribution of income continues to determine total asset demand, while household portfolio choices determine demand for each asset. The discount rate for each asset and firms' financing structures determine the corresponding asset supplies. The two asset extension in Section 6.1 separates the safe return, the equity required return, and the cost of capital relevant for firms' production decisions. Appendix H derives household portfolio choices and the resulting market clearing system.

4 Quantification

We now use our sufficient-statistic characterization of asset market clearing in Theorem 1 to quantify the effects of the secular increase in market power on long-run output and interest rates. Using U.S. data on production costs, inputs, and sales, we estimate the path of annual, aggregate cost-weighted markups μ using the production function approach. We measure the relative wealth-to-income ratio of business owners to workers λ using household balance sheet data and ω using the allocation of aggregate profits earned by U.S. private businesses relative to publicly traded corporations. We then estimate the counterfactual contributions[10] of the estimated path of markups μ starting from a 1980 baseline calibration of the U.S. economy on steady state r and Y year-by-year, as in Auclert et al. (2025); De Loecker, Eeckhout and Mongey (2026), and compare this sequence of steady state allocations to those obtained from the actual transition dynamics given various assumptions on households' foresight with respect to the estimated path of markups $\{\hat{\mu}_t\}_{t\geq 1980}$.

4.1 Estimating the path of market power

To quantify the consequences of aggregate market power, we require a time series for the aggregate markup μ. With heterogeneous firm level markups, the relevant aggregate object for factor payments is the cost weighted markup in (3), equivalently the sales weighted harmonic mean of firm level markups:

$$\mu_t = \left(\sum_i s_{it}\mu_{it}^{-1}\right)^{-1} = \frac{\sum_i p_{it}y_{it}}{\sum_i p_{it}y_{it}/\mu_{it}}, \qquad s_{it} \equiv \frac{p_{it}y_{it}}{\sum_j p_{jt}y_{jt}}. \tag{15}$$

We therefore use this measure throughout the quantification rather than the sales-weighted arithmetic markup commonly reported in the markup literature. We use the estimated series from Ren

[10] That is, holding fixed demographics, fiscal policy, and other important determinants of long-run interest rates (Rachel and Summers, 2019; Auclert et al., 2021*b*; Platzer and Peruffo, 2022; Kopecky and Taylor, 2022).

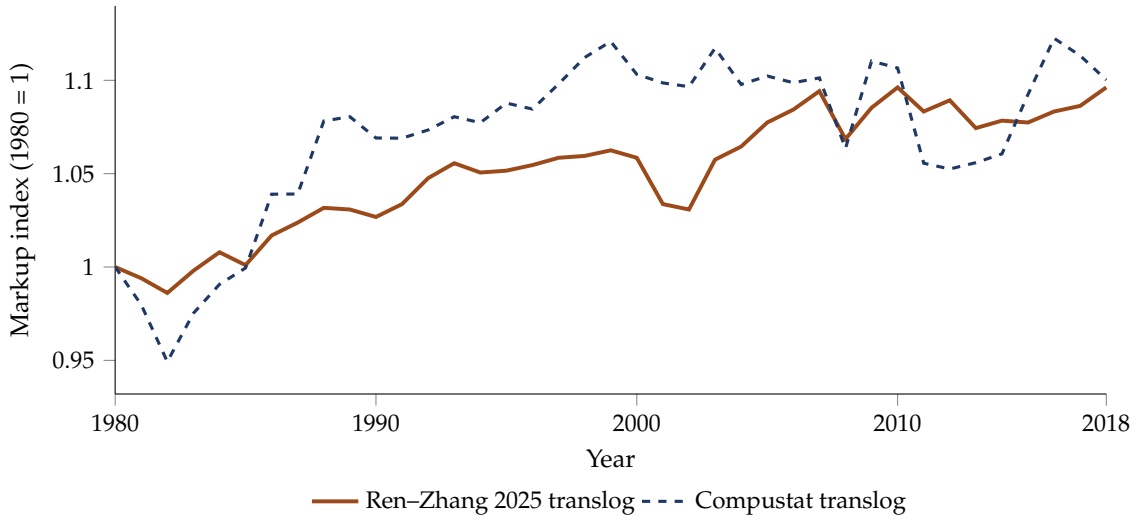


Figure 5: The path of market power. The solid line is the baseline: the index of the measured wedge estimated by Ren and Zhang (2025) on Census matched firms with COGS as the flexible input, built from sales weighted harmonic means of firm level estimates within two digit industries. The dashed line is a translog estimate on the full Compustat sample, the sales weighted harmonic mean across all firms. Both series are normalized to one in 1980.

and Zhang (2025), which estimates markups and markdowns using publicly traded firms matched to the confidential Census Longitudinal Business Database from 1977 to 2019. The Census data provide payroll information that is largely unavailable in Compustat. This matters because COGS includes labor expenditures, so conventional markup measures can reflect both price markups and wage markdowns. After separating the two sources of market power, the secular rise in market power is concentrated in wage markdowns, while price markups remain relatively stable. Section 6 revisits our results under this interpretation, but for now we treat the estimated composite market power series as a markup.

The implied factor shares, through which market power enters the sufficient statistic, are also closer to those observed than under conventional Compustat estimates. There are two reasons. First, the timing lines up with the evolution of factor shares. Conventional Compustat measures place most of the increase in the 1980s, when the U.S. labor share changed relatively little. The Census matched series instead rises gradually through 2010. Second, the increase is modest: the cost weighted markup rises by 9.6 percent between 1980 and 2018, at the bottom of the 10 to 20 percent range of conventional estimates. The estimation follows the production function approach of Hall (1988) and De Loecker and Warzynski (2012) and, as in De Loecker, Eeckhout and Unger (2020), treats cost of goods sold as the flexible input, giving the conventional firm level measure

$$\widehat{\mu}_{it}^{\text{meas}} = \widehat{\theta}_{it}^{v} \frac{\text{Sales}_{it}}{\text{COGS}_{it}}, \tag{16}$$

where $\widehat{\theta}_{it}^{v}$ is the estimated output elasticity of the flexible input. The firm level estimates are

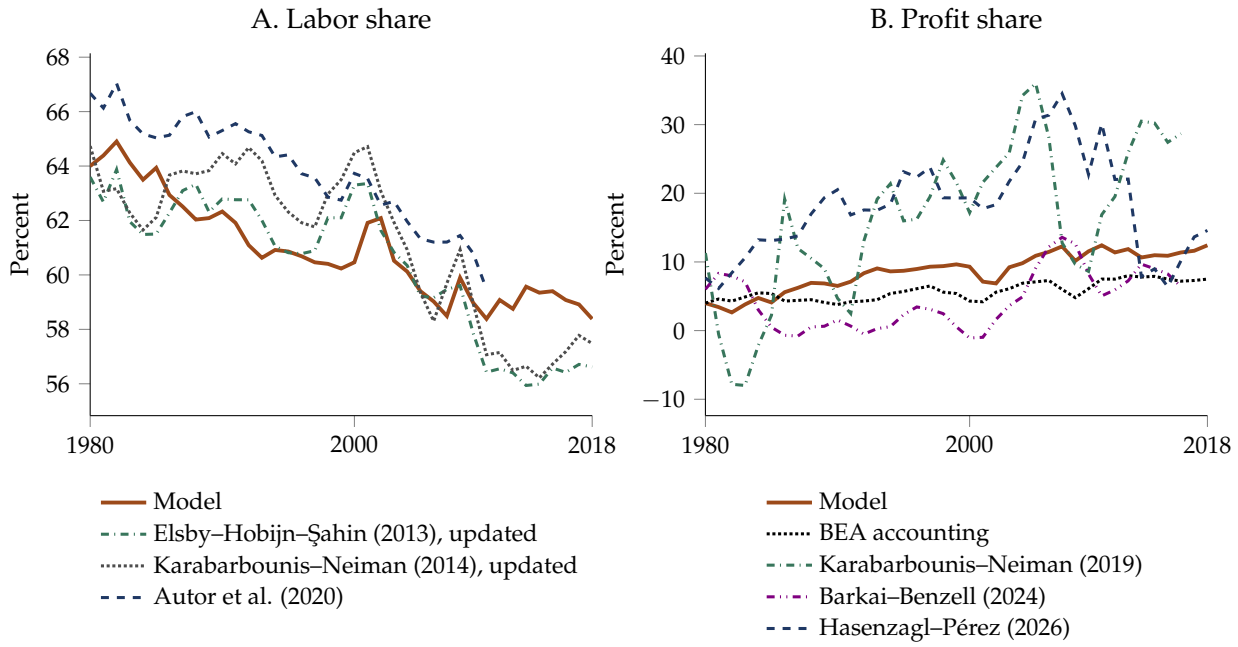


Figure 6: Implied labor and profit shares, 1980–2018. Solid lines are the model shares implied by the measured markup path and the 1980 calibration. The remaining series are the empirical estimates identified in the different papers, as shown in the legends. Shares are in percent; empirical coverage and definitions vary across sources.

aggregated with the harmonic formula (15) within two digit industries and combined into an index I_t of the growth of the measured wedge within industries. We follow the conventional interpretation here and attribute the measured wedge to the product markup μ. Appendix D.1 describes the construction and Appendix D.2 the interpretation.

The production function estimates discipline changes in market power rather than its absolute level (De Ridder, Grassi and Morzenti, 2025). We therefore rebase the index to the model's initial year, 1980, and calibrate the initial level separately:

$$\mu_t^{\text{model}} = \mu_{1980} \frac{I_t}{I_{1980}}, \tag{17}$$

where $\mu_{1980} = 1/(1 - s_{\Pi,1980}) = 1.0417$ is the level implied by the 1980 profit share of 4 percent targeted in Table 2.

Figure 5 plots the resulting index together with a conventional Compustat estimate. The measured wedge rises by 9.6 percent between 1980 and 2018. The increase is modest during the 1980s, continues through the 1990s and 2000s, and is essentially complete by 2010. Through (5), with $s_{W,t} + s_{K,t} = 1/\mu_t$ and $s_{\Pi,t} = 1 - 1/\mu_t$, this path determines the factor shares that enter the Capital Wedge, Redistribution, and Asset Creation terms in the sufficient statistic. The sufficient statistic calculation and the nonlinear transition use the same path.

Figure 6 compares these implied factor shares with the data. The labor share falls from 64.0 to 58.4 percent between 1980 and 2018, while the profit share rises from 4.0 to 12.4 percent, broadly consistent with empirical evidence.

4.2 Measurement and calibration of the model parameters

Publicly incorporated profit share ω^{inc} The profit share of public firms ω^{inc} measures the fraction of aggregate profits generated by publicly incorporated businesses, before accounting for retained equity. Given the difficulty of measuring this concept, we consider three different methods for measuring ω^{inc} and choose a baseline value of $\omega^{\text{inc}} = 0.4$, the midpoint of the three methods.

The most direct measurement of ω^{inc} comes from estimates obtained from IRS data used in Bhandari et al. (2020), which contains reported taxable net income by legal form: C-corporations, S-corporations, partnerships and sole proprietorships. In addition to the aggregate IRS Statistics of Income (SOI) net income measures for each legal form, the authors additionally use the confidential IRS Schedule M-3 microdata to separately compute the net income of public and private C-corporations, using data from 2004 through 2014. The implied ω^{inc} from the aggregated net income measures is 0.39 and with underreporting adjustments for private businesses falls to 0.345. While these data are high quality and allow for the separation of public and private business income using IRS data, there is suggestive evidence that ω^{inc} may have shifted over the past couple of decades: The share of firms that are publicly listed has declined Gao, Ritter and Zhu (2013), listed firms seem to account for a smaller share of economic activity Schlingemann and Stulz (2022), and the relative profitability of public versus private firms also seems to have fallen Davis, Sollaci and Traina (2021).

We use two other measurement approaches for ω^{inc} using U.S. data from 1980. The first combines IRS SOI data and Compustat data on federal tax expense `TXFED` or `TXC - TXFO - TXS`[11] to "gross up" (Manzon and Plesko, 2002) the taxable net income using the top statutory marginal federal corporate income tax at the time of 46%. This calculation yields an $\omega^{\text{inc}} = 0.41$. There are a number of other tax adjustments that may occur in a given year that do not directly affect taxable net income, which might make the gross up method an inaccurate proxy for income. Two adjustments we consider are 1) adding back investment tax credits `ITCI`, which reduce tax liability but not income, raising ω^{inc} to 0.5 from the baseline and separately 2) subtracting the annual increase in the stock of tax-loss carryforwards $-\Delta$`TLCF` lowering ω^{inc} to 0.4. An alternative direct measurement approach uses direct measures of earnings from the BEA, Compustat, and CRSP, computing ω^{inc} as the ratio of total Compustat/CRSP EBIT of publicly traded firms to the total BEA private-enterprise net operating surplus as used in Hartman-Glaser, Lustig and Xiaolan (2019), yielding an $\omega^{\text{inc}} = 0.39$ for nonfinancial firms and winsorized at the 1% level, or $\omega^{\text{inc}} = 0.47$ without these filters. The primary drawback to this measure is the misalignment in geographic coverage in the numerator and denominator. While the EBIT measure in the numerator can include earnings from foreign operations, the BEA operating surplus measure is restricted to domestic earnings.

[11] Total current tax expense minus foreign and state taxes, used as a backup measure if (`TXFED`) is missing.

Retained public equity share θ_F, private IPO rate κ, and public exit rate δ_C The publicly incorporated profit share ω^{inc} and the retained equity share θ_F jointly determine the publicly traded equity share of profits ω. In many countries with public equity markets, a substantial share of public equity remains closely held by insiders, such as the founders that took the companies public and their families or corporate executives (Peter, 2026). We therefore allow for a positive fraction, θ_F, for the retained share of equity of liquid business owners in our model. Drawing on empirical evidence from U.S. data, Using data from the Securities Data Corporation spanning 1970 through 2001, Helwege, Pirinsky and Stulz (2007) document that the average share of insider ownership following an IPO reaches 15% after year 30. Eisfeldt and Shi (2025) construct a new dataset spanning 1996 to 2021 on founder and venture capital ownership and find that by years 10 and 15 the mean retained equity shares are 16.6% and 17.3%. While long-horizon retained equity shares do not necessarily imply literal non-tradability of equity holdings, an assumption that holds in our model, we treat these empirical estimates as suggestive that there may be other preferences or frictions that might induce these concentrated holdings by past founders. We use the Helwege, Pirinsky and Stulz (2007) estimate as our baseline $\theta_F = 0.15$ value. Together with $\omega^{\text{inc}} = 0.40$, this implies $\omega = (1 - 0.15) \times 0.40 = 0.34$.

Because of the simplicity of our stationary model, the public firm exit rate δ_C is overdetermined by a number of independent moments in the data. The key stationary flow condition in our model connects the masses of private N_P and public N_C businesses with the iid transition rate κ from private $P \to L$ and δ_C back from public $L \to P$ to private. By independence of IPO probability across firms, this implies

$$\omega^{\text{inc}} = \frac{N_C}{N_P + N_C} = \frac{\kappa}{\kappa + \delta_C}$$

That is, the profit share of public firms is equivalent to the population share of public firms in stationary equilibrium, which in turn is pinned down by these transition rates. For our model, it is important to align ω^{inc} with the profit share of public firms, which restricts one degree of freedom in determining κ, δ_C.

We consider two separate ways of motivating our baseline estimate of $\delta_C = 0.05$, which in turn pins down $\kappa = 0.03$. First, δ_C determines the average duration of a public claim and consequently the average spell length that a business owner remains liquid. Using CRSP data on firms first listed from 1980-1984, we can calculate the total number of non-financial spells and potentially destructive exits, which includes liquidation, bankruptcy, or other adverse delistings, which yields $\delta_C = 0.049$. A separate way in which δ_C matters is through the aggregate valuation multiple $Q(r)$, where period flow profits that are publicly traded contribute a multiple of $(r + \delta_C)^{-1}$ to total asset supply. Using data from Damodaran (2026) on the aggregate valuation multiple for the S&P 500 in 1980, and given our baseline composite asset return $r = 0.06$, this implies $\delta_C = 0.05$. While we do not technically have an equity premium in our baseline model, in an extension in Section 6.1 we consider a multi-asset framework and align this measured equity valuation multiple with the risky

equity asset there.

Relative wealth-to-income ratio of owners to workers λ Our model allows for differences in total household savings of business owners relative to workers per unit of permanent income earned. The relative wealth-to-income ratio, λ, consequently summarizes the aggregate asset demand shift for a unit of permanent income redistribution between workers and owners.[12]

We use household balance sheet data from the Survey of Consumer Finances (SCF) 1983 wave to separately measure the wealth and income of business owners and workers, focusing on the household population between ages 25-64. In the data, there is a large degree of heterogeneity in the observable characteristics of business owners, which reflects the widely varying motives for becoming an entrepreneur, see Sterk, Sedláček and Pugsley (2021). In lieu of choosing the entire SCF sample of households earning business income to map to our business owner type, we focus on a smaller sub-sample of this population that better reflects the owner type in our model.

The first sub-samples we consider from the SCF are households who are active business owners, operating larger scale businesses as measured by those with annual gross receipts or sales of $\geq$ \$250K and $\geq$ \$500K, which constitute 2.8 and 2.1 percent of the total SCF 1983 household population and 19.8 and 15.2 percent of the total active business owner population respectively. The defining feature of private business owners in our model is that the aggregate component of their flow income is determined by aggregate profits derived from market power. Given recent evidence that a substantial driver of the rise of aggregate markups seems to be a reallocation of economic activity toward larger firms (Autor et al., 2020; De Loecker, Eeckhout and Unger, 2020), this operating scale filter seems to be a reasonable and transparent way to focus on likely business owners of these types of firms. We consider an alternative sub-sample that isolates the subset of business income earners with high incomes, in particular those that fall within the top 5% and 1% of the income distribution in the SCF 1983. The benefit of this screen is that we can also consider the contribution of passive business income earners, tied to the idea in our model that some households may be limited partners, family shareholders, or former owner-operators who have retained equity after sale. In terms of population shares and balance sheet characteristics, households from this income filter are largely similar to those from our operating scale filter. We choose the $\geq$ \$250K subset of households as our baseline specification. We will map our model worker type to households that earn no business income and do not actively or passively own a business. Table 1 summarizes the resulting estimates.

We measure household wealth using the SCF's net-worth measure (`B3323`), subtracting the value of all privately held business equity.[13] This produces the SCF's nonbusiness net-worth

[12] While in our model, $\lambda \neq 1$ follows from workers and business owners differing in terms of their time preferences β and idiosyncratic income processes, an alternative mechanism that yields aggregate asset demand consequences of permanent income redistribution is allowing for non-homothetic preferences for consumption-savings as in Straub (2019); Morrison (2026).

[13] This is given by the sum of equity in businesses in which the household has a management role (`B3502`) and equity

Table 1: Alternative SCF measures of relative wealth to income

Screen	Owner definition	λ_0	Overall population share	Business owner population share
Business sales $\geq$ \$250K (baseline)	Active	3.31	2.83%	19.77%
Business sales $\geq$ \$500K	Active	3.41	2.17%	15.15%
Top 5% of household income	Active or passive	3.13	3.04%	18.50%
Top 1% of household income	Active or passive	3.67	0.80%	4.89%

Notes: The sample is the 1983 SCF population ages 25–64. Workers report no business income and hold no active or passive private-business interest. The income screens rank households in the overall SCF income distribution and include owners with either an active or a passive private-business interest. The business owner share uses all active owners as the denominator for the sales screens and all active or passive owners for the income screens.

measure, B3322. A key distinction required by our model is that the relevant measure of financial wealth to define the numerator of λ does not include the capitalized value of ownership claims to flow labor and private business income. For income, we use total pretax household income (B3201) for business owners, rather than solely relying on reported business and wage income. Using total income reduces the sensitivity of our results to different classifications of business owners' income across sources, consistent with the idea that Smith et al. (2019) find that switching from C-corporation legal status to pass-through reduces reported wages and increases reported profits. However, because total income includes interest, dividends, and capital gains, which our model would classify as asset income, we adjust for this income concept misalignment by adding back interest income in the denominator when aligning the model-implied λ with the SCF λ.

Previously, we described how to construct a "micro-based" measurement of the λ parameter based purely on SCF data. Alternatively, one could rely on the homogeneity properties of aggregate asset demand implied by our model to derive a "macro-based" measurement equation for λ. This calculation measures the relative wealth-to-income ratio of owners to workers, λ, using aggregate owner financial wealth relative to the profit share and aggregate worker wealth relative to the labor share.

$$\lambda = \frac{D_O / s_\Pi}{D_W / s_W} \approx 5.8$$

where the relative wealth ratio $D_O/D_W = 0.36$ is computed from the SCF 1983 and the relative income shares $s_W/s_\Pi = 16$ under our baseline calibration. This calculation for λ is substantially higher than our micro-based approach for two main reasons. First, while the business owner income concept we used in the micro-based approach was purposefully broad to account for potential misclassification, this macro-based approach narrowly defines business income as profit income. While the stark separation of income sources between workers and business owners is useful as a modeling device, it likely understates business income and hence overestimates λ. Second, there is substantial uncertainty around the measurement of the aggregate profit share s_Π itself. We use a more conservative accounting-based measure of the profit share from the BEA NIPA Table

in businesses in which it has no management role (B3501).

1.11: after-tax domestic corporate profits, including inventory valuation and capital consumption adjustments, as a share of gross domestic income, which yields a profit share of about 4% in 1980. Alternative s_Π estimates for 1980 from the literature, such as Karabarbounis and Neiman (2018); Hasenzagl and Pérez (2026), yield 11.3% and 7.7% respectively, implying macro-based λ estimates of 2.0 and 3.0.

Asset demand elasticities for owners and workers The remaining objects in Theorem 1 for us to characterize are the unit-income asset demand curves for workers and owners $\bar{D}(r), \bar{D}_O(r) \equiv \lambda(r)\bar{D}(r)$. In principle, our sufficient-statistics approach could be used without fully specifying and solving the household problem. For example, one could assume that both asset demand curves have constant semi-elasticities, implying

$$\bar{D}(r) = \bar{D}(r_0)\exp[\varepsilon_W(r - r_0)], \qquad \lambda(r) = \lambda(r_0)\exp[(\varepsilon_O - \varepsilon_W)(r - r_0)]$$

Hence, as r changes from its baseline value r_0, the relative wealth-to-income ratio of owners to workers $\lambda(r)$ changes because the savings of one type, say workers, are more sensitive to changes in equilibrium returns. However, existing empirical evidence primarily identifies the aggregate responses of wealth or capital supply to net returns, as opposed to separate estimates based on subsets of the household population, see Moll, Rachel and Restrepo (2022). Using our calibrated model to recover these two group-specific semi-elasticities yields the following estimates

$$\hat{\varepsilon}_W = 16.46, \quad \hat{\varepsilon}_O = 15.49$$

Aggregate asset demand per dollar of income $D(r)$ is the income share weighted average of worker and business owner asset demand per dollar of income at the baseline factor shares.[14] The semi-elasticity of this aggregate asset demand is 16.2963, which lies roughly at the center of the 1 to 35 range from the quasi-experimental estimates described in Moll, Rachel and Restrepo (2022). For simplicity and consistency with the approach that maximizes the use of our analytical equation, we adopt the constant semi-elasticity form for $\bar{D}(r), \lambda(r)$, using $\hat{\varepsilon}_W, \hat{\varepsilon}_O$ from our calibrated model. This approximation is quantitatively accurate, resulting in only a 5 basis point discrepancy in r between the constant semi-elasticity approximation and the full model stationary equilibrium evaluated at the terminal 2018 markup level.

Household model parameters. Workers have mass $N_W = 1 - 0.0283$, and business owners have mass $1 - N_W = 0.0283$, matching the 1983 SCF share of active owners with business sales of at

[14] The weighted average is

$$D(r) \equiv \frac{s_{W,0}\bar{D}(r) + s_{\Pi,0}\lambda(r)\bar{D}(r)}{s_{W,0} + s_{\Pi,0}}.$$

Multiplying by $s_{W,0} + s_{\Pi,0}$ gives aggregate desired assets per dollar of output. This constant normalization leaves the asset demand semi elasticity unchanged.

Table 2: Calibration

Panel A. Parameters and discipline

Parameter	Value	Source / target
Frisch elasticity; EIS	0.50; 0.50	Standard
α	1/3	Standard
δ_K	0.0685	$K/Y = 2.49$; BEA
$\delta_C = \rho_L$	0.05	Exit proxy; Damodaran 1980 P/E
ω^{inc}	0.40	Tax and earnings calculations
ω	0.34	$(1-\theta_F)\omega^{\text{inc}}$
θ_F	0.15	Helwege, Pirinsky and Stulz (2007); Eisfeldt and Shi (2025)
κ	0.0333	Implied by δ_C and ω^{inc} in steady state
Owner fraction	2.831%	1983 SCF active owners; sales at least \$250,000
ρ_e, σ_e	0.91, 0.613	$\text{Var}[\log(\ell_i e_i)] = 0.92^2$; Auclert et al. (2021*b*)
ρ_z, σ_z	0.799, 1.432	DeBacker, Panousi and Ramnath (2023), Tables 2 and 5; log AR(1)

Panel B. Solved parameters

Parameter	Value	Notes
β_W, β_O	0.8872, 0.9032	Targeting $r_0 = 6\%$ and $\lambda_0 = 3.315$
μ_0	1.0417	Targeting $s_{\Pi,0} = 4\%$, implying $s_{W,0} = 64\%$

Notes: The income processes are annual, and σ_e and σ_z are stationary log standard deviations. The baseline profit share is the BEA NIPA accounting measure described above. Given $\alpha = 1/3$, the calibrated markup implies $s_{K,0} = 32\%$ and $s_{W,0} = 64\%$. The SCF target is the private-owner-to-worker wealth-to-total-income ratio, including interest income. The reported λ_0 is its profit-normalized model counterpart.

least \$250,000. Both types have an elasticity of intertemporal substitution (EIS) of 0.5, and workers have GHH preferences with a Frisch elasticity of 0.5. Worker log productivity follows an AR(1) process with persistence 0.91 and stationary standard deviation 0.613. Under GHH preferences, earnings are proportional to productivity raised to 1.5, so this productivity dispersion produces a log earnings standard deviation of 0.92, following Auclert et al. (2021*b*).

Business owners tend to have significantly more volatile income than labor income earners and often earn zero income or incur losses in a given year. Because the richer business income process estimated by DeBacker, Panousi and Ramnath (2023) from IRS microdata includes these zeros and losses, we cannot import it directly as the positive log income process required for our model business owners. In lieu of adding model complications, such as bankruptcy and occupational switching back to being a labor income earner, we instead approximate a positive business income process from the results in DeBacker, Panousi and Ramnath (2023). To do so, we use Table 2 and the interval boundaries in the authors' Footnote 26 to assign deciles to their midpoints. For example, the fifth decile of business income is the range [5000; 9000], which we assign to a realization of 7000. The exterior deciles are unbounded, with $< -6,000$ for the bottom and $> 147,000$. To infer point estimates for these deciles, we choose values to ensure that collectively all deciles produce first and second moments matching their full-sample means and standard deviations reported in their Table 2. We retain the seven deciles with income above \$1,000, condition the Table 5 transition matrix on

remaining within these states, and estimate the best-fitting log AR(1) process on the process implied by the tables. This yields persistence $\rho_z = 0.799$ and stationary log standard deviation $\sigma_z = 1.432$. The resulting dispersion is close to the log standard deviation of 1.466 among SCF active owners ages 25–64 with positive business income.[15] We choose the household discount factors jointly to clear the baseline asset market at $r_0 = 6\%$ and match the SCF relative wealth-to-total-income ratio. This implies $\beta_W = 0.8872$, $\beta_O = 0.9032$, and $\lambda_0 = 3.31$.

4.3 Quantifying the asset market channel

We proceed to use Theorem 1 to map the model-implied factor shares $(s_{K,t}, s_{W,t}, s_{\Pi,t})$ generated by our estimated markup path into our model's implied path of interest rates and output r_t, Y_t. Our sufficient-statistic calculations solve for a sequence of stationary equilibria indexed by the estimated markup $\hat{\mu}_t$ in each year, as in Auclert et al. (2025); De Loecker, Eeckhout and Mongey (2026). For each equilibrium, aggregate prices and quantities, e.g. r_t, Y_t, are constant, while distributions of households and ownership statuses are stationary even as individual households and owners may transition between idiosyncratic states.

These calculations omit the transition dynamics associated with the gradual evolution of states and the anticipation of future aggregate changes. Therefore, we also compute the full transition dynamics of our structural equilibrium model under two sets of assumptions on the degree of foresight of forward-looking agents in our model. In the first case, agents have perfect foresight with respect to aggregate variables upon the unanticipated announcement of the full $t = 1980, ..., 2018$ path of markups $\{\hat{\mu}_t\}$ in period $t = 1980$. We then solve for the full non-linear transition dynamics given this "MIT shock". In the second case, agents are completely myopic and assume that the newly observed markup in the current period $\hat{\mu}_t$ will last indefinitely. At time-t, they still anticipate the gradual transition of endogenous variables back to a steady state indexed by $\hat{\mu}_t$ after the initial surprise of learning $\hat{\mu}_t$, shifting from their prior time-$t-1$ belief that $\hat{\mu}_{t-1}$ would last indefinitely. Hence, we solve for this non-linear transition given this "sequence of MIT shocks", where in each period-t, aggregate state variables may have still been in transition from past-period surprises of learning $\hat{\mu}_{t-1}$ at time-$t-1$, $\hat{\mu}_{t-2}$ at time-$t-2$ and so on.

Figure 7 displays the path of rates r_t implied by our sufficient-statistic calculation, and the perfect foresight and myopic transition dynamics, and their common stationary endpoint after 2018 once markups $\hat{\mu}_t$ cease to change. The perfect-foresight path responds when the future markup path is announced: r initially rises by 11.4 basis points, while the myopic and sufficient-statistic paths begin at the 1980 baseline. The perfect-foresight path tends to move in advance of the other paths, although all three remain close. By 2018, the interest rate responses are -94.0, -103.2, and -97.6

[15] DeBacker, Panousi and Ramnath (2023) also report an analogous transition matrix for labor earnings in Table 6. Applying the same procedure, with the open top decile chosen to match average labor earnings in Table 3, implies persistence 0.880 and a stationary log earnings standard deviation of 0.866. Under GHH labor supply, this corresponds to a standard deviation of the productivity process of 0.577, close to the persistence of 0.91 and productivity standard deviation of 0.613 in our Auclert et al. (2021*b*) calibration.

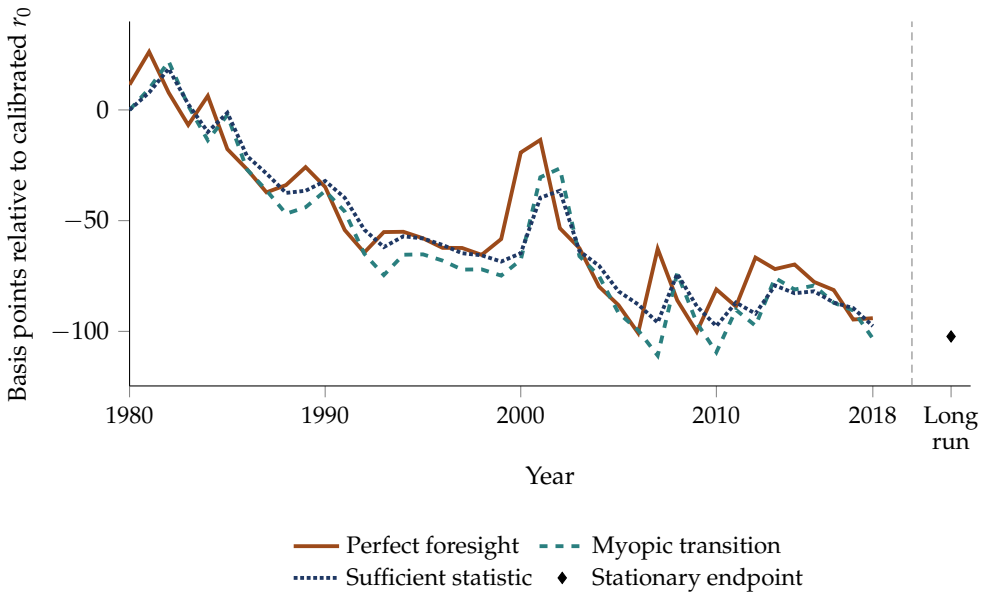


Figure 7: Interest rate r along the perfect foresight transition, the myopic transition, and the two-group sufficient statistic. All three use the same cost-weighted markup path and report changes from the calibrated 1980 economy in basis points. The diamond reports the stationary equilibrium associated with the 2018 markup.

basis points under perfect foresight, myopic expectations, and the sufficient statistic, respectively, with a long-run response of -102.3 basis points.

Comparisons to benchmark assumptions on asset markets In our model, profits directly accrue to private business owners as income or to liquid owners as wealth after taking their companies public, where the profits associated to the businesses sold by liquid owners are capitalized and publicly traded as equity. The existing literature has often made simplifying assumptions, either that all profit income is directly earned by the business sector as in the entrepreneurship literature (Quadrini, 2000; Cagetti and De Nardi, 2006), or that all profit income is capitalized and traded in equity markets (Farhi and Gourio, 2018; Eggertsson, Robbins and Wold, 2021; Auclert et al., 2025).

Figure 8 shows how these different assumptions on the ownership of profits changes the response of rates r through asset markets to our estimated markup path, and consequently of output Y to the endogenous response of the user cost of capital induced by r. Additionally, we plot the response of output Y under the representative household benchmark, where the rate is fixed $r = \beta^{-1} - 1$ by the discount rate. The calculations displayed in Figure 8 are sequences of steady states implied by our sufficient-statistic formula.

To construct the "Pure Redistribution" path, we set $\kappa = \omega = 0$, so all profits directly accrue to private business owners who never IPO and enter into the liquid state. Since private business owners face idiosyncratic risk and now have more income, they increase their demand for diversified assets, which pushes r downward. To construct the "Pure Asset Creation" path, we set

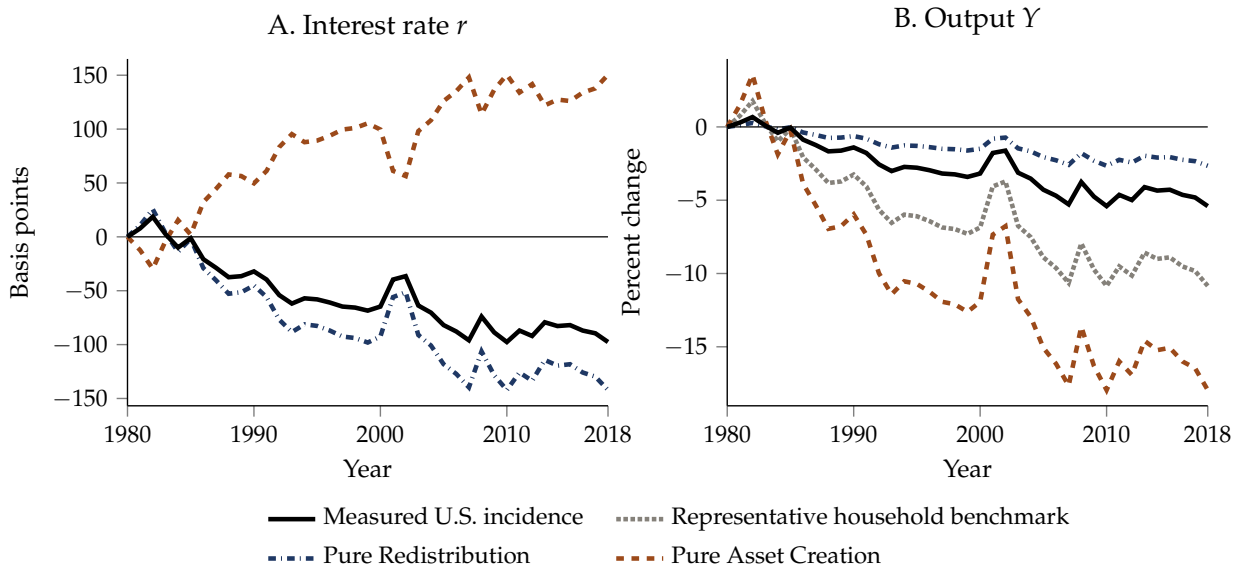


Figure 8: Ownership and the markup counterfactual. Interest rate r and output Y responses under alternative incidence assumptions, together with the representative household benchmark. The two-group sufficient statistic uses the same cost weighted markup path in all cases. Changes are relative to the calibrated 1980 economy.

$\lambda_0 = \theta_F = \delta_C = 0$ and consequently $\omega = 1$. This case can be interpreted as all private business owners eventually selling their claims in an IPO and perpetually remaining as liquid owners without any retained equity. They draw down their assets over time until they make a negligible contribution to aggregate asset demand resulting in $\lambda_0 = 0$. One can essentially reinterpret existing models that assume all profit income is capitalized and traded as following from this sequence of assumptions in our model. Now because all profit income is steadily increasing and fully capitalized, the total market value of publicly traded equity is increasing. To clear asset markets, the return on this asset r must rise to induce households to be willing to save more to hold this increasing stock of assets in equilibrium.

Panel A of Figure 8 shows that the implications of these different assumptions for the path of rates r are quantitatively significant. Under "Pure Redistribution", rates r fall by 142.2 basis points, whereas under "Pure Asset Creation" rates r *rise* by 150.5 basis points. Given our calibration on U.S. data, where a significant portion of profits are earned by private businesses and a non-trivial share of publicly traded equity is retained by insiders, our calibrated model finds that rates r fall by 97.6 basis points by 2018. Panel B of Figure 8 shows that these interest rate responses substantially change the output effect of heightened markups. Output falls by 2.65 percent under Pure Redistribution and by 17.95 percent under Pure Asset Creation. Under measured U.S. incidence, the output response is -5.40 percent, compared with -10.85 percent in the representative household benchmark, where the rate r is fixed.

Figure 9 decomposes the analytical equation response into the Capital Wedge, Redistribution,

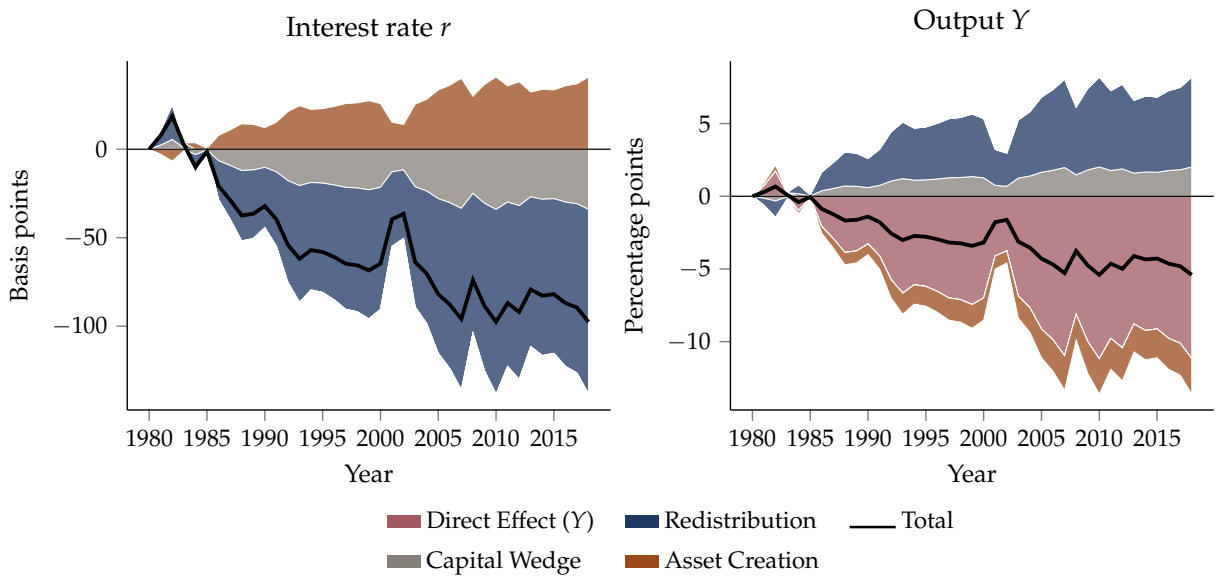


Figure 9: Decomposition of the markup counterfactual. The left panel reports contributions to the interest rate r response in basis points. The right panel reports percentage-point contributions to output Y, separating the Direct Effect in the output equation from the Capital Wedge's effect through the endogenous interest rate. In both panels, the black line is the total two-group sufficient-statistic response relative to the calibrated 1980 economy.

and Asset Creation. For output, we separate the Direct Effect of the markup on capital and labor demand from the Capital Wedge's effect through the endogenous interest rate. Following Shapley (1953), we average each force's marginal contribution across all orderings of the three interest rate forces or four output forces. By 2018, Redistribution contributes -104.4 basis points to the interest rate response, more than offsetting the 40.8 basis point increase from Asset Creation. The right panel shows that Redistribution and the Capital Wedge's interest rate effect mitigate the direct output loss from the markup's distortions of capital and labor demand.

Figure 10 extends our output mitigation result to more sophisticated production specifications. Under our calibration, replacing the representative household with our heterogeneous households reduces the output loss from 10.85 to 5.40 percent. Under the production calibration of Edmond, Midrigan and Xu (2023) (EMX), which incorporates material inputs into production, and with separable log preferences over consumption, the same change reduces the output loss from 14.28 to 2.95 percent. The asset market channel thus mitigates 50 or 79 percent of the respective output losses.

4.4 Historical evolution of wealth and asset prices

Can changes in market power explain the historical decline and subsequent rise in wealth concentration and asset values? To examine this question, we extend the historical comparison back to 1962, covering both the decline in markups into the early 1980s and their subsequent rise.

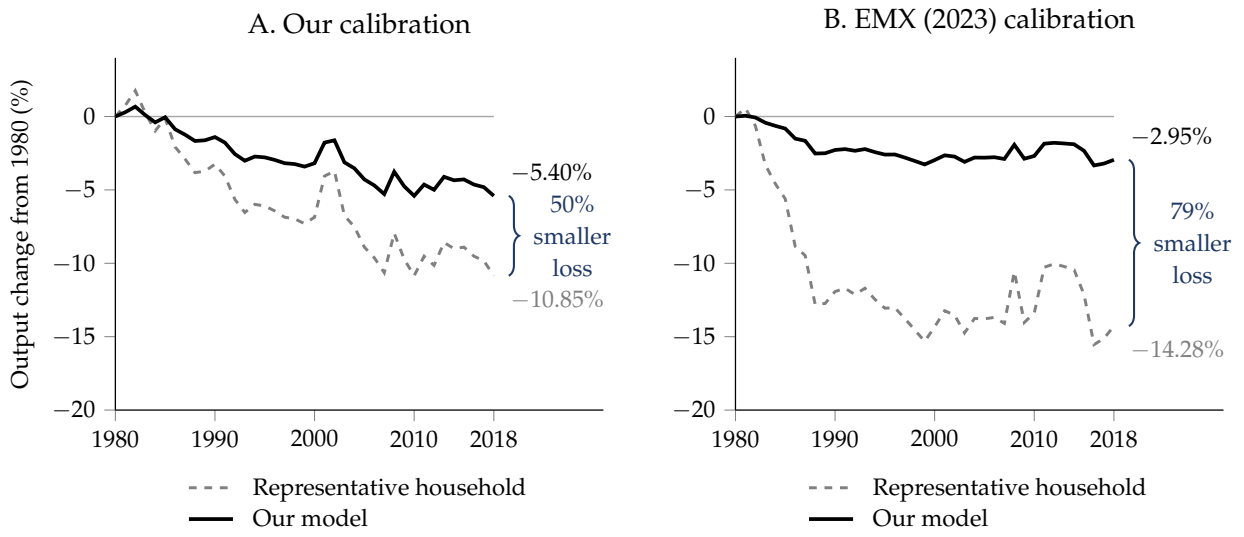


Figure 10: Output mitigation under our calibration and the EMX (2023) calibration. Each panel compares our heterogeneous household economy with the corresponding representative household economy. Panel A uses the two-group sufficient statistic and the Census matched markup path; Panel B uses stationary EMX production allocations and the Compustat markup path. The black and gray lines show sequences of stationary equilibria.

We recalibrate the initial stationary economy to 1962 macroeconomic moments and the top decile wealth share, then feed the observed markup path into the model.

Figure 11 compares the resulting paths with the data. In the data, wealth concentration and asset values fall alongside markups, then rise as markups recover. The model with myopic expectations generates this broad reversal in wealth concentration and equity values. Perfect foresight substantially smooths the response. Overall, changes in market power can help explain both the earlier decline and the subsequent rise in wealth concentration and asset values. Allowing for some anticipation, short of perfect foresight, brings the model very close to the observed dynamics.

4.5 Model extensions

The interest rate decline remains large across the model extensions in Table 3. Each exercise adds one feature to the baseline price-markup counterfactual and uses the corresponding sufficient statistic from Section 3.4. Appendix G re-solves the household problem when an extension changes the calibrated 1980 economy.

Balanced growth produces the largest attenuation, reducing the interest rate decline from 97.6 to 87.2 basis points. Fiscal policy and CES production imply responses of -96.1 and -95.6 basis points, respectively. The local misallocation exercise moves the baseline interest rate by at most 8 basis points. These exercises retain a common return on physical capital and tradable equity and treat market power as a price markup. Section 6 studies the wage-markdown and multiple-asset

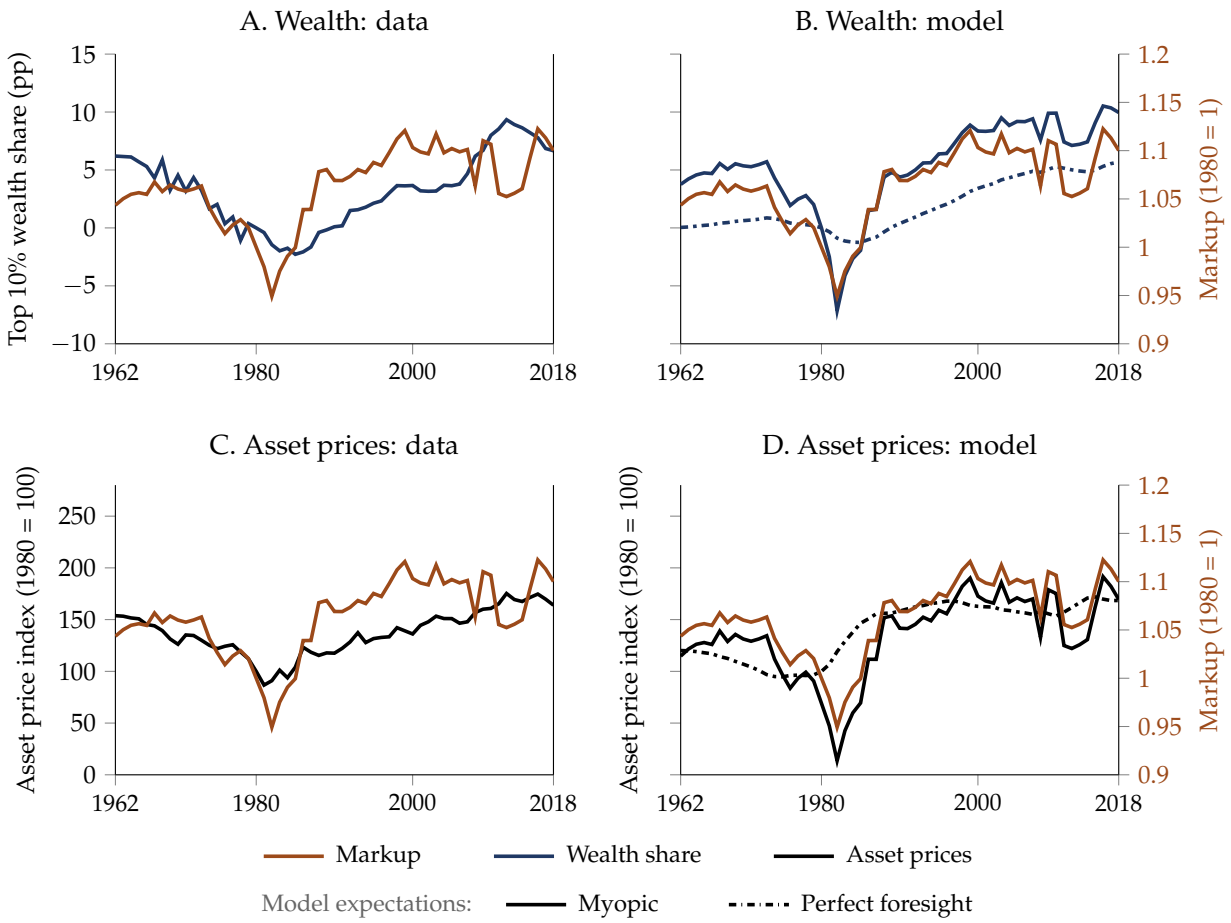


Figure 11: Markups, wealth concentration, and asset prices, 1962–2018. Wealth shares (data: WID) are percentage-point changes from each series' 1980 level. Markups use the shared right axis (1980 = 1). The Treasury price proxy, $(1+r)^{-10}$, is indexed to 100 in 1980; both model asset price paths use the perfect foresight 1980 value as their common base. Solid and dot-dashed model paths denote myopic expectations and perfect foresight, respectively.

extensions.

Finally, Appendix E.8 varies key parameters λ and ω, and provides a heatmap on the sensitivity of the interest rate and output response. Appendix E.6 reports how asset demand elasticities change between the baseline and long run stationary equilibria.

5 Welfare

The asset market channel dampens output loss from the production distortions of market power. In spite of this, we show that the welfare effects of market power in our model are significantly amplified due to its negative distributional consequences.

We proceed by quantifying the welfare effects of our estimated, increasing path of markups from Section 4.1. Welfare is measured in consumption equivalent variation (CEV) units, the permanent

Table 3: Interest rate response across model extensions

Specification	Added feature	2018 response (bp)	Difference from baseline (bp)
Baseline	None	-97.6	0.0
Fiscal policy	Taxes on labor, profits, capital, and government debt	-96.1	$+1.5$
Balanced growth	Trend growth of 2 percent	-87.2	$+10.4$
CES production	Substitution elasticity $\sigma_{KL} = 0.7$ in place of Cobb–Douglas	-95.6	$+2.0$
Misallocation	A 3 percent productivity loss with aggregate wedges fixed, $\sigma_{KL} \in [0.6, 1.2]$	n.a.	$\lvert\Delta r\rvert \approx 8$

Notes: Responses use the baseline calibration in Table 2, with a 6 percent 1980 interest rate and a 4 percent initial profit share, and are changes from that 1980 interest rate. A positive difference from the baseline denotes a smaller interest rate decline. The household block is re-solved where the 1980 problem changes. The misallocation row bounds a local change from the 1980 baseline under a separate productivity perturbation, rather than a 2018 markup-path response. Appendices G.3 and G.4 report the exact stationary heterogeneous agent solutions as checks; the misallocation exercise provides only a local bound.

proportional change in the initial consumption path prior to the markup transition required to match discounted, lifetime utility along the post-markup transition path. We evaluate this measure separately under perfect foresight and myopia as in Section 4.3. Note that in this section we do not rely on the sufficient-statistics calculation. All results follow from actual dynamic transitions.

Table 4 summarizes our main welfare findings. The first two rows report our earlier results, which show that under our baseline heterogeneous-agent (HA) model with workers and owners, the long-run output decline from the increase in market power from 1980 to 2018 is mitigated by about 50% relative to the representative household (RA) benchmark.

Are aggregate quantities, such as a smaller decline of aggregate output or consumption, informative about the magnitude or direction of the average welfare consequences of markups? As a benchmark, we compute a CEV welfare loss of -0.32% for a representative household given the estimated markup transition path. As an illustrative experiment, we apply the same representative household's preferences (equivalently, the preferences of our worker type) to the equilibrium paths of aggregate consumption and labor generated by our baseline HA model (row four of Table 4). The welfare loss to a representative household given these allocations is -0.18% CEV units, a nearly 50% welfare loss mitigation. Nonetheless, we show in Panel B that the actual welfare effects of market power in our model are significantly larger due to its heterogeneous incidence.

The population-level CEV in our model, which is the common proportional change in baseline consumption that equates population share-weighted lifetime utility to that under the markup transition, is -1.52 percent. This substantially larger welfare loss compared to the RA benchmark is driven by the welfare losses of the large worker population, at the benefit of the smaller business owner population.

The welfare effects of market power are more unequal under perfect foresight than under myopia. One of the primary driving factors is the larger revaluation effect on public equity claims

Table 4: Long run output and welfare consequences of market power

Outcome	Perfect foresight	Myopic
Panel A. Model aggregates and representative-agent welfare		
Long run output change, RA	-10.85%	
Long run output change, HA	-5.12%	
RA CEV with RA allocations	-0.32%	-0.25%
RA CEV with HA allocations	-0.18%	-0.15%
Panel B. Welfare heterogeneity in our model		
Population-level CEV	-1.52%	-1.43%
Worker type-level CEV	-1.65%	-1.53%
Business owner type-level CEV	+20.04%	+14.71%

Notes: Long run output compares stationary equilibria at the 2018 and initial markups, so each value spans both expectations columns. All CEVs use a permanent proportional change in baseline actual consumption. For myopic expectations, the final markup observation supplies the infinite welfare horizon. The population-level CEV uses the model's cardinal normalization across types. The welfare figure below uses perfect foresight.

that occurs under perfect foresight. Wealthier business owners, who hold a substantial share of aggregate wealth, gain disproportionately more from the wealth effects due to this markup-induced asset revaluation than workers who hold less per capita wealth. In addition, because of the large valuation increase in aggregate equity under perfect foresight, suddenly a larger quantity of assets has to clear asset markets in the initial period. This induces an increase in the equilibrium r relative to the myopic case, where the valuation effect is smaller given only a single, one-time markup increase is expected to persist compared to the steady markup increase over time under foresight. This relatively higher r then crowds out capital K, further lowering wages for workers beyond the direct distortions induced by the realized markup increase.

Figure 12 further decomposes the welfare effects to the individual-level CEVs and orders them across the CEV distribution to show the heterogeneity in welfare loss within types. Unsurprisingly, workers lose and business owners gain across their full within-type distribution, with business owners entering their IPO gaining the most. Appendix Sections E.2 and E.3 provide the representative-household benchmark, formal CEV definitions, and supplementary welfare source decomposition and figures for further reference. The bars in Figure 12 decompose the sources of this incidence. Lower labor income accounts for most worker losses, while business income and IPO transfers account for most owner gains. Date-0 revaluation partly offsets some worker losses. More defails are shown in Figure E1.

6 Generalizations: multiple assets and labor market power

So far, our analysis of the asset market channel has focused on a single asset class, where markup changes both asset demand and asset supply in a single asset market. In this section, we

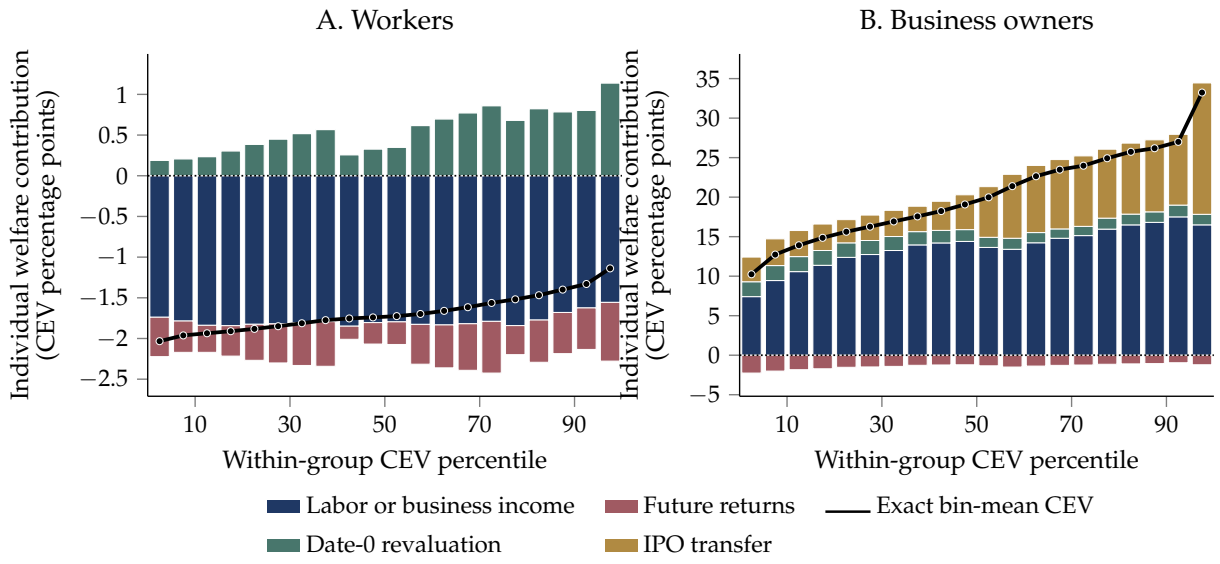


Figure 12: Sources of individual welfare effects under perfect foresight. Within each household type, households are sorted by individual CEV into 20 equal mass bins. Colored bars show income and asset return contributions in CEV percentage points; the black line shows the exact mean CEV in each bin.

propose two key extensions of our model framework. We first consider the implications of the asset market channel when there are multiple asset classes, safe and risky assets, whose asset demand and supply might differentially affected by an increase in market power. This results in differential implications of market power on returns across asset classes. We apply this generalized framework to study the effects of market power on the increasing market value of U.S. public equity and the evolution of the equity premium. We next consider the implications of the asset market channel when firms have market power over factor input markets. Concretely, we will consider the case of where the increase of market power is in fact, driven by labor market power, as suggested by Ren and Zhang (2025).

6.1 Multiple assets

In the one asset economy, the interest rate r determines both the financing cost of physical capital K and the value of tradable equity. We separate these roles by introducing a safe asset class and a risky asset class into the economy with a fiscal authority, specified and discussed in full in Appendix G.2. Household saving determines total asset demand D, while portfolio choice allocates it across the two markets. Appendix H gives the full household problems and derives the equilibrium conditions. The key distinction is that Redistribution increases household demand for both safe and risky assets, while Asset Creation expands only the supply of risky equity. This asymmetry will be proven to increase the equity premium, allowing the safe return and the equity required return to respond differently to market power. Let r^b denote the safe return and r^e the

equity required return, and write

$$\mathbf{r} = (r^b, r^e).$$

Physical capital is financed by a share θ of bond-like claims and a share $1-\theta$ of equity. Its cost of capital is therefore

$$r^c(\mathbf{r}) = \theta r^b + (1-\theta) r^e.$$

The tax-adjusted user cost of capital, same as in the fiscal extension in Appendix G.2 maps r^c into firms' demand for physical capital. On the other hand, tradable equity backed by aggregate profit income Π is instead discounted at the equity required return, with valuation multiple per dollar of publicly traded profit income

$$Q^{\Pi}(r^e) = \frac{1}{r^e + \delta_C}.$$

The cost of capital r^c therefore takes the role of r in transmitting the asset market response to output Y through the user cost of physical capital K. Government debt belongs to safe asset supply and pays r^b. The two returns consequently play different roles even before household portfolio choice is introduced: r^c governs the user cost of physical capital, r^e governs the value of tradable equity, and r^b governs government debt service and safe claims to productive capital.

Asset market clearing. For group $g \in \{W, O\}$, workers and owners, let D_g denote total asset demand and ϕ_g its equity share. Homogeneity in each group's income scale gives the following extension of Theorem 1:

$$\underbrace{\bar{D}(\mathbf{r}) \begin{pmatrix} [1-\phi_W(\mathbf{r})]\widetilde{s}_W + \lambda(\mathbf{r})[1-\phi_O(\mathbf{r})]\widetilde{s}_\Pi \\ \phi_W(\mathbf{r})\widetilde{s}_W + \lambda(\mathbf{r})\phi_O(\mathbf{r})\widetilde{s}_\Pi \end{pmatrix}}_{\text{asset demand}} = \underbrace{\begin{pmatrix} \theta \dfrac{s_K}{u_K(\mathbf{r})} + b \\ (1-\theta)\dfrac{s_K}{u_K(\mathbf{r})} + Q^{\Pi}(r^e)\omega\widetilde{s}_\Pi \end{pmatrix}}_{\text{asset supply}}. \tag{18}$$

Here $\widetilde{s}_W$ and $\widetilde{s}_\Pi$ are after tax labor and profit income shares, $\bar{D}(\mathbf{r})$ is worker asset demand per dollar of after tax aggregate labor income, and $\lambda(\mathbf{r})$ is the relative wealth-to-income ratio of owners to workers. The tax-adjusted user cost $u_K(\mathbf{r})$ determines physical capital relative to output, $K/Y = s_K/u_K(\mathbf{r})$, and $b = B/Y$ is government debt relative to output. The first row clears the safe asset market. Its supply consists of the bond-like claims financing physical capital and government debt. The second row clears the equity market. Its supply consists of the equity financing physical capital and the tradable equity created by Asset Creation.

The seemingly more complex representation is closely related to the one-asset analytical equation. Adding the two rows recovers the aggregate asset-market accounting of the one-asset model: Redistribution still determines how much total asset demand is generated by the shift in income toward business owners, while Asset Creation still adds the value of tradable equity to total asset supply. Importantly, Redistribution and Asset Creation affect the two asset markets differently.

Redistribution increases household demand for both safe assets and equity, putting downward pressure on both returns. Asset Creation, however, expands only the supply of tradable equity, putting upward pressure on the equity required return relative to the safe return.

Household asset demand and portfolio allocation. We discipline households' asset demand by restricting attention to two responses: how total asset demand D_g changes with the level of returns, and how the equity share ϕ_g changes with the equity premium, consistent with the empirical evidence documented in Ring (2025). The household problems in Appendix H allow for aggregate and idiosyncratic risk while preserving homogeneity in income. We combine asset demand responses from the calibrated household problems with an empirical portfolio response rather than estimate a particular portfolio friction. Around the baseline asset demand system, we parameterize these local responses as

$$\begin{pmatrix} d\log D_g \\ d\phi_g \end{pmatrix} = \begin{pmatrix} \epsilon_g(1-\phi_{g,0}) & \epsilon_g\phi_{g,0} \\ -\eta_g & \eta_g \end{pmatrix} \begin{pmatrix} dr^b \\ dr^e \end{pmatrix}.$$

The first row captures the response of total asset demand to changes in the level of returns, weighted by the household group's baseline portfolio shares, with semi-elasticity ϵ_g. That is, to first order, the changes in the equity premium have no additional effect on total desired assets beyond their effect on this weighted return. The second row captures portfolio reallocation: the equity share responds to the equity premium with slope η_g,

$$d\phi_g = \eta_g\, d(r^e - r^b).$$

Thus, ϵ_g governs how much households wish to save, while η_g governs how they allocate their savings between safe assets and equity.

The distinction is also consistent with the available empirical evidence. Ring (2025) studies household saving responses to wealth taxation, which changes after-tax asset returns broadly, and finds a substantial response of financial saving with relatively little movement in portfolio shares. We therefore take the total asset demand responses from the one asset fiscal household calibration. For portfolio composition, we use the long run response of equity holdings to the equity premium estimated by Fagereng, Guiso and Ring (2026). Their design exploits the 1998 removal of preferential wealth-tax treatment of equity in Norway. Because our exercise concerns long run risky steady states, we use their long run estimate rather than the shorter horizon response. Shorter horizon estimates imply substantially weaker portfolio responses, consistent with evidence of limited portfolio rebalancing at higher frequencies (also see Gabaix et al. (2023)) as documented by the same paper, but are less relevant for our exercise. However, if we were to use the short run response, the equity premium would rise more, and the risk free rate would fall more, an intuitive result that will become even more transparent after our discussion of the quantitative results.

We compare *risky steady states* as the markup changes: the realized allocation at the mean aggre-

gate state once the wealth distribution has adjusted, with households still facing and internalizing the same aggregate and idiosyncratic risk. In our approximation, the asset demand semi elasticities and portfolio slopes summarize household responses around the baseline, including precautionary and hedging motives. For each markup, the pair (r^b, r^e) clears the safe asset and equity markets jointly, while the government budget determines the balancing labor tax and the cost of capital and equity values adjust with the two returns.[16]

Calibration. The asset demand responses carry over directly from the one asset household block with fiscal policy in Appendix G.2. The asset demand semi elasticities are

$$\epsilon_W = 18.13, \qquad \epsilon_O = 16.89.$$

These determine how much total desired wealth workers and business owners demand in response to the return on their respective reference portfolios. Differences in wealth holdings per dollar of income between the two groups continue to be summarized by the relative wealth-to-income ratio of owners to workers. Because this extension includes the fiscal closure, the relevant relative wealth-to-income ratio of owners to workers, measured using after-tax income, is $\lambda = 3.05$.

We calibrate the initial asset market equilibrium using aggregate financing conditions and household portfolio evidence. We retain the 6.00 percent baseline cost of capital, set the initial equity premium to 5 percentage points, and fix the debt financing share at $\theta = 0.33$. Given the resulting asset supply, we choose the total asset demand level and the portfolio shares of workers and business owners to clear both asset markets, preserving the difference between their equity shares measured in the SCF. This gives

$$\phi_{W,0} = 60.06\%, \qquad \phi_{O,0} = 63.40\%.$$

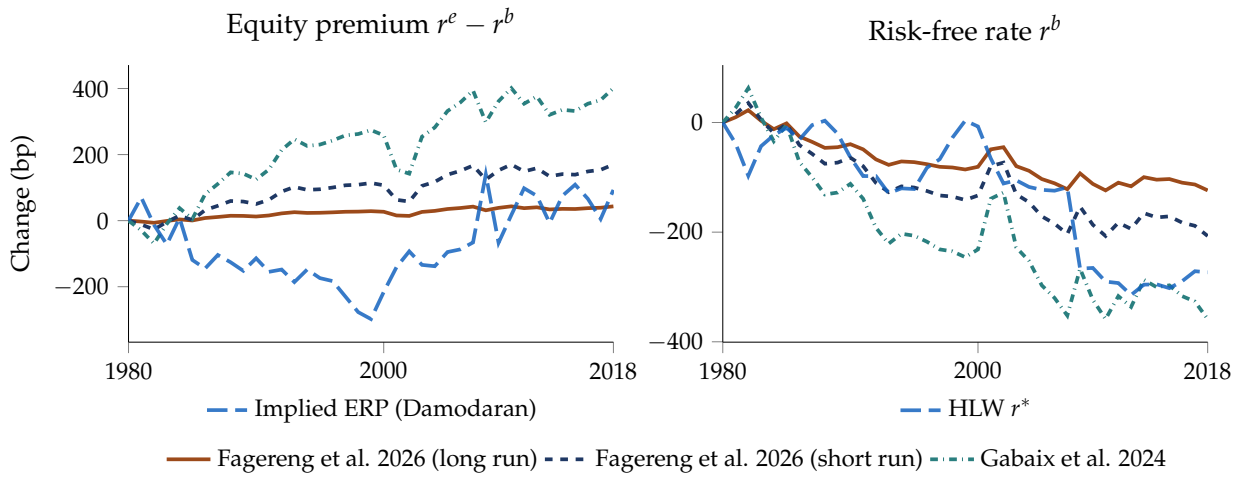
For portfolio allocation, the long run estimate of Fagereng, Guiso and Ring (2026) implies

$$\eta_W = \eta_O = 6.9.$$

Thus a 100 basis point increase in the equity premium raises the equity share by 6.9 percentage points. We apply the same slope to workers and business owners. The initial financing share and returns are $r_0^b = 2.65\%, r_0^e = 7.65\%, r_0^c = 6.00\%$. The equity required return therefore exceeds the cost of capital by 1.65 percentage points at the baseline. This gap will matter directly for Asset Creation because future tradable equity is discounted at r^e, rather than at r^c.

The remaining fiscal objects are inherited from Appendix G.2: government debt held by the public is 26.2 percent of GDP, the initial effective labor tax is 26.4 percent, the marginal corporate-tax

[16] Away from the baseline, a logit schedule extends the equity share response while reproducing the local estimate η_g.



2018 change (bp)	η	Δr^b	Δr^e	$\Delta(r^e - r^b)$	Δr^c	ΔY (%)
Fagereng et al. 2026 (LR)	**6.9**	**−123.8**	**−80.5**	**+43.3**	**−94.8**	**−5.00**
Fagereng et al. 2026 (SR)	1.63	−207.1	−37.1	+170.0	−93.2	−4.85
Gabaix et al. 2024	0.6	−358.6	+42.5	+401.0	−89.9	−4.62

Figure 13: Equity premium and risk free rate under alternative portfolio substitution estimates. Model paths and the table compare risky steady states along the markup transition path.

user-cost factor is 1.331, and the other fiscal ratios are held at their matched 1980 values. [17]

Quantitative results. Figure 13 visualizes the path of equity premium and risk free rateunder different elasticity of portfolio substitution. More inelastic portfolio reallocation raises the equity premium response from 43 to 401 basis points, while the cost of capital continues to fall by about 90–95 basis points. In our long run calibration, output falls by 5 percent, essentially the same loss as in the one asset economy. Introducing multiple assets therefore preserves our output mitigation result. However, give our interest of investigating the long-run effects of the markup increase, we uses the long-run estimate of portfolio substitution from Fagereng, Guiso and Ring (2026), instead of the short run estimate reported in the same paper or the calibrated portfolio response in Gabaix et al. (2024). Overall, this empirical exercise shows that an increase in market power contributes to the observed changes in ex-ante equity premium.

Appendix Figure H1 reports these returns across the dated markup values. The cost of capital r^c lies between the safe return r^b and equity required return r^e and remains close to the matched one asset fiscal return.

[17] Government debt now pays r^b rather than the common one asset return. We therefore adjust the residual fiscal term so that the two asset economy reproduces the same 26.4 percent labor tax in 1980. This keeps the comparison focused on the change in asset structure rather than a different initial fiscal position.

Equity valuation and portfolio allocation. The decline in the cost of capital in the two asset economy is close to that in the one asset benchmark. Tradable equity is discounted at the equity required return r^e, which exceeds the cost of capital r^c. Holding the claim decay rate fixed, this reduces the market value of tradable profit claims, weakening Asset Creation relative to Redistribution. At the baseline, however, the lower effective claim decay rate more than offsets this discount rate difference: the profit valuation multiple is 9.26, compared with 9.09 in the one asset benchmark. In our calibration, the cost of capital falls by 94.8 basis points, compared with 96.1 basis points in the one asset benchmark.

Mechanism. Overall, the two-asset economy introduces two new economic mechanisms. First, tradable equity is discounted at the equity required return r^e, which exceeds the cost of capital r^c. Holding the claim decay rate fixed, this lowers the market value of tradable profit claims relative to the one-asset economy, weakening Asset Creation as a counterforce to Redistribution. The lower claim decay rate offsets this valuation effect in the calibration.

Second, the two forces affect safe and risky asset markets differently. Redistribution raises household demand for both assets, while Asset Creation expands only equity supply. Thus, Asset Creation counteracts Redistribution in the equity market, but provides no such counterforce in the safe asset market. This asymmetry leads to lower the safe return more than the equity required return, increasing the equity premium. The magnitude depends on household portfolio substitution: when substitution is more inelastic, a larger equity premium is needed to induce households to absorb the additional equity supply, and the limited reallocation can reinforce downward pressure on the safe return. In our long run calibration, the equity premium rises by 43.3 basis points.

6.2 Price Markups or Wage Markdowns?

For the same rise in the profit share, does it matter whether market power comes from product markets or labor markets? Price markups and wage markdowns both shift income toward profits, but they distort production and change factor income shares differently. In our quantification, wage markdowns generate an even smaller output loss than price markups, but a more unequal division of income between workers and business owners: the labor share and real wage fall further.

Separating these sources of market power is fundamentally an identification problem. Suppose one unit of labor produces one apple. The price is \$1.50, the marginal revenue product of labor is \$1, and the wage is \$0.50. The price markup is therefore 1.5 and the wage markdown is 2. A researcher who assumes competitive labor markets would attribute the entire gap between price and wage to a price markup of 3. More generally, the labor ratio estimator measures

$$\frac{\theta_{it}^{\ell}}{\alpha_{it}^{\ell}} = \mu_{it}\nu_{it}, \tag{19}$$

Table 5: Price markups and wage markdowns with matched profit shares

	Price markup	Wage markdown
Output	-5.40%	-3.78%
Labor share	$64.00\% \to 58.38\%$	$64.00\% \to 55.58\%$
Real wage	-9.36%	-11.29%

Notes: Output and real wage changes are relative to the calibrated 1980 economy. The labor share row reports 1980 and 2018 levels. Both experiments match the same profit share at every date, reaching 12.42 percent in 2018 from 4.00 percent in 1980. The comparisons are stationary and use the same calibrated household asset demand semi elasticities.

where θ_{it}^{ℓ} is the output elasticity of labor and α_{it}^{ℓ} is labor's revenue share. Using matched Census–Compustat data to separate the two wedges, Ren and Zhang (2025) attribute most of the increase in measured aggregate market power to wage markdowns.

The distinction changes both production incentives and the incidence of profits. Under the Cobb–Douglas production assumptions of Section 2, the factor income shares are

$$s_K = \frac{\alpha}{\mu}, \qquad s_W = \frac{1-\alpha}{\mu\nu}, \qquad s_\Pi = 1 - s_K - s_W. \tag{20}$$

A higher price markup reduces both the capital and labor income shares. A higher wage markdown, holding the price markup fixed, leaves the capital income share unchanged: the increase in the profit share comes entirely from the labor income share.

This difference matters for both the aggregate and distributional effects of market power. A price markup directly distorts both labor and capital demand, whereas a wage markdown directly distorts only labor demand. With elastic labor supply, wage markdowns still reduce labor and output through the labor demand distortion. Price markups impose an additional distortion on physical capital, whose response is particularly important in the long run.

To compare the two sources of market power, we investigate their aggregate and distributional effects for the same path of profit share. Both experiments start from the same 1980 calibration. The price markup experiment uses our baseline markup path and holds the wage markdown at one. The wage markdown experiment holds the price markup at its 1980 level and uses the wage markdown at each date to match the profit share in the first experiment. To do this, we again use our stationary analytical equation using the calibrated worker and owner asset demand semi elasticities.

Table 5 compares the 2018 outcomes for the same increase in the profit share, from 4.00 percent to 12.42 percent. Wage markdowns generate a smaller output loss. They directly distort only labor demand, whereas price markups also distort capital demand. The smaller output loss comes with larger distributional consequences: both the labor share and real wages fall further under wage markdowns. At the same profit share, the lower labor share implies a higher ratio of profit income to labor income, $\Pi/W = s_\Pi/s_W$.

Compared with price markups, wage markdowns generate even smaller output losses in our quantification, but a more unequal division of income between workers and business owners: the same profit share is accompanied by a lower labor share and a larger real wage decline.

7 Conclusion

The asset market channel redefines the positive and normative implications of market power. Away from the representative household benchmark, our framework demonstrates how central the distributional effects of market power are in determining its aggregate consequences. Quantitatively, we have shown that redistribution due to market power from working households earning labor income toward a small subset of wealthy firm owners is a dominant force in the asset market channel through its effects on asset demand. Rising markups result in an endogenous decline in the long-run equilibrium interest rate r in spite of the rise in asset supply due to the appreciating market value of public equity. We identified a link between these two asset market forces—Redistribution and Asset Creation—through the dual role of public firm owners, measured the distribution of market power profits across U.S. private and public firms, and showed that their contributions to changes in output Y through the endogenous change in r are large relative to conventional product market distortions from market power.

A smaller degree of aggregate output loss due to the asset market channel does not imply a similar reduction in welfare loss from market power. Instead, we find that the smaller aggregate output loss coincides with a *larger* aggregate utilitarian welfare loss because market power diverts income away from less wealthy, labor-earning households, who constitute the majority of the population and have higher marginal utility of consumption, toward wealthier firm owners. Accounting for the incidence of market power across households is essential for evaluating its welfare costs.

Beyond our baseline, we developed extensions to show how fiscal policy and growth alter the aggregate effects of market power and characterized the additional effects of misallocation through the asset market channel. We provided further analysis for two extensions, multiple assets and labor market power, showing that rising markups and its contribution to the increased supply of risky assets can explain a rising equity premium and that when there is no direct Capital Wedge under labor market power, the smaller output loss, larger welfare cost narrative is strengthened.

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Appendix Contents

APPENDIX		PAGE
A	Proofs and Derivations	56
B	Redistribution and Asset Creation: The Two Special Cases	67
C	Microfoundations of Linear Asset Demand	72
D	Measurement Appendix	74
E	Quantitative Appendix	81
F	Wealth Inequality	93
G	Extensions	98
H	Multiple Assets	114

A Proofs and Derivations

A.1 Aggregation with heterogeneous wedges

This appendix derives the aggregate representation used in Section 2.1. Firm i produces $y_i = z_i v_i$ from a common constant returns input composite $v_i = F(k_i, \ell_i)$. Aggregate output is a homothetic index with $PY = \int p_i y_i \, di$. Define the output-to-index ratio $q_i \equiv y_i/Y$ and the revenue share $s_i \equiv p_i y_i/(PY)$.

Productivity. Aggregate use of the input composite is

$$V = \int \frac{y_i}{z_i} \, di = Y \int \frac{q_i}{z_i} \, di.$$

Hence $Y = ZV$, with

$$Z^{-1} \equiv \int q_i z_i^{-1} \, di.$$

The allocation of output across producers determines Z. For a general homothetic output index, the q_i need not integrate to one, so Z is a productivity index rather than a harmonic mean. In the additive special case, where $\int q_i \, di = 1$, it is the quantity-weighted harmonic mean of firm productivities.

Aggregate markup. Let $c_{v,i}$ denote firm i's shadow unit cost of the input composite, evaluated at its shadow factor prices, and let $\mathcal{C}_i \equiv c_{v,i} v_i$ denote its shadow variable cost. Constant returns and the definition of the markup imply $p_i y_i = \mu_i \mathcal{C}_i$. Letting $\mathcal{C} \equiv \int \mathcal{C}_i \, di$ allows shadow factor prices, and hence $c_{v,i}$, to differ across firms. Aggregation gives

$$PY = \mu \mathcal{C}, \qquad \mu \equiv \int \mu_i \frac{\mathcal{C}_i}{\mathcal{C}} \, di.$$

Moreover,

$$s_i = \frac{\mu_i}{\mu} \frac{\mathcal{C}_i}{\mathcal{C}}, \qquad \mu^{-1} = \int s_i \mu_i^{-1} \, di.$$

Thus the aggregate markup is the cost-weighted arithmetic mean of firm markups, equivalently their sales-weighted harmonic mean. If all firms face a common shadow unit cost c_v for the composite, then $\mathcal{C}_i = c_v v_i$, $\mathcal{C} = c_v V$, and the special-case identities $\mu = \int \mu_i (v_i/V) \, di$ and $P = \mu c_v / Z$ follow. The factor-share derivation below does not impose this common-cost restriction.

Factor shares and aggregate markdown. Now specialize the common composite to Cobb–Douglas, $v_i = k_i^{\alpha} \ell_i^{1-\alpha}$. Capital is rented competitively and labor is marked down. Euler's theorem

and the firm's first-order conditions give $\mathcal{C}_i = r^k k_i + \nu_i w_i \ell_i$. The firm factor shares are

$$\frac{r^k k_i}{p_i y_i} = \frac{\alpha}{\mu_i}, \qquad \frac{w_i \ell_i}{p_i y_i} = \frac{1-\alpha}{\mu_i \nu_i}.$$

Integrating against revenue shares gives

$$s_K = \alpha \int \frac{s_i}{\mu_i}\, di = \frac{\alpha}{\mu}, \qquad s_W = (1-\alpha) \int \frac{s_i}{\mu_i \nu_i}\, di = \frac{1-\alpha}{\mu\nu}.$$

The aggregate markdown separates the labor wedge from the product wedge:

$$\nu^{-1} = \frac{\int s_i (\mu_i \nu_i)^{-1}\, di}{\int s_i \mu_i^{-1}\, di}.$$

Using the firm labor share condition,

$$\nu_i w_i \ell_i = (1-\alpha) \mu_i^{-1} s_i P Y,$$

so the same object can be written as

$$\nu^{-1} = \int c_i \nu_i^{-1}\, di, \qquad c_i \equiv \frac{\nu_i w_i \ell_i}{\int \nu_j w_j \ell_j\, dj}.$$

The weights c_i are shares of the shadow wage bill, $\nu_i w_i \ell_i$, where $\nu_i w_i$ is the marginal cost of labor implied by the firm's first-order condition. This is the labor-market analogue of the cost weights in the aggregate markup; observed wage-bill shares would not recover the aggregate markdown.

The aggregate factor shares are therefore

$$s_K = \frac{\alpha}{\mu}, \qquad s_W = \frac{1-\alpha}{\mu\nu}, \qquad s_\Pi = 1 - s_K - s_W.$$

Under the common Cobb–Douglas technology, heterogeneous markups and markdowns enter factor shares only through μ and ν.

Misallocation. Let $\mathcal{Z}^*$ denote frontier TFP and let $\Omega \leq 1$ denote misallocation, so realized TFP is $A = \Omega \mathcal{Z}^*$. Under Cobb–Douglas, Ω contains two components. The first is the output allocation term $Z/\mathcal{Z}^*$ from the allocation of output across producers. The second is an input mix component. Since

$$V = \int k_i^\alpha \ell_i^{1-\alpha}\, di = K^\alpha L^{1-\alpha} \int \hat{k}_i^\alpha \hat{\ell}_i^{1-\alpha}\, di,$$

where $\hat{k}_i \equiv k_i/K$ and $\hat{\ell}_i \equiv \ell_i/L$, aggregate output can be written as

$$Y = Z\left(\int \hat{k}_i^{\alpha}\hat{\ell}_i^{1-\alpha}\,di\right)K^{\alpha}L^{1-\alpha}, \qquad \Omega = \frac{Z}{\mathcal{Z}^*}\int \hat{k}_i^{\alpha}\hat{\ell}_i^{1-\alpha}\,di.$$

Markup dispersion affects Ω through Z. Dispersion in labor shadow prices, $\nu_i w_i$, also affects Ω through the input mix component because it changes how firms combine capital and labor. Substituting the factor demands gives

$$\hat{k}_i \propto \frac{s_i}{\mu_i}, \qquad \hat{\ell}_i \propto \frac{s_i}{\mu_i \nu_i w_i}, \qquad \frac{\hat{\ell}_i}{\hat{k}_i} \propto (w_i\nu_i)^{-1}.$$

The markup cancels from the relative input choice, while the labor shadow price remains. Hölder's inequality implies that the input mix component is at most one, with equality if and only if $w_i\nu_i$ is constant across active firms. A second-order expansion around a common labor shadow price gives

$$\int \hat{k}_i^{\alpha}\hat{\ell}_i^{1-\alpha}\,di \simeq 1 - \frac{\alpha(1-\alpha)}{2}\mathrm{Var}_{\hat{k}}\big(\log w_i\nu_i\big),$$

where $\mathrm{Var}_{\hat{k}}$ is the variance under the capital-share weights $\{\hat{k}_i\}$. Thus dispersion in labor shadow prices lowers Ω by distorting the input mix across firms. Realized output is

$$Y = AK^{\alpha}L^{1-\alpha}.$$

This is the production side separation used in the main text: under Cobb–Douglas, wedge dispersion affects realized TFP, while factor shares depend on the cross section only through the aggregate wedges.

A.2 Misallocation and the Asset Market Channel

This appendix measures how much the baseline separation changes when production is CES in place of Cobb–Douglas. It is a sensitivity exercise, not a general aggregation result for heterogeneous-firm CES economies: aggregate wedges are held fixed, and dispersion is represented by the Hicks-neutral productivity term $A = \Omega\mathcal{Z}^*$ in a common-wedge CES firm. The question is whether a change in Ω moves the asset market by changing factor shares.

Under Cobb–Douglas, a fall in Ω lowers output but leaves factor shares unchanged. The return equation is therefore unchanged. Under CES, factor shares depend on the user cost of capital relative to productivity, r^k/A. At a fixed return, a fall in Ω raises r^k/A, changes the capital and labor shares, and shifts the asset market equation. The response is proportional to $1-\sigma_{KL}$ and vanishes at $\sigma_{KL} = 1$.

Let production be constant returns to scale and CES,

$$Y = A\,F(K,L), \qquad F = \left[\alpha K^{\rho} + (1-\alpha)L^{\rho}\right]^{1/\rho}, \qquad \rho = \frac{\sigma_{KL}-1}{\sigma_{KL}},$$

with capital elasticity $\varepsilon_K \equiv F_K K/F$, where σ_{KL} is the elasticity of substitution between capital and labor and is distinct from the household's CRRA parameter. The user cost satisfies $r^k = (A/\mu)F_K$, and the factor shares are $s_K = \varepsilon_K/\mu$, $s_W = (1-\varepsilon_K)/(\mu\nu)$, and $s_\Pi = 1 - s_K - s_W$.

The capital cost share responds to the relative price of capital with elasticity $1-\sigma_{KL}$, so, holding the wedges fixed,

$$\begin{aligned} d\log\varepsilon_K &= (1-\sigma_{KL})\,d\log\frac{r^k}{A}, \\ ds_K &= (1-\sigma_{KL})\,s_K\,d\log\frac{r^k}{A}, \\ ds_W &= -\frac{1}{\nu}\,ds_K, \qquad ds_\Pi = -\frac{\nu-1}{\nu}\,ds_K. \end{aligned}$$

A fall in Ω raises r^k/A at a fixed return. Under gross complements ($\sigma_{KL} < 1$) the capital share s_K rises and the labor share s_W falls; under gross substitutes ($\sigma_{KL} > 1$) s_K falls and s_W rises. The business profit share s_Π moves by $-(\nu-1)/\nu$ times the move in s_K and is unchanged at the calibration, which sets $\nu = 1$.

The asset market equation remains

$$\underbrace{\bar{D}(r)\left[s_W(\Omega,r) + \lambda(r)s_\Pi(\Omega,r)\right]}_{\text{asset demand}} = \underbrace{\frac{s_K(\Omega,r)}{r+\delta_K} + Q(r)\omega s_\Pi(\Omega,r)}_{\text{asset supply}}.$$

These share movements therefore shift asset demand and asset supply, and r adjusts while asset market clearing holds. Define the fixed-share semielasticity of aggregate household asset demand by

$$\epsilon_D \equiv \frac{\partial}{\partial r}\log\left\{\bar{D}(r)\left[s_W + \lambda(r)s_\Pi\right]\right\}\Big|_{s_W,s_\Pi} = \frac{\partial\log\bar{D}(r)}{\partial r} + \frac{\lambda'(r)s_\Pi}{s_W + \lambda(r)s_\Pi}.$$

This is the aggregate household-demand semielasticity used in the numerical exercise; if λ is held fixed, its second term is zero. Differentiating at the Cobb–Douglas baseline and using $r^k = r + \delta_K$,

Table A1: Effect of misallocation on shares and the return under CES production ($d\log\Omega = -0.03$, $\epsilon_D = 16.2963$).

σ_{KL}	dr	ds_K	ds_W
0.6	+8 bp	+0.47 pp	−0.47 pp
0.8	+4 bp	+0.21 pp	−0.21 pp
0.9	+2 bp	+0.10 pp	−0.10 pp
1.0	0 bp	0.00 pp	0.00 pp
1.1	−2 bp	−0.09 pp	+0.09 pp
1.2	−3 bp	−0.18 pp	+0.18 pp

Notes: The baseline sets $\nu = 1$, so $ds_\Pi = -\frac{\nu-1}{\nu} ds_K = 0$ in this exercise. Here ϵ_D is the fixed-share semielasticity of aggregate household asset demand defined above, including the response of $\lambda(r)$. Calibration $r = 0.06$, $\delta_K = 0.07$, $\delta_C = 0.05$, $\omega^{\text{inc}} = 0.40$, $\omega = (1-\theta_F)\omega^{\text{inc}}$, $\theta_F = 0.15$, $\lambda = 3.31$, $\mu = 1.0417$, $\nu = 1$, $\varepsilon_K = 1/3$.

the return solves

$$\left[\frac{1}{r} + \epsilon_D - \frac{\delta_K s_K (r+\delta_K)^{-2} + \omega\delta_C s_\Pi (r+\delta_C)^{-2}}{\dfrac{r}{r+\delta_K} s_K + rQ(r)\omega s_\Pi}\right] dr$$

$$= (1-\sigma_{KL})\, s_K \left[\frac{\dfrac{r}{r+\delta_K} - rQ(r)\omega\dfrac{\nu-1}{\nu}}{\dfrac{r}{r+\delta_K} s_K + rQ(r)\omega s_\Pi} + \frac{1+\lambda(\nu-1)}{\nu(s_W+\lambda s_\Pi)}\right]\left(\frac{dr}{r+\delta_K} - d\log\Omega\right).$$

Let $\mathcal{L}$ denote the bracket on the left and let $\mathcal{B}$ denote the bracket multiplying $(1-\sigma_{KL})s_K$ on the right. After collecting the feedback through r^k, the relevant local-equilibrium slope is

$$\mathcal{S}_{CES} \equiv \mathcal{L} - \frac{(1-\sigma_{KL})s_K\mathcal{B}}{r+\delta_K}.$$

The local-stability condition is $\mathcal{S}_{CES} > 0$, not merely $\mathcal{L} > 0$. It holds at the calibration for the values reported in Table A1, where $\mathcal{B} > 0$. Hence a fall in Ω raises r under complements and lowers it under substitutes. A smaller ϵ_D produces a larger response as long as the stability condition continues to hold. The endogenous change in r^k reinforces the share movement under complements and offsets it under substitutes.

The perturbation $d\log\Omega = -0.03$ lies within the 2 to 6% value added misallocation losses measured by Edmond, Midrigan and Xu (2023). Attributing the entire loss to the experiment would roughly double the entries. Over the central range $\sigma_{KL} \in [0.6, 1.2]$, the return moves by approximately 8 basis points. The corresponding business profit share movement is zero because the baseline sets $\nu = 1$. At $\sigma_{KL} = 0.5$, a stress case below most estimates, the return moves about 11 basis points. These movements are small compared with the main transition, which puts the return -94.0 basis points relative to baseline under the observed aggregate markup path. Thus the separation is exact under Cobb–Douglas, and away from Cobb–Douglas the feedback from

misallocation to the return remains quantitatively small at estimated elasticities.

A.3 Business profit shares from a homothetic single-aggregator (HSA) demand system

This appendix microfounds the business profit share state z and shows it carries no markup dispersion, so the cross-section stays in the common-wedge case of Section 2. Demand comes from a homothetic single-aggregator (HSA) system (Matsuyama and Ushchev, 2017) with a multiplicative appeal shifter. The asset market needs a distribution of business profit shares with the properties the calibration targets, and the construction below is one microfoundation that delivers them.

Demand. A continuum of product lines $m \in \mathcal{M}$ is consumed in quantities q_m. Demand is

$$q_m = z_m \frac{E}{\mathcal{A}} D\Big(\frac{p_m}{\mathcal{A}}\Big),$$

where E is aggregate expenditure and $z_m > 0$ is a multiplicative appeal shifter with $\int_{\mathcal{M}} z_m \, dm = 1$. The function D is positive, twice differentiable, and strictly decreasing, with elasticity $\varepsilon(x) \equiv -xD'(x)/D(x) > 1$ and ε nondecreasing (Marshall's second law), so the pricing problem below has a unique interior solution. The single aggregator $\mathcal{A}$ is defined by the adding-up condition $\int_{\mathcal{M}} z_m \, (p_m/\mathcal{A}) \, D(p_m/\mathcal{A}) \, dm = 1$, which has a unique positive root under these conditions. The appeal z_m is a *pure horizontal* taste shifter, orthogonal to marginal cost; quality interpretations that raise cost are excluded precisely because they would move the markup. The system nests CES, $D(x) = x^{-\varepsilon}$.

Appeal is markup-neutral. Lines are priced atomistically: each takes $\mathcal{A}$ and E as given, even though ownership is organized into positive-measure baskets below. The perceived demand elasticity is

$$-\frac{\partial \log q_m}{\partial \log p_m} = \varepsilon\Big(\frac{p_m}{\mathcal{A}}\Big),$$

which depends on $p_m/\mathcal{A}$ alone and not on z_m: a multiplicative shifter scales the demand curve without rotating it. With common marginal cost c, every line solves the same first-order condition $p_m = \mu(p_m/\mathcal{A})\, c$, where $\mu(x) = \varepsilon(x)/(\varepsilon(x) - 1)$, so all lines set the same price $p^\star$ and the same markup $\mu^\star$. The cross-section is markup-homogeneous by construction.

Business profit shares. At the symmetric price the adding-up condition gives $(p^\star/\mathcal{A})D(p^\star/\mathcal{A}) = 1$, so the revenue share is $s_m = z_m(p_m/\mathcal{A})D(p_m/\mathcal{A}) = z_m$ and line profit is $\pi_m = (1 - 1/\mu^\star)p_m q_m \propto z_m$. The measure of lines is fixed and there is no free entry, so Π is a pure rent to incumbent ownership with no free-entry dissipation. Aggregate profit income is

$$\Pi = \int_{\mathcal{M}} \pi_m \, dm = \Big(1 - \tfrac{1}{\mu^\star}\Big) E = \Big(1 - \tfrac{1}{\mu^\star}\Big) Y,$$

set by the common markup and independent of the cross-sectional distribution of $\{z_m\}$. With a common labor markdown ν, markdown rents accrue to each line in proportion to its size and distribute in the same shares, so z is the entrepreneur's share of *total* aggregate profit income.

Ownership and dynamics. Entrepreneurs own baskets of lines $\{B_i\}$ that partition $\mathcal{M}$. Entrepreneur i earns

$$\pi_i = \Pi z_i, \qquad z_i \equiv \int_{B_i} z_m \, dm, \qquad \int z_i \, di = \int_{\mathcal{M}} z_m \, dm = 1.$$

The owner-specific shock is a *basket-level common factor* that scales the appeal of every line in B_i together, so it survives aggregation within the basket and makes z_i a non-degenerate, stationary, mean-one process—the AR(1) for z in the calibration. Were appeal shocks instead independent across an entrepreneur's continuum of lines, a law of large numbers would make z_i deterministic and the idiosyncratic profit income risk would vanish. Because the shocks are relative, $\int z_i \, di = 1$ at every date: they reallocate rents across entrepreneurs without moving aggregate profit income Π, the factor shares, or realized TFP. The business profit share distribution is thus orthogonal to the Section 2 accounting, which is what lets the household problem scale exactly with Π.

What the construction requires. Three features are essential, and each is a modeling choice. (i) Lines are infinitesimal and priced atomistically, so each entrepreneur takes substitution within her basket as external; with internalization, markups would rise in basket share (Atkeson and Burstein, 2008) and dispersion would return. (ii) Appeal enters multiplicatively and is orthogonal to cost; cost heterogeneity, or quality entering as a price equivalent, would move $p_m/\mathcal{A}$ across lines and break markup homogeneity. (iii) The appeal shocks are relative, so the cross-sectional reallocation leaves the aggregate markup, Π, and realized TFP untouched.

A.4 Stationary private, incorporated, and liquid masses

Let N_P, N_C, N_L be the masses of private businesses, incorporated businesses, and liquid entrepreneurs. The laws of motion are

$$N_{P,t+1} = (1-\kappa)N_{P,t} + \delta_C N_{L,t}, \quad N_{C,t+1} = (1-\delta_C)N_{C,t} + \kappa N_{P,t}, \quad N_{L,t+1} = (1-\delta_C)N_{L,t} + \kappa N_{P,t}.$$

In the stationary composition with active-business mass $N_P^* + N_C^* = \eta$: $\kappa N_P^* = \delta_C N_C^*$ and $N_L^* = N_C^*$, hence

$$N_C^* = \eta \frac{\kappa}{\kappa + \delta_C}, \qquad N_P^* = \eta \frac{\delta_C}{\kappa + \delta_C}, \qquad N_L^* = \eta \frac{\kappa}{\kappa + \delta_C}.$$

Define the publicly incorporated profit share $\omega^{\text{inc}} = \int \tau_j z_j \, dj$, where $\tau_j = 1$ for publicly incorporated businesses. We assume that a firm's probability of public incorporation is independent of its business profit share z_j. Publicly incorporated businesses then carry the stationary z-distribution,

and $\omega^{\text{inc}} = N_C^*/\eta = \kappa/(\kappa + \delta_C)$. The publicly traded equity share of aggregate profits is $\omega = (1-\theta_F)\omega^{\text{inc}}$, as in (9). The private, retained, and publicly traded profit shares are respectively $1-\omega^{\text{inc}}$, $\theta_F\omega^{\text{inc}}$, and ω. Without independence, ω^{inc} is the profit-weighted share of publicly incorporated businesses. The aggregate market value of tradable equity is $\int_{\tau_j=1} q(z_j;\Pi,r)\,dj = Q(r)(1-\theta_F)\omega^{\text{inc}}\Pi = Q(r)\omega\Pi$.

A.5 Equity valuation

Dividing (7) by Π, the normalized price $\theta_q(z;r) = q(z;\Pi,r)/\Pi$ solves

$$(1+r)\theta_q(z;r) = \mathbb{E}\big[(1-\theta_F)z' + (1-\delta_C)\theta_q(z';r) \mid z\big],$$

a recursion free of Π. Taking expectations under the stationary distribution of z (mean one) and solving the resulting scalar equation gives $\mathbb{E}_\pi\theta_q = (1-\theta_F)/(r+\delta_C)$. Dividing by the publicly traded fraction $1-\theta_F$ gives $Q(r) = 1/(r+\delta_C)$ in (8); when $\theta_F = 1$, this multiple is defined by continuity and tradable equity has zero value. If z is constant the pointwise equity value is $q = (1-\theta_F)\Pi z/(r+\delta_C)$.

A.6 Proof of Proposition 2 (linearity)

Proof. **Workers.** With GHH preferences, the intratemporal labor choice can be solved before the savings problem. Let

$$y^W(w,e) = \max_\ell\{we\ell - v(\ell)\}.$$

For $v(\ell) = \psi_\ell \ell^{1+1/\varphi}/(1+1/\varphi)$,

$$y^W(w,e) = \frac{1}{1+\varphi}\psi_\ell^{-\varphi}(we)^{1+\varphi}.$$

Aggregate labor income is

$$W = \int we\ell^*(w,e)\,d\Lambda_e = \psi_\ell^{-\varphi}w^{1+\varphi}\int e^{1+\varphi}\,d\Lambda_e,$$

so $y^W(w,e) = W\widetilde{e}$ with $\widetilde{e} = e^{1+\varphi}/[(1+\varphi)\int e^{1+\varphi}d\Lambda_e]$, which is independent of the aggregate scale W. Setting $x = c - v(\ell)$, $b = a/W$, $b' = a'/W$, and $\hat{x} = x/W$, the worker problem is equivalent to

$$v^W(b,e) = \max_{\hat{x},\,b'\geq 0}\big\{u(\hat{x}) + \beta_W\mathbb{E}[v^W(b',e') \mid e]\big\}, \qquad \hat{x} + b' = Rb + \widetilde{e}.$$

The normalized problem contains no W; the guess $V^W(a,e) = W^{1-\sigma}v^W(a/W,e)$ verifies by homogeneity of u. Normalized policies g_W and the invariant distribution Λ_W^r are therefore independent

of W, and

$$D_W(r, W) = W \int g_W(b, e)\, d\Lambda_W^r \equiv \bar{D}(r)\, W.$$

Entrepreneurs. Set $b = a/\Pi$, $\widetilde{t} = t/\Pi$, $\tilde{c} = c/\Pi$, and let $\theta_q(z; r)$ be the normalized tradable equity price of Appendix A.5, which is independent of Π. Guess $V^P(a, z) = \Pi^{1-\sigma} v^P(b, z)$ and $V^L(t, a, z) = \Pi^{1-\sigma} v^L(\widetilde{t}, b, z)$. The normalized budgets are

$$\tilde{c} + b' = Rb + z \qquad \text{and} \qquad \tilde{c} + b' = Rb + \widetilde{t} + \theta_F z,$$

incorporation sends the entrepreneur to the normalized state $v^L(\theta_q(z; r), b', z)$, and the transfer state resets to zero while the business profit share state follows its Markov process until the incorporated business exits. Neither normalized problem contains Π, so normalized policies g_O and the invariant distribution Λ_O^r are independent of Π, and

$$D_O(r, \Pi) = \Pi \int g_O(b, z, \widetilde{t})\, d\Lambda_O^r \equiv \lambda(r)\, \bar{D}(r)\, \Pi.$$

□

A.7 Proof of Theorem 1

Proof. The clearing identity follows from Proposition 2 (demand side), the supply construction $S(r) = K + Q(r)\omega\Pi$ of Appendix A.4–A.5, and market clearing. Dividing by output and using $K/Y = s_K/(r + \delta_K)$ gives

$$\bar{D}(r)\left[s_W + \lambda(r) s_\Pi\right] = \frac{1}{r + \delta_K} s_K + Q(r)\omega s_\Pi.$$

This is (11). □

A.8 Derivations for Section 3.3

The derivations of these special cases impose complete sale, $\theta_F = 0$, and no capital depreciation, $\delta_K = 0$, as in Assumption 1. Write $H(r) \equiv r\bar{D}(r)$, with $H'(r) > 0$. This slope converts shifts in the right side of the sufficient statistic into interest rate responses.

Redistribution ($\omega = 0$). Under the transparent benchmark $\delta_K = 0$, the statistic is $r\bar{D} = s_K/(s_W + \lambda^P s_\Pi)$ where λ^P is the relative wealth-to-income ratio of owners to workers when all businesses remain private. With markup-only Cobb–Douglas shares $(s_K, s_W, s_\Pi) = (\alpha/\mu, (1-\alpha)/\mu, 1 - 1/\mu)$:

$$r\bar{D}(r) = \frac{\alpha/\mu}{(1-\alpha)/\mu + \lambda^P(r)\,(1 - 1/\mu)},$$

which at $\lambda^P = 1$ collapses to $\alpha/(\mu - \alpha)$, decreasing in μ. With markdown-only shares $(\alpha, (1 -$

$\alpha)/\nu, (1-\alpha)(1-1/\nu)$):

$$r\bar{D}(r) = \frac{\alpha}{(1-\alpha)/\nu + \lambda^P(r)\,(1-\alpha)(1-1/\nu)},$$

which at $\lambda^P = 1$ collapses to $\alpha/(1-\alpha)$: the denominator $(1-\alpha)/\nu + (1-\alpha)(1-1/\nu) = (1-\alpha)$ exactly, so ν drops out at the equal-asset-demand case. For $\lambda^P > 1$ the direct right-side shift is decreasing in ν; under the local-stability condition stated below, r^* falls.

Asset Creation ($\omega = 1$, $\lambda = 0$). With $\kappa > 0$ and $\delta_C = 0$, every business eventually incorporates and its founder sells the publicly traded equity once. Complete sale gives $Q(r) = 1/r$, and $\beta_O(1+r) < 1$ makes founders draw down their assets (Lemma 1). At this endpoint $\lambda = 0$, so

$$r\bar{D}(r) = \frac{s_K + s_\Pi}{s_W} = \frac{1 - s_W}{s_W}.$$

For markup-only and markdown-only Cobb–Douglas shares, respectively,

$$r\bar{D}(r) = \frac{\mu - 1 + \alpha}{1-\alpha}, \qquad r\bar{D}(r) = \frac{\nu - 1 + \alpha}{1-\alpha}.$$

The first expression rises with μ for every $\alpha \in (0,1)$; the second rises with ν. With both wedges,

$$r\bar{D}(r) = \frac{1 - s_W}{s_W} = \frac{\mu\nu}{1-\alpha} - 1.$$

Hence $\partial r^*/\partial\mu = \nu/[(1-\alpha)H'(r^*)] > 0$ and $\partial r^*/\partial\nu = \mu/[(1-\alpha)H'(r^*)] > 0$. Pure Asset Creation raises the interest rate under either form of market power for every $\alpha \in (0,1)$.

Local sign comparison. Write the equilibrium as

$$F(r; s_W, s_K, s_\Pi) \equiv r\bar{D}(r) - \mathrm{RHS}(r; s_W, s_K, s_\Pi) = 0, \qquad \mathrm{RHS} = \frac{\dfrac{r}{r+\delta_K}s_K + rQ(r)\omega s_\Pi}{s_W + \lambda s_\Pi}.$$

Assume the local-stability condition $F_r > 0$, which includes the r-dependence of the capital and equity valuation terms and of λ. The implicit function theorem then implies that r^* moves in the direction of the direct shift in RHS. A markup raises s_Π by ds_Π and lowers s_K, s_W by $\alpha\, ds_\Pi$ and $(1-\alpha)\, ds_\Pi$; a markdown leaves s_K fixed and moves $ds_W = -ds_\Pi$. Evaluating the direct change in RHS at the undistorted baseline, with the incidence terms evaluated at the initial return, gives, for the markup,

$$\mathrm{sign}\left(dr^*\right) = \mathrm{sign}\left[(1-\alpha)Q(r)\omega - \frac{\alpha\lambda}{r+\delta_K}\right],$$

so r^* falls iff $\lambda > (1-\alpha)Q(r)\omega(r+\delta_K)/\alpha$; for the markdown the same computation gives sign$[(1-\alpha)Q(r)\omega - \alpha(\lambda-1)/(r+\delta_K)]$, i.e. $\lambda > 1 + (1-\alpha)Q(r)\omega(r+\delta_K)/\alpha$. At $\alpha = 1/3$, $r/(r+\delta_K) \approx 0.47$,

and $rQ(r)\omega = 0.218$, the transparent cutoffs are 0.93 and 1.93; around the calibrated product markup $\mu_0 = 1.0417$, the markdown cutoff is 1.99.

These are direct share comparisons: the incidence objects are held fixed when the shares move, while their dependence on the return enters F_r. Appendix B instead varies the structural hazards, so ω and λ move jointly.

B Redistribution and Asset Creation: The Two Special Cases

In the literature, profits typically enter asset-market clearing in two distinct ways. In models of entrepreneurial saving, profits are income received by business owners. They increase the wealth those owners wish to hold but do not create a traded asset (Quadrini, 2000; Cagetti and De Nardi, 2006; Mian, Straub and Sufi, 2021*a*). In models with capitalized profits, the market value of tradable equity backed by future profit income enters asset supply (Eggertsson, Robbins and Wold, 2021; Auclert et al., 2025).

This appendix studies the complete-sale subcase $\theta_F = 0$ in order to establish the two special cases. The baseline with retained owner equity in the main text instead holds $\theta_F = 0.15$ and defines $\omega = (1 - \theta_F)\omega^{\text{inc}}$, with $Q(r) = 1/(r + \delta_C)$ per dollar of publicly traded profit income. Throughout this appendix, complete sale implies $\omega = \omega^{\text{inc}}$, so the formulas below use ω for both shares.

These are special cases of our model. The pure redistribution case is obtained by ruling out the incorporation of private businesses into tradable equity, or setting the probability of incorporation to $\kappa = 0$. Consequently, the share of aggregate profit income represented by tradable equity is zero: $\omega = 0$. The asset-market clearing condition then becomes

$$\bar{D}(r)\left[W + \lambda(r)\Pi\right] = K. \tag{B1}$$

At the pure asset-creation endpoint, tradable equity backed by future profit income is fully tradable. This case is obtained by setting the exit rate of public firms to zero, $\delta_C = 0$, while maintaining $\kappa > 0$. Every private business then eventually incorporates, and its founder sells the equity once. Because the resulting tradable equity is permanent, $\omega = 1$ and $Q(r) = 1/r$. Profits therefore contribute Π/r to asset supply. The corresponding asset-market-clearing benchmark is

$$\bar{D}(r)W = K + \frac{\Pi}{r}. \tag{B2}$$

The absence of profits from the demand side does not follow mechanically from $\omega = 1$, which determines only asset supply. It also requires the assets founders accumulate from private-profit income and sale proceeds to vanish as the endpoint is approached. To illustrate the mechanism, we assume $\beta_O R < 1$, as in standard stationary incomplete-market environments in which precautionary saving keeps the equilibrium risk-free return below $1/\beta_O$. A liquidated firm owner who receives sale proceeds once then draws down the additional assets generated by that payment.

For every $\delta_C > 0$, however, stationary founder asset demand reflects recurring flows of private-profit income and sale proceeds. The relevant question is whether their contribution to asset demand vanishes as $\delta_C \downarrow 0$. We first record the asset-market accounting and then study the drawdown of a one-time payment. Finally, we show that both flows are of order δ_C and, under a uniform bound on the persistence of founder saving, that the associated stock of founder assets converges to zero. Thus asset-market clearing converges to (B2). Away from the endpoint, both

sources of founder asset demand are encoded in $\lambda(r;\kappa,\delta_C)$.

B.1 Asset-market accounting

For general (κ,δ_C), write asset demand as

$$D(r) = \bar{D}(r)W + D_O(r,\Pi), \qquad \lambda(r;\kappa,\delta_C) \equiv \frac{D_O(r,\Pi)}{\bar{D}(r)\Pi}, \tag{B3}$$

where D_O is aggregate founder asset demand and its dependence on (κ,δ_C) is suppressed in the arguments. Because incorporation is independent of a firm's share of aggregate profit income, the stationary ownership masses also determine the shares of aggregate profit income represented by private and public firms. Asset supply is therefore

$$S(r) = K + Q(r)\omega\Pi, \qquad Q(r) = \frac{1}{r+\delta_C}, \qquad \omega = \frac{\kappa}{\kappa+\delta_C}. \tag{B4}$$

Thus the stationary asset-market equation is

$$\bar{D}(r)\big[W + \lambda(r;\kappa,\delta_C)\Pi\big] = K + Q(r)\omega\Pi. \tag{B5}$$

At $\kappa = 0$, the pure redistribution endpoint has $\omega = 0$ and

$$\bar{D}(r)\big[W + \lambda(r)\Pi\big] = K. \tag{B6}$$

At $\delta_C = 0$, $\omega = 1$, $Q(r) = 1/r$, and the asset-market equation has the form

$$\bar{D}(r)W + D_O(r,\Pi) = K + \frac{\Pi}{r}. \tag{B7}$$

The remaining demand-side result is that, along the interior stationary economies, $D_O(r_{\delta_C},\Pi)$ converges to zero as $\delta_C \downarrow 0$. This result yields the benchmark in (B2).

B.2 A one-time sale and the drawdown mechanism

When there is no exit for firms, $\delta_C = 0$, a founder sells her equity at most once. Normalize the liquidated firm owner's sale date to $j = 0$. Let $a_0 \geq 0$ denote financial assets at the beginning of that date and let $x > 0$ denote the sale proceeds. Total resources at the sale date are $q \equiv Ra_0 + x$, and there is no subsequent nonasset income. Hold the gross return fixed at $R = 1 + r > 1$. Taking (a_0, x), and hence q, as given, the founder solves

$$\max_{\{c_j,a_{j+1}\}_{j\geq 0}} \sum_{j=0}^{\infty} \beta_O^j u(c_j), \qquad u(c) = \begin{cases} c^{1-\sigma}/(1-\sigma), & \sigma \neq 1, \\ \log c, & \sigma = 1, \end{cases} \tag{B8}$$

subject to

$$c_0 + a_1 = Ra_0 + x \equiv q, \qquad c_j + a_{j+1} = Ra_j, \quad j \geq 1, \qquad c_j > 0, \quad a_{j+1} \geq 0, \qquad j \geq 0, \tag{B9}$$

and the present-value exhaustion condition $\lim_{J\to\infty} a_{J+1}/R^J = 0$.

Lemma 1 (Drawdown after a one-time sale). *Suppose $\sigma > 0$, $0 < \beta_O < 1$, and $\beta_O R \leq 1$. Define*

$$\gamma \equiv (\beta_O R)^{1/\sigma}. \tag{B10}$$

The optimal paths are

$$c_j(q) = q\left(1 - \frac{\gamma}{R}\right)\gamma^j, \tag{B11}$$

$$a_{j+1}(q) = \frac{q}{R}\gamma^{j+1}, \qquad j \geq 0. \tag{B12}$$

If $\beta_O R < 1$, asset holdings converge to zero at rate $\gamma < 1$. Moreover, the assets attributable to the sale proceeds satisfy

$$a_{j+1}(Ra_0 + x) - a_{j+1}(Ra_0) = \frac{x}{R}\gamma^{j+1}, \qquad j \geq 0, \tag{B13}$$

and therefore converge to zero at the same rate. If $\beta_O R = 1$, the founder holds q/R after date zero and consumes the interest income in every subsequent period.

Proof. The Euler equation gives $c_{j+1}/c_j = \gamma$. Combining this condition with the intertemporal budget $c_0 + \sum_{j=1}^{\infty} c_j/R^j = q$ gives (B11). Substituting consumption into (B9) and iterating forward gives (B12). Evaluating that expression at $Ra_0 + x$ and at Ra_0, and then taking the difference, gives (B13). □

The resources q determine the size of the initial saving response, while γ determines how quickly that response decays. Under the assumed inequality $\beta_O R < 1$, the liquidated firm owner does not maintain the additional assets generated by the one-time proceeds indefinitely.

This example isolates the saving response to one-time IPO proceeds. Date zero is the individual founder's sale date, not a common incorporation date for all firms. The calculation supplies the drawdown intuition; the convergence result for the full nonlinear model instead uses the uniform policy bound imposed below.

B.3 Convergence of asset-market clearing at the asset-creation endpoint

Fix $\kappa > 0$ and consider stationary economies indexed by $\delta_C > 0$. Public-firm exit returns a liquid founder to private ownership, after which the new private business may incorporate at rate κ. These flows generate founder asset demand in every interior economy. We now ask whether that asset demand remains positive as $\delta_C \downarrow 0$.

The stationary flow of aggregate private profit income received by founders is

$$Y_{P,\delta_C} = (1 - \omega_{\delta_C})\Pi = \frac{\delta_C}{\kappa + \delta_C}\Pi. \tag{B14}$$

Here $\omega_{\delta_C} = \kappa/(\kappa + \delta_C)$. By the maintained assumption that incorporation is independent of a firm's share of aggregate profits, this ownership share is also the share of aggregate profit income represented by tradable equity. In a stationary equilibrium, the value of newly sold equity equals the value of tradable equity removed by incorporated business exit. Aggregate sale proceeds in each period are therefore

$$X_{\text{IPO},\delta_C} = \delta_C \omega_{\delta_C} Q(r_{\delta_C})\Pi = \frac{\kappa\delta_C}{(\kappa + \delta_C)(r_{\delta_C} + \delta_C)}\Pi. \tag{B15}$$

Both Y_{P,δ_C} and X_{IPO,δ_C} are of order δ_C provided that r_{δ_C} is bounded away from zero. The question is whether the founder asset demand generated by these flows also vanishes in the limit.

To translate these flows into the level of the entrepreneur's asset demand, let s collect the founder's current nonfinancial states. Let $y_{\delta_C}(s)$ denote current private-profit income or sale proceeds, excluding returns on financial assets, and let $g_{\delta_C}(a, s)$ denote next-period assets. We impose the following uniform bound on the founder's policy function near the endpoint: there are constants $0 \leq \rho_a < 1$ and $0 \leq b < \infty$, independent of δ_C, such that

$$g_{\delta_C}(a, s) \leq \rho_a a + b\, y_{\delta_C}(s). \tag{B16}$$

This inequality is a restriction on the nonlinear saving policy. Economically, it rules out saving behavior that becomes arbitrarily persistent as δ_C approaches zero[18]. Integrating (B16) across founders and using stationarity gives

$$\begin{aligned} D_{O,\delta_C} &\leq \rho_a D_{O,\delta_C} + b\left[Y_{P,\delta_C} + X_{\text{IPO},\delta_C}\right], \\ D_{O,\delta_C} &\leq \frac{b}{1 - \rho_a}\left[Y_{P,\delta_C} + X_{\text{IPO},\delta_C}\right]. \end{aligned} \tag{B17}$$

The bound is the only stock-flow relationship needed for the endpoint result. It does not assign particular dollars of founder wealth to past private profits or sale proceeds.

[18] We also require the stationary founder distribution to have a finite first moment.

Proposition 3 (Convergence to the asset-creation benchmark). *Fix $\kappa > 0$ and a production-side allocation (W, K, Π) with $\Pi > 0$. For each sufficiently small $\delta_C > 0$, suppose a stationary equilibrium exists with return r_{δ_C} and founder asset demand D_{O,δ_C}. Suppose that (B16) holds with constants independent of δ_C, that the stationary founder distributions have finite first moments, that $r_{\delta_C} \in [\underline{r}, \bar{r}] \subset (0, \infty)$, and that $\bar{D}(r)$ is continuous and strictly positive on this interval. Provided that the equation*

$$\bar{D}(r)W = K + \frac{\Pi}{r} \tag{B18}$$

has a unique solution $r \in [\underline{r}, \bar{r}]$, then, as $\delta_C \downarrow 0$,

$$r_{\delta_C} \longrightarrow r, \qquad \omega_{\delta_C} \longrightarrow 1, \qquad D_{O,\delta_C} = O(\delta_C), \qquad \lambda(r_{\delta_C}; \kappa, \delta_C) = O(\delta_C) \longrightarrow 0, \tag{B19}$$

and

$$Q(r_{\delta_C})\omega_{\delta_C}\Pi \longrightarrow \frac{\Pi}{r}. \tag{B20}$$

Proof. The positive lower bound on r_{δ_C}, together with (B14) and (B15), gives

$$Y_{P,\delta_C} + X_{\mathrm{IPO},\delta_C} = O(\delta_C).$$

Equation (B17) therefore implies $D_{O,\delta_C} = O(\delta_C)$. Because $\bar{D}(r)$ is strictly positive on the compact interval,

$$\lambda(r_{\delta_C}; \kappa, \delta_C) = \frac{D_{O,\delta_C}}{\bar{D}(r_{\delta_C})\Pi} = O(\delta_C).$$

Consider any sequence $\delta_C \downarrow 0$. Compactness gives a subsequence along which $r_{\delta_C} \to \widehat{r}$. Asset-market clearing along this subsequence is

$$\bar{D}(r_{\delta_C})W + D_{O,\delta_C} = K + \frac{\kappa}{(\kappa + \delta_C)(r_{\delta_C} + \delta_C)}\Pi.$$

Taking the limit and using continuity gives

$$\bar{D}(\widehat{r})W = K + \frac{\Pi}{\widehat{r}}.$$

Uniqueness of the solution to (B18) implies $\widehat{r} = r$. Every convergent subsequence has the same limit, so the entire sequence converges to r. The remaining claims follow directly. □

The qualifications in the proposition identify when convergence can fail. A vanishing exit rate need not eliminate founder asset demand if returns approach zero, if saving becomes arbitrarily persistent (e.g., "status-seeking"), or if the limiting asset-market equation has multiple solutions. Subject to these qualifications, profits enter demand as private-owner income at one endpoint and supply as tradable equity at the other. Along this limit, ω and λ move jointly.

C Microfoundations of Linear Asset Demand

The sufficient-statistic representation uses the homogeneity of group asset demand in the relevant income scale. An upward-sloping asset-demand schedule is a separate condition used for equilibrium comparative statics; homogeneity by itself does not establish that condition. This appendix gives three examples that deliver exact linearity and then states the general argument.

C.1 Standard incomplete markets (Aiyagari)

A type-g household has CRRA utility, faces the borrowing constraint $a' \geq 0$, and receives idiosyncratic income $X_g e_t$, where $X_g > 0$ is a group income scale and e_t is a stationary Markov process. This is the standard Bewley–Huggett–Aiyagari income-fluctuation problem (Bewley, 1977; Huggett, 1993; Aiyagari, 1994). At a fixed gross return $R = 1 + r$, assume that the normalized household problem has a unique invariant distribution with a finite first asset moment. The usual impatience condition $\beta_g R < 1$, together with appropriate ergodicity and moment conditions on income, is a standard sufficient set of restrictions.

For $\sigma \neq 1$, scaling assets and consumption by X_g gives

$$V_g(a, e; X_g) = X_g^{1-\sigma} v_g(a/X_g, e), \qquad D_g(r, X_g) = \bar{D}_g(r) X_g. \tag{C1}$$

For log utility, the first equality is replaced by $V_g(a, e; X_g) = v_g(a/X_g, e) + (1 - \beta_g)^{-1} \log X_g$; the policy and demand scaling are unchanged. Homogeneity therefore establishes linearity in X_g. It does not by itself establish that $\bar{D}_g(r)$ is increasing in r. In the canonical incomplete-markets model desired wealth often rises sharply as $\beta_g R$ approaches one from below, but monotonicity and finiteness must be verified under the specified income process and parameterization.

C.2 Perpetual-youth OLG

Consider a Blanchard–Yaari perpetual-youth economy (Blanchard, 1985). A household survives to the next period with probability $v \in (0, 1)$, receives the constant endowment X_g while alive, is born with zero assets, cannot borrow, and leaves no bequest. Deaths are replaced by newborns, so population mass is constant. Expected utility is $\sum_{j \geq 0} (\beta_g v)^j u(c_{g,j})$. Actuarially fair annuities pay the gross return R/v conditional on survival, where $R = 1 + r > 1$. The budget of an age-j household is therefore

$$c_{g,j} + a_{g,j+1} = \frac{R}{v} a_{g,j} + X_g, \qquad a_{g,0} = 0. \tag{C2}$$

With CRRA utility, the Euler equation gives $c_{g,j+1}/c_{g,j} = \gamma_g$, where

$$\gamma_g(r) \equiv \left(\beta_g R\right)^{1/\sigma}. \tag{C3}$$

The budget equations and the no-Ponzi condition then imply

$$a_{g,j} = \frac{v}{R - v}\left(\gamma_g^j - 1\right) X_g. \tag{C4}$$

The stationary share of households of age j is $(1 - v)v^j$. Hence aggregate group asset demand is

$$\begin{aligned} D_g(r, X_g) &= \sum_{j=0}^{\infty} (1 - v) v^j a_{g,j} \\ &= \underbrace{\frac{v^2\left(\gamma_g(r) - 1\right)}{(1 + r - v)\left(1 - v\gamma_g(r)\right)}}_{\bar{D}_g(r)} X_g. \end{aligned} \tag{C5}$$

The admissible domain $1 < \gamma_g < 1/v$ makes lifecycle asset holdings nonnegative and the cross-sectional first moment finite. On this domain, $\bar{D}_g$ is increasing in γ_g. Thus, holding survival probabilities and other parameters fixed, $\beta_O > \beta_W$ implies $\lambda > 1$. Whether $\bar{D}_g(r)$ is increasing in the return is a separate comparative-static restriction because r affects both consumption growth and the capitalization term in (C5).

C.3 Wealth in utility

As a static representation of preferences for wealth, let $0 < \theta_g < 1$ and $\rho(r) > 0$, and consider

$$\max_{c,a \geq 0} \frac{\left(c^{1-\theta_g} a^{\theta_g}\right)^{1-\sigma}}{1 - \sigma} \quad \text{subject to} \quad c + \rho(r)a = X_g. \tag{C6}$$

For $\sigma = 1$, use the logarithm of the Cobb–Douglas composite. Because the outer CRRA transformation is increasing, the expenditure shares satisfy $c = (1 - \theta_g)X_g$ and $\rho(r)a = \theta_g X_g$. Thus

$$D_g(r, X_g) = \frac{\theta_g}{\rho(r)} X_g. \tag{C7}$$

Homotheticity gives exact linearity. Demand is increasing in r if and only if $\rho'(r) < 0$. If groups face the same $\rho(r)$, then $\lambda = \theta_O/\theta_W > 1$ requires $\theta_O > \theta_W$, not heterogeneity alone.

C.4 A general homogeneity principle

The same argument applies to a broader class of household problems. Let $X_{g,t} > 0$ denote the group income scale and let normalized wealth be $b_t = a_t/X_{g,t}$. Suppose that: (i) period utility is CRRA; (ii) all nonasset income, transfers, borrowing limits, and other constraints measured in goods scale with $X_{g,t}$; (iii) feasible portfolios and the conditional return distribution depend on $(a_t, X_{g,t})$ only through b_t and other normalized states; and (iv) $X_{g,t+1} = \Gamma_{t+1} X_{g,t}$, where the

law of Γ_{t+1} does not depend on the level of $X_{g,t}$. Finally, assume that the normalized Markov decision problem is well defined and has an invariant distribution with the moments needed to aggregate asset holdings. With constant X_g this is an ordinary stationary distribution; with stochastic growth it is a stationary distribution in normalized variables, so the level allocation follows a balanced-growth path.

For $\sigma \neq 1$, the value function and policy functions take the form

$$V_g(a, X_g, s) = X_g^{1-\sigma} v_g(a/X_g, s), \qquad a' = X_g g_g(a/X_g, s), \tag{C8}$$

where s collects the remaining normalized states. To see the scaling, write $b' = a'/X_g$. The normalized continuation value is

$$\frac{\beta_g \mathbb{E}[V_g(a', X_g', s')]}{X_g^{1-\sigma}} = \beta_g \mathbb{E}\left[(\Gamma')^{1-\sigma} v_g\left(\frac{b'}{\Gamma'}, s'\right)\right], \tag{C9}$$

which contains no level X_g. The required integrability conditions include the relevant moments of Γ' and of normalized wealth; the single moment $\mathbb{E}[(\Gamma')^{1-\sigma}] < \infty$ need not be sufficient on its own. For log utility, the multiplicative value-function relation becomes $V_g = v_g + (1-\beta_g)^{-1} \log X_g$, while policy homogeneity is unchanged.

With several assets, the same argument gives $a_j' = X_g g_{g,j}(a/X_g, s)$ for every portfolio position. Integrating these policies over the normalized invariant distribution gives asset-specific demands

$$D_{g,j}(r, X_g) = \bar{D}_{g,j}(r) X_g. \tag{C10}$$

Borrowing need not be prohibited; any borrowing limit must simply scale with X_g. The result accommodates uninsurable idiosyncratic investment risk (Angeletos, 2007), portfolio choice over multiple assets, and return heterogeneity across groups or normalized states, as motivated empirically by Fagereng et al. (2020). It does not accommodate fixed dollar participation costs, fixed nominal debt limits, or lump-sum taxes that remain unchanged when X_g changes. In those cases a local approximation generally introduces an intercept and additional derivatives; it does not preserve the sufficient statistic automatically. In the one-asset model, exact homogeneity is what permits the asset block to be summarized by $\bar{D}(r)$ and the relative demand coefficient $\lambda(r)$.

D Measurement Appendix

D.1 Measuring the path of market power

This section describes the estimation of the aggregate markup path.

The Census matched sample. The series is estimated by Ren and Zhang (2025) on publicly traded firms linked to the Longitudinal Business Database (LBD) of the U.S. Census Bureau. The LBD is a census of private nonfarm establishments in the United States. It is built from the Business Register, which the Census Bureau maintains from its own surveys and from administrative records such as those of the IRS, and it reports annual payroll and employment for each establishment together with an identifier of the firm that owns it (Chow et al., 2021). Establishments are aggregated to the firm, and firms are linked to the CRSP/Compustat merged file through a crosswalk developed by Lawrence Schmidt. In the resulting firm year panel, the income statement of a public firm sits beside the administrative record of its U.S. payroll and employment, where the compustat data has limited information on: its coverage of labor expenses is highly incomplete, the reason why the markup literature has folded labor into a composite variable input.

The panel covers 1977 to 2019. It excludes utilities, finance, real estate, public administration, and unclassified firms (NAICS 22, 52, 53, 92, and 99), drops firms without a four digit industry code, and requires positive sales, COGS, SG&A, total assets, and capital. Observations are trimmed by year at the 1st and 99th percentiles of the ratios of COGS, SG&A, and materials to sales and at the 99th percentile of R&D to sales. About 69,500 firm year observations remain: roughly 1,400 firms in 1980, about 2,000 during the 1990s, and 1,000 in 2018.[19] The matched firms employ between 11 and 16 million workers in the United States in every year of the sample. The series therefore describes market power among publicly traded firms, measured on firm years for which U.S. payroll is observed. This second property is what allows the measured wedge to be taken apart in Section D.2.

Output, the flexible input, and capital. Output is sales and the flexible input is cost of goods sold, both deflated with the GDP deflator. COGS is the conventional choice since De Loecker, Eeckhout and Unger (2020): it is the one broadly reported expense that varies with production.

Capital plays two roles in the estimation, and both shape how it is built. It is an argument of the production function, so the elasticity of the flexible input cannot be estimated apart from it. And it provides the timing restriction that identifies that elasticity: capital in place at the start of a year was chosen before the year's productivity innovation, whereas the flexible input responds to it. The estimation therefore needs a stock that is measured consistently over the life of a firm and dated before production takes place. Ren and Zhang (2025) construct it by accumulating investment on a book value benchmark. At a firm's first observation the stock equals gross property, plant, and equipment (Compustat `PPEGT`, bounded below by zero). In each later year it grows by net investment, measured as the change in net property, plant, and equipment (`PPENT`). The stock is deflated with the price index for nonresidential fixed investment (NIPA Table 1.1.9, line 9), because the price of capital goods has not followed the GDP deflator. Balance sheets record capital at the

[19] Counts are rounded under Census disclosure rules. The COGS based measure used in this paper and the labor separated estimates of Section D.2 are computed on the same firm years.

end of the fiscal year, so the capital input for year t is the stock at the end of year $t-1$.

Production function and estimation. Within each two digit NAICS industry, log output is

$$y_{it} = \sum_a \beta_a x_{it}^a + \sum_a \beta_{aa} \left(x_{it}^a\right)^2 + \sum_{a<b} \beta_{ab}\, x_{it}^a x_{it}^b + \omega_{it} + \varepsilon_{it}, \tag{D1}$$

where x_{it} collects the logs of the flexible input v_{it} and of capital k_{it}, ω_{it} is Hicks neutral productivity, and ε_{it} captures measurement error and shocks realized after inputs are chosen. The translog is a second order approximation to an arbitrary technology. Its coefficients are constant within an industry over the entire sample, but the output elasticities they imply are specific to the firm and the year,

$$\theta_{it}^v = \beta_v + 2\beta_{vv} v_{it} + \sum_{b \neq v} \beta_{vb}\, x_{it}^b, \tag{D2}$$

so the measured wedge reflects each firm's input mix as well as its accounting ratio of sales to COGS.

Estimation follows the two stage procedure of De Loecker and Warzynski (2012), which builds on Olley and Pakes (1996), Levinsohn and Petrin (2003), and Ackerberg, Caves and Frazer (2015). The first stage regresses log sales on a second order polynomial in the inputs and year effects. Its fitted value $\widehat{\phi}_{it}$ is output net of ε_{it}, and its residual $\widehat{\varepsilon}_{it}$ is retained. In the second stage, a candidate coefficient vector β implies productivity $\omega_{it}(\beta) = \widehat{\phi}_{it} - f(x_{it}; \beta)$, where f is the deterministic part of (D1). Productivity follows a first order autoregression with innovation $\xi_{it}(\beta)$. Under the timing assumption the innovation is orthogonal to capital in place and to last year's flexible input, which gives the moment conditions

$$\mathbb{E}\left[\xi_{it}(\beta)\, z_{it}\right] = 0, \tag{D3}$$

with z_{it} containing current capital, the lagged flexible input, and their squares and interactions.

The elasticity of the flexible input is the coefficient on which the wedge depends, and it is the one these moments identify least well. Without variation in the relative price of the flexible input, the proxy variable approach leaves it underdetermined (Gandhi, Navarro and Rivers, 2020). Following Flynn, Gandhi and Traina (2019), the estimation adds a restriction on returns to scale: constant returns enters as the additional moment $\mathbb{E}[\sum_a \theta_{it}^a(\beta) - 1] = 0$. This is the restriction our model places on the technology F in Section 2.1, so the estimated elasticities and the model's factor shares rest on a common assumption. The size of the rise is not sensitive to it. Without the restriction the index rises 10.3 percent between 1980 and 2018, against 9.6 percent with it.[20]

The firm level wedge. A cost minimizing firm hires a flexible input until its price equals its marginal product valued at marginal cost. When the firm takes the input price as given, this

[20] The moments are weighted equally. In each industry the objective is minimized from 1,000 random starting values, with first order coefficients restricted to $[0, 1]$ and second order coefficients to $[-0.05, 0.05]$, and the estimates are interior.

condition says that the ratio of price to marginal cost equals the output elasticity of the input divided by its share of revenue (Hall, 1988; De Loecker and Warzynski, 2012). Applied to COGS, the firm level measure in (16) is

$$\widehat{\mu}_{it}^{\text{meas}} = \frac{\widehat{\theta}_{it}^{v}}{\widehat{\alpha}_{it}^{v}}, \qquad \widehat{\alpha}_{it}^{v} = \frac{\text{COGS}_{it}}{\text{Sales}_{it} / \exp(\widehat{\varepsilon}_{it})}. \tag{D4}$$

Dividing sales by $\exp(\widehat{\varepsilon}_{it})$ removes the variation in revenue that is unrelated to input choices, as in De Loecker and Warzynski (2012). Because a ratio magnifies errors in either term, the elasticities and the revenue shares are winsorized at the 5th and 95th percentiles before the ratio is formed. The requirement that the firm be a price taker in the market for the flexible input is what licenses reading the ratio as a product markup. Section D.2 examines it.

Aggregation within and across industries. The firm level wedges are aggregated as the theory prescribes. Within each two digit industry j,

$$\widehat{\mu}_{jt}^{\text{meas}} = \left(\sum_{i \in j} s_{it}^{j} \left(\widehat{\mu}_{it}^{\text{meas}} \right)^{-1} \right)^{-1}, \tag{D5}$$

where s_{it}^{j} is firm i's share of industry sales. This is (15) applied to the industry.

Across industries, levels cannot be combined in the same way, for a reason of identification. The data record revenue, and without firm level prices the estimated output elasticity carries a multiplicative bias of unknown size (Bond et al., 2021; De Ridder, Grassi and Morzenti, 2025). The bias is common to the firms that share a production function, here an industry. It therefore leaves the growth of each industry series informative and its level uninformative. An aggregate of levels would treat the industry constants as if they were data: a shift of sales toward industries with a high estimated level would register as rising market power whether or not the true wedge in those industries is high. The index removes the constants before aggregating. Each industry series is divided by its 1977 value, and the normalized series are averaged with industry sales weights w_{jt}:

$$I_t = \sum_{j} w_{jt} \frac{\widehat{\mu}_{jt}^{\text{meas}}}{\widehat{\mu}_{j,1977}^{\text{meas}}}. \tag{D6}$$

I_t is a sales weighted average of the growth of the wedge within industries.

Panel A of Table D1 shows what each choice does. The harmonic mean across all firms, taken in levels, rises 16.7 percent between 1980 and 2018, against 9.6 percent for the index. The difference of 7 points reflects sales moving toward industries with higher estimated levels, the component that cannot be told apart from the industry constants. The arithmetic sales weighted counterpart of the index, the statistic most often reported in the literature, rises 15.4 percent. It exceeds the harmonic index because reallocation toward high markup firms raises an arithmetic mean by more than a

Table D1: The measured wedge under alternative constructions

	Index, 1980 = 1				Share of rise
	1990	2000	2010	2018	by 1990 (%)
Panel A. Census matched sample					
Harmonic index within industries (baseline)	1.027	1.059	1.096	1.096	28
without the returns to scale restriction	1.042	1.084	1.104	1.103	41
with arithmetic sales weights	1.044	1.091	1.162	1.154	29
Harmonic mean across all firms, in levels	1.049	1.147	1.175	1.167	29
Aggregate sales over COGS	1.079	1.120	1.161	1.180	44
Labor separated price markup	1.006	1.025	1.033	1.022	
Labor separated wage markdown	1.131	1.393	1.590	1.760	
Panel B. Full Compustat sample					
Translog	1.069	1.103	1.107	1.100	69
Cobb–Douglas	1.081	1.094	1.103	1.105	77
Rolling Cobb–Douglas elasticities	1.095	1.130	1.098	1.112	85
Aggregate sales over COGS	1.101	1.126	1.134	1.128	79

Notes: Each series is divided by its 1980 value. The last column is the share of the increase between 1980 and 2018 that has occurred by 1990. Panel A uses the Census matched sample of Ren and Zhang (2025). The first three rows are indexes built as in (D6); the fourth is the harmonic mean (15) of firm level estimates across all firms without the industry normalization; the fifth requires no estimation. The labor separated price markup is aggregated as in the first row, and the wage markdown is weighted by the wage bill. Panel B uses Compustat firms reporting sales, COGS, SG&A, and capital, excluding finance and real estate, with COGS as the flexible input and gross property, plant, and equipment as capital. The translog and Cobb–Douglas rows estimate time invariant production functions by two digit industry; the third row applies the rolling window elasticities of De Loecker, Eeckhout and Unger (2020). Firm level estimates in these three rows are trimmed at the 1st and 99th percentiles by year and aggregated with (15) across all firms.

harmonic one (Edmond, Midrigan and Xu, 2023). Factor shares depend on inverse markups, so the harmonic index is the one the model requires.

From the index to the model path. The same identification problem governs how the series enters the model. The estimated level is uninformative even in the aggregate: the harmonic mean across all firms is 0.82 in 1980, and a wedge below one would have large public firms selling below marginal cost. The growth of the series is informative, and growth is all the model takes from it. We rebase the index to 1980 and attach it to a level taken from the national accounts, as in (17). By (5) the level of the wedge is pinned down by the profit share, $\mu_{1980} = 1/(1 - s_{\Pi,1980})$. The 1980 profit share of 4 percent in Table 2 gives $\mu_{1980} = 1.0417$ and, with $\alpha = 1/3$, a labor share of 64 percent. Firm level data thus discipline the proportional change in the wedge, and national accounts discipline the level to which that change applies. The model path rises from 1.042 in 1980 to 1.142 in 2018, which lowers the labor share to 58.4 percent and raises the profit share to 12.4 percent.

D.2 What the measured wedge captures

The ratio estimator recovers a product markup from an input only if the firm is a price taker in the market for that input. Cost of goods sold fails the condition on accounting grounds: it includes the wages of production workers, and a firm with labor market power pays a wage below the marginal revenue product of labor. Let $\nu_{it} \geq 1$ denote this wage markdown, the ratio of the marginal revenue product of labor to the wage. Ren and Zhang (2025) show that the ratio estimator applied to labor returns the product of the two wedges, $\theta^{\ell}_{it}/\alpha^{\ell}_{it} = \mu_{it}\nu_{it}$, while applied to a competitively supplied input such as materials it returns the markup alone, $\theta^{m}_{it}/\alpha^{m}_{it} = \mu_{it}$. COGS bundles the two. For a proportional change in the bundle, its output elasticity is $\theta^{m}_{it} + \theta^{\ell}_{it}$ and its revenue share is $\alpha^{m}_{it} + \alpha^{\ell}_{it}$, so the conventional measure is

$$\widehat{\mu}^{\text{meas}}_{it} = \frac{\theta^{m}_{it} + \theta^{\ell}_{it}}{\alpha^{m}_{it} + \alpha^{\ell}_{it}} = \mu_{it}\left[1 + (\nu_{it} - 1)\,\frac{\alpha^{\ell}_{it}}{\alpha^{m}_{it} + \alpha^{\ell}_{it}}\right]. \tag{D7}$$

The measured wedge is the product markup times a weighted average of one and the wage markdown, with weight equal to labor's share of the bundle. When the flexible input is labor alone it equals $\mu_{it}\nu_{it}$, the case in (19). A rise in the conventional measure therefore establishes that total market power has risen. It is silent on the market in which it rose.

The matched data can separate the two components because payroll is observed. On the same firm years, Ren and Zhang (2025) estimate a production function in which labor, taken from the LBD, and materials, measured as COGS plus SG&A net of payroll, rents, and the nonlabor part of intangible investment, enter as separate inputs alongside physical and intangible capital. Materials are the price taking flexible input and identify the product markup, $\mu_{it} = \theta^{m}_{it}/\alpha^{m}_{it}$. The wage markdown follows as $\nu_{it} = (\theta^{\ell}_{it}/\alpha^{\ell}_{it})/\mu_{it}$. The two series part ways, as the last rows of Panel A show. Between 1980 and 2018 the price markup index rises 2 percent and the wage markdown index rises 76.0 percent.

The reason is visible in the cost shares, before any estimation. From 1977 to 2019 payroll falls from 21 to 10 percent of sales in the matched sample, while the estimated output elasticity of labor declines only from about 0.25 to 0.22. The ratio of the two roughly doubles, and with it the markdown. The materials share and the materials elasticity instead rise together, from 0.66 to 0.70 and from 0.65 to 0.69, which leaves the price markup flat. Over the same years COGS falls from 73 to 62 percent of sales. The eleven points of sales that leave COGS are matched by eleven points that leave payroll. In this sample the conventional measure rises because labor is paid a declining share of what firms sell, a fact read directly from the accounts that does not depend on the production function.

Two implications follow for this paper. The first concerns the reading of the baseline. Section 4 attributes the measured wedge to the product markup, under which labor and capital payments fall in proportion as the wedge rises. The labor separated estimates point to the wage markdown,

Table D2: Implied and observed changes in the labor share

	Change since 1980 (points)				RMS gap to observed		
	1990	2000	2010	2018	Business	Corporate	Aggregate
Panel A. Implied by the measured wedge							
Census matched index (baseline)	−1.7	−3.5	−5.6	−5.6	1.6	2.0	1.0
Compustat, translog	−4.1	−6.0	−6.2	−5.8	3.1	3.4	2.3
Compustat, Cobb–Douglas	−4.8	−5.5	−6.0	−6.1	2.6	2.8	1.9
Compustat, rolling elasticities	−5.5	−7.4	−5.7	−6.4	3.4	3.5	2.9
Compustat, sales over COGS	−5.9	−7.2	−7.6	−7.3	3.5	3.6	3.1
Panel B. Observed							
Nonfarm business sector	−0.8	−0.3	−7.2	−7.0			
Corporate sector	−0.3	−0.2	−7.7	−7.3			
Aggregate	−1.4	−2.9	−7.2				

Notes: Changes are in percentage points of the labor share relative to 1980. The implied labor share is $(1-\alpha)/\mu_t$ with $\alpha = 1/3$ and μ_t from (17) for each series in Table D1; it equals 64 percent in 1980. The nonfarm business series is the BLS labor share used by Elsby, Hobijn and Şahin (2013), the corporate series is compensation over gross value added of the corporate sector as in Karabarbounis and Neiman (2014), both updated through 2018, and the aggregate series is the EU KLEMS labor share used by Autor et al. (2020), which ends in 2010. The last three columns report the root mean squared difference between the implied and the observed change across the years 1980 to 2018, and 1980 to 2010 for the aggregate series.

under which the capital share is unchanged and the whole increase in the profit share comes out of the labor share, as in (20). Section 6.2 constructs wage markdowns to match the profit shares implied by the baseline markup path. Both readings deliver the shift on which the asset market channel operates, from labor income to the income of those who own the rents. For this reason we refer to $\widehat{\mu}^{\text{meas}}$ as a measure of total market power.

The second concerns factor shares. A wedge that mirrors a falling payroll share at the firm level should agree with the labor share in the national accounts, and that agreement is where the Census matched path differs most from conventional Compustat estimates. Panel B of Table D1 reports four such estimates. All use the sample definition of De Loecker, Eeckhout and Unger (2020), COGS as the flexible input, and the harmonic aggregate (15) across all firms. They differ in the output elasticity: a translog and a Cobb–Douglas production function with time invariant coefficients by two digit industry, the rolling Cobb–Douglas elasticities of De Loecker, Eeckhout and Unger (2020), and an elasticity of one, which is the ratio of aggregate sales to aggregate COGS. By 2018 the four series stand 10 to 13 percent above 1980, close to the 9.6 percent of the baseline. The disagreement is about timing. Each Compustat series completes at least two thirds of its rise by 1990. The Census matched index completes 28 percent.

The national accounts favor the later timing. Table D2 passes each path through (5) at the baseline calibration and compares the implied labor share with three published series. In the data the labor share is at most 1.4 points below its 1980 value in 1990 and about 7 points below it after 2010. The baseline path lowers the labor share by 1.7 points by 1990 and by 5.6 points by 2018. The Compustat paths lower it by 4 to 6 points by 1990, a decade in which the measured labor share

barely moved. Over 1980 to 2018 the root mean squared gap between the implied and the observed change is 1.6 points for the baseline against the nonfarm business labor share and 2.6 to 3.5 points for the Compustat paths, and the ranking is the same against the other two series.

Panel A of Table D1 traces the later timing to two features of the baseline. The cost ratio of the matched sample keeps rising after 1990: sales over COGS stands 7.9 percent above 1980 in 1990 and 18.0 percent above it in 2018, whereas in the full Compustat sample it has already risen 10.1 percent by 1990 and ends at 12.8 percent. And the index within industries removes the part of the early rise that comes from sales moving across industries.

The long run results of Section 4.3 depend on the 2018 level of the wedge, on which all series roughly agree. The path between 1980 and 2018 depends on timing, and for the path we use the series whose timing is consistent with the factor shares through which market power enters the model.

E Quantitative Appendix

E.1 Computation

We solve the nonlinear economy in stationary equilibrium and along an annual perfect-foresight transition. We calibrate the group discount factors, productivity normalization, and baseline wedges to match the targets in Table 2; the equilibrium then determines the return, household policies, invariant distributions, and asset demand. Along the transition, the return clears the asset market each year, with market-clearing errors below 9×10^{-9}. The sufficient-statistic calculation uses the same sales-harmonic markup series and baseline calibration as the nonlinear transition.

E.2 Representative-household welfare benchmark

Consider a simple welfare benchmark implied by a representative household with GHH preferences, $U(C, L) = u(C - v(L))$. Equation (6) connects the output response to the distorted user cost $\tilde{r}^k$. We use this result to connect changes in output Y to representative household welfare, accounting for replacement investment and labor disutility.

In an initial steady state with aggregate production wedge μ^0, the household consumes C^0 and supplies labor L^0. For a change to μ^1, with allocation (C^1, L^1), we compute the consumption equivalent variation (CEV) by solving

$$U\Big((1 + \text{CEV}^{\text{RA}})C^0, L^0\Big) = U(C^1, L^1).$$

A positive CEV denotes a welfare gain: it is the proportional increase in baseline consumption that delivers the counterfactual utility. With investment share $s_I = I/Y$ and resource constraint

$C = Y - I$, GHH preferences give

$$1 + \text{CEV}^{\text{RA}} = \frac{C^1}{C^0} - \frac{v(L^1) - v(L^0)}{C^0} = \frac{Y^1(1 - s_I^1)}{Y^0(1 - s_I^0)} - \frac{v(L^1) - v(L^0)}{Y^0(1 - s_I^0)}.$$

The same distorted user cost introduced in Section 2,

$$\tilde{r}^k = \mu(r + \delta_K) = AF_K(K, L), \tag{E1}$$

governs the local output response. In a steady state, replacement investment gives $s_I = \delta_K K/Y$; the other income shares retain their earlier definitions.

For $r > 0$ and fixed A, equation (6) gives

$$\frac{d \log \tilde{r}^k}{d \log \mu} = 1 + \frac{r}{r + \delta_K} \frac{d \log r}{d \log \mu}, \tag{E2}$$

and

$$\frac{d \log Y}{d \log \mu} = -\varphi - (\sigma_{KL} + \varphi) \frac{s_K}{s_W} \frac{d \log \tilde{r}^k}{d \log \mu}. \tag{E3}$$

The following proposition connects this output response to consumption C and representative household welfare.

Proposition 4 (Local consumption and representative household welfare responses)**.** *Under the production and GHH labor supply assumptions of Section 2, consider a local change in the aggregate production wedge μ, holding effective productivity A, labor supply parameters, and depreciation δ_K fixed. The consumption response is*

$$\frac{d \log C}{d \log \mu} = \frac{d \log Y}{d \log \mu} + \sigma_{KL} \frac{s_I}{1 - s_I} \frac{d \log \tilde{r}^k}{d \log \mu}. \tag{E4}$$

Evaluating these allocations with representative household GHH preferences gives

$$\begin{aligned} \left. \frac{d \, \text{CEV}^{\text{RA}}(\mu^1; \mu^0)}{d \log \mu^1} \right|_{\mu^1 = \mu^0 = \mu} &= \frac{d \log C}{d \log \mu} - \frac{s_W}{1 - s_I} \frac{d \log L}{d \log \mu} \\ &= \frac{d \log C}{d \log \mu} + \frac{\varphi s_W}{1 - s_I} \left(1 + \frac{s_K}{s_W} \frac{d \log \tilde{r}^k}{d \log \mu} \right). \end{aligned} \tag{E5}$$

The consumption response accounts for the change in replacement investment, while the CEV also values the change in labor. In particular, a decline in labor reduces disutility and offsets part of the consumption loss. These adjustments extend the output result without requiring another asset market calculation: the equilibrium interest rate response $d \log r / d \log \mu$ remains the link to the household block.

In the inelastic labor limit, $\varphi \to 0$, the output, consumption, and CEV responses become exactly proportional to the elasticity of the distorted user cost $\tilde{r}^k$:

$$\frac{d \log Y}{d \log \mu} = -\sigma_{KL} \frac{s_K}{s_W} \frac{d \log \tilde{r}^k}{d \log \mu},$$
$$\left. \frac{d \, \mathrm{CEV}^{\mathrm{RA}}(\mu^1; \mu^0)}{d \log \mu^1} \right|_{\mu^1 = \mu^0 = \mu} = \frac{d \log C}{d \log \mu} = -\sigma_{KL} \left(\frac{s_K}{s_W} - \frac{s_I}{1 - s_I} \right) \frac{d \log \tilde{r}^k}{d \log \mu}.$$

To illustrate the role of the asset market channel, compare a local increase in the aggregate production wedge μ in the representative household economy (RA) and the incorporation economy (HA). Both economies share the production and labor supply assumptions above and begin at a common reference allocation; their output responses differ through the equilibrium interest rate response in the HA economy.

With inelastic labor, the ratio of their output elasticities is

$$\left. \frac{d \log Y^{\mathrm{HA}} / d \log \mu}{d \log Y^{\mathrm{RA}} / d \log \mu} \right|_{\varphi = 0} = 1 + \frac{r}{r + \delta_K} \frac{d \log r^{\mathrm{HA}}}{d \log \mu} \approx \underbrace{1 + \frac{0.06}{0.06 + 0.0685} (-2.15) \simeq 0}_{\text{1980 calibration}}.$$

Here we use the reference values $\alpha = 1/3$, $r = 0.06$, $\delta_K = 0.0685$, $s_K = 0.32$, and $s_W = 0.64$. The two-group sufficient statistic gives the local interest rate elasticity $d \log r^{\mathrm{HA}} / d \log \mu = -2.15$. Holding this interest rate response fixed in the illustration, the decline in r almost exactly offsets the local output loss when labor supply is inelastic. With elastic labor supply, the aggregate production wedge μ also reduces the wage w directly. At $\varphi = 0.5$, the same local interest rate response mitigates the output loss:

$$\left. \frac{d \log Y^{\mathrm{HA}} / d \log \mu}{d \log Y^{\mathrm{RA}} / d \log \mu} \right|_{\varphi = 0.5} \approx \underbrace{0.40}_{\text{1980 calibration}}.$$

As a simple heuristic, consider how a representative household would value the welfare effects of this change in markups when the interest rate r is determined by the asset market channel. We compare representative household CEV under RA allocations with the same welfare evaluation under HA aggregate allocations. Denote these by RA|RA and RA|HA, respectively. At the same reference allocation with $\varphi = 0.5$, Proposition 4 gives

$$\frac{d \, \mathrm{CEV}^{\mathrm{RA|RA}}}{d \log \mu} = \frac{d \log C^{\mathrm{RA}}}{d \log \mu} - \frac{s_W}{1 - s_I} \frac{d \log L^{\mathrm{RA}}}{d \log \mu} \approx \underbrace{-0.466}_{\text{1980 calibration}},$$
$$\frac{d \, \mathrm{CEV}^{\mathrm{RA|HA}}}{d \log \mu} = \frac{d \log C^{\mathrm{HA}}}{d \log \mu} - \frac{s_W}{1 - s_I} \frac{d \log L^{\mathrm{HA}}}{d \log \mu} \approx \underbrace{-0.114}_{\text{1980 calibration}}.$$

Viewed through aggregate consumption and labor, this local calculation implies a smaller welfare loss with the asset market channel. While RA|HA is not a measure of average welfare in the actual

HA economy, it is a useful benchmark for the household welfare calculations below: changes in aggregate allocations may conceal significant welfare effects across households. These numerical comparisons use the local sufficient statistic and the representative household benchmark at the stated reference allocation. They are not the full transition welfare results; the next subsections evaluate both economies along fully solved markup transitions.

E.3 Welfare calculation and source decomposition

Individual, type, and population CEVs. The preceding representative household calculation only values changes in aggregate consumption and labor. We now turn to welfare in the heterogeneous household economy, where these aggregate changes can conceal large differences across households. We define individual-, type-, and population-level CEVs that account for household heterogeneity and the full transition induced by the markup counterfactual in Section 4.3. We first describe the perfect foresight transition; the same CEV definitions apply to the realized myopic transition in Table 4. The economy begins in its calibrated 1980 stationary equilibrium. At date 0, households unexpectedly learn the future aggregate markup path, while continuing to face idiosyncratic risk. The reference economy retains the initial markup indefinitely. With $t = 0$ corresponding to 1980, $T = 2018 - 1980$, and estimated markups $\widehat{\mu}^{y}$, the paths are

$$\mu_t^0 = \mu^{1980}, \qquad \mu_t^1 = \begin{cases} \mu^{1980} \dfrac{\widehat{\mu}^{1980+t}}{\widehat{\mu}^{1980}}, & t = 0, \dots, T, \\ \mu^{2018}, & t > T. \end{cases}$$

Here μ^{2018} is the normalized counterfactual markup at the end of the sample. Because the change is unanticipated, households enter date 0 with the assets, productivity states, and ownership statuses inherited from the initial stationary distribution. Households have perfect foresight over the aggregate transition but continue to face idiosyncratic uncertainty. Prices, asset valuations, labor, consumption, and saving can therefore respond from the announcement date onward.

Let $g \in \{W, O\}$ denote workers and business owners, and let x collect a household's initial state. Write the announced path as $\boldsymbol{\mu}^1 = \{\mu_t^1\}_{t=0}^{\infty}$. Expected lifetime utility along the counterfactual is

$$V_g^1(x) = V_g(x; \boldsymbol{\mu}^1) = \mathbb{E}_1 \left[\sum_{t=0}^{\infty} \beta_g^t U_g(c_{g,t}^1, \ell_{g,t}^1) \,\middle|\, x_{g,0} = x \right],$$

where $U_W(c, \ell) = u(c - v(\ell))$ and $U_O(c, \ell) = u(c)$ are the preferences specified in Section 3. Expectations integrate over future idiosyncratic histories. For a permanent proportional change in baseline consumption, define

$$V_g^0(x; \mathrm{CEV}) = \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta_g^t U_g\Big((1 + \mathrm{CEV}) c_{g,t}^0, \ell_{g,t}^0 \Big) \,\middle|\, x_{g,0} = x \right].$$

Compensation scales actual consumption, holding baseline labor and policies fixed. For workers, it therefore changes c inside the GHH composite, rather than scaling consumption net of labor disutility.

The individual CEV equates these values for each initial state:

$$V_g^0(x; \text{CEV}_g^{\text{ind}}(x)) = V_g^1(x).$$

Its value can differ across initial states, but the compensation for a given household is constant across dates and future histories. To evaluate welfare within a type, integrate over its initial-state distribution Λ_g^0:

$$\overline{V}_g^0(\text{CEV}) = \int V_g^0(x; \text{CEV})\, d\Lambda_g^0(x), \qquad \overline{V}_g^1 = \int V_g^1(x)\, d\Lambda_g^0(x).$$

The type-level CEV applies a common compensation within that type,

$$\overline{V}_g^0(\text{CEV}_g^{\text{type}}) = \overline{V}_g^1.$$

It generally differs from the mean individual CEV because utility is nonlinear. The population-level CEV additionally aggregates across types:

$$N_W \overline{V}_W^0(\text{CEV}^{\text{pop}}) + (1 - N_W)\overline{V}_O^0(\text{CEV}^{\text{pop}}) = N_W \overline{V}_W^1 + (1 - N_W)\overline{V}_O^1.$$

The type- and population-level measures use a utilitarian criterion, with initial-state probabilities and population shares as weights. The population measure also depends on the cardinal normalization of utility across types; it is one social welfare benchmark rather than an average of individual CEVs.

For the myopic calculation in Table 4, each observed annual markup is believed permanent. Only the first year of each subjective forecast is realized until the next observation arrives. The final forecast supplies the constant-markup continuation for lifetime welfare. The compensation definitions above are applied to the resulting realized allocation. Both calculations use the same initial household distribution and the same markup observations.

Lifetime values cover the 39 observed annual allocations from 1980 through 2018, a 120-year convergence tail, and the exact terminal stationary continuation. We invert the baseline value function for every positive-mass initial worker and business owner cell, including private, IPO-period, and ongoing incorporated founder states. Baseline labor and policies are held fixed on the compensation side. In particular, worker compensation scales actual consumption inside the GHH composite rather than scaling consumption net of labor disutility.

For either aggregate allocation path $M \in \{\text{RA}, \text{HA}\}$, the representative-household benchmark

solves

$$\frac{1}{1-\beta}U\Big((1+\text{CEV}^{\text{RA}|M})C^0, L^0\Big) = \sum_{t=0}^{\infty}\beta^t U(C_t^M, L_t^M).$$

The RA|HA measure evaluates aggregate allocations from the incorporation economy with representative-household preferences; it is not the population-level CEV in that economy.

Source decomposition under perfect foresight. Figure 12 shows how changes in household income and asset returns contribute to welfare. For workers, changes in individual labor income $we\ell$ account for the principal loss. Initial asset revaluation partly offsets this loss, while lower subsequent returns reduce the offset. Business owners gain from changes in individual business profit income π, retained individual profit income $\theta_F \Pi z$, equity sale proceeds, and initial asset revaluation, partly offset by lower subsequent returns. These are the household consequences of the income and valuation changes that determine asset demand D and asset supply S in the earlier sections.

The individual CEV combines every change in a household's equilibrium consumption and labor path. To attribute this total welfare effect to its economic sources, we gradually increase the markup change, measure each source's marginal contribution, and add these contributions. We connect the reference and counterfactual markup paths through

$$\log \mu_t^\tau = \log \mu_t^0 + \tau(\log \mu_t^1 - \log \mu_t^0), \qquad \tau \in [0,1]. \tag{E6}$$

Here τ indexes the size of the markup change, while t indexes calendar time. At each of 129 homotopy nodes, we solve the complete nonlinear equilibrium transition and define

$$V_g^0(x; \text{CEV}_g^{\text{ind}}(x;\tau)) = V_g^\tau(x).$$

The individual CEV is zero at $\tau = 0$ and equals the reported counterfactual CEV at $\tau = 1$.

Let $j \in \mathcal{J}_g$ index the income and return sources for household type g: labor or business profit income, equity sale proceeds, initial asset revaluation, and subsequent asset returns, as applicable. Initial asset revaluation is the change in the value of assets held when the counterfactual is announced. Let $\mathcal{R}_{g,j,t}^\tau$ denote the resources from each source. The envelope condition gives

$$\begin{aligned} \frac{dV_g^\tau(x)}{d\tau} &= \sum_{j\in\mathcal{J}_g} G_{g,j}^\tau(x), \\ G_{g,j}^\tau(x) &:= \mathbb{E}_\tau\left[\sum_{t=0}^{\infty}\beta_g^t U_{g,c,t}^\tau \frac{\partial \mathcal{R}_{g,j,t}^\tau}{\partial \tau}\,\middle|\, x_{g,0} = x\right]. \end{aligned} \tag{E7}$$

Here $G_{g,j}^\tau(x)$ is source j's contribution to the marginal change in lifetime utility, and $U_{g,c,t}^\tau$ is marginal utility of actual consumption. Because households choose consumption, labor, and saving optimally,

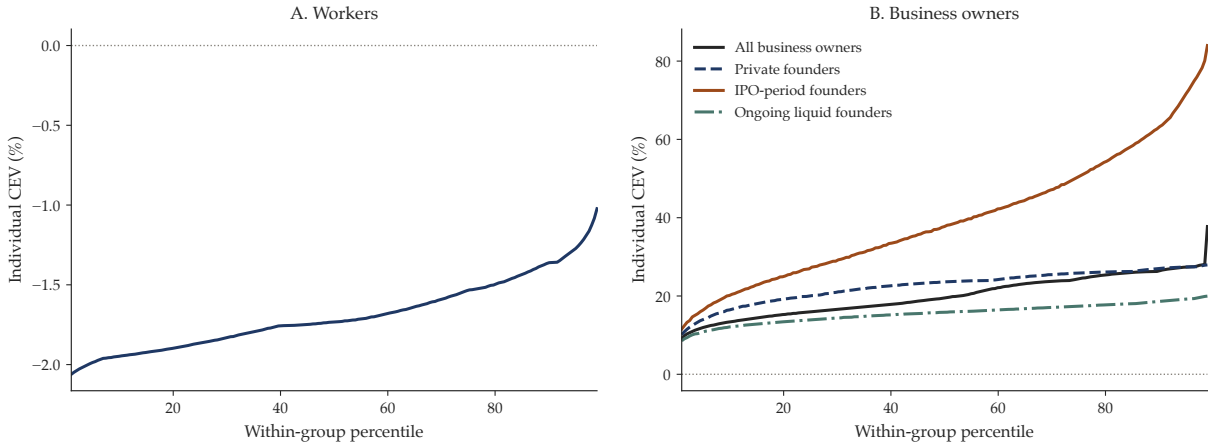


Figure E1: Distribution of individual welfare effects under perfect foresight. Curves show weighted quantiles of individual CEVs from the 1st through 99th percentile within each household type, using the 1980 stationary distribution. Business owner curves are also shown conditional on initial founder status. Positive CEVs denote welfare gains.

their marginal welfare changes can be measured from changes in income and asset returns, holding their choices fixed at each intermediate equilibrium. Converting these utility changes into CEV units and integrating gives

$$\mathrm{CEV}^{\mathrm{ind}}_{g,j}(x) := \int_0^1 \frac{G^{\tau}_{g,j}(x)}{\partial_{\mathrm{CEV}} V^0_g(x; \mathrm{CEV}^{\mathrm{ind}}_g(x;\tau))}\, d\tau, \tag{E8}$$

$$\mathrm{CEV}^{\mathrm{ind}}_g(x) = \sum_{j \in \mathcal{J}_g} \mathrm{CEV}^{\mathrm{ind}}_{g,j}(x). \tag{E9}$$

The denominator is the marginal lifetime utility value of a permanent proportional increase in baseline actual consumption. Dividing by it expresses each source's contribution in the same consumption units as CEV. The contributions sum to each household's total CEV. They attribute that welfare change to income and asset returns along the specified sequence of equilibria; they do not measure the effects of changing each source separately.

Figure 12 reports these contributions for households grouped by their total CEV. For business owners, the income component combines private business profit income and retained individual profit income. Taxes are zero in this counterfactual.

E.4 Sufficient statistic implementation

The sufficient-statistic calculation takes the normalized sales-harmonic markup path as given. For each date t, the markup determines the factor shares $(s_{K,t}, s_{W,t}, s_{\Pi,t})$. The calibration supplies $\lambda_0 = \lambda(r_0)$, ω, θ_F, r_0, δ_K, δ_C, and the worker and owner semi-elasticities ϵ_W and ϵ_O, held fixed at their baseline values. The implied baseline fixed-share semi-elasticity of total household asset

demand is

$$\epsilon_D = \frac{\partial}{\partial r} \log\{\bar{D}(r)\,[s_{W,0} + \lambda(r) s_{\Pi,0}]\}\Big|_{r_0} = \frac{\partial \log D(r)}{\partial r}\Big|_{r_0},$$

where $D(r)$ is the income share weighted average defined in footnote 14. This is the aggregate slope measured in the heterogeneous-agent model. It includes the direct saving responses of both groups and the local movement in $\lambda(r)$. Let $\widehat{D}(r)$ denote the worker demand coefficient used in the scalar approximation. Define

$$M(r, s_t) = \frac{\frac{1}{r+\delta_K} s_{K,t} + Q(r)\omega s_{\Pi,t}}{s_{W,t} + \lambda(r) s_{\Pi,t}}, \qquad Q(r) = \frac{1}{r+\delta_C}.$$

Normalize $\widehat{D}(r_0) = M(r_0, s_0)$ so that the baseline asset market clears, and close the demand side locally by

$$\widehat{D}(r_t) = \widehat{D}(r_0) \exp\{\epsilon_W (r_t - r_0)\}, \qquad \lambda(r_t) = \lambda_0 \exp\{(\epsilon_O - \epsilon_W)(r_t - r_0)\}.$$

The return plotted in the sufficient-statistic figures is the root of

$$\epsilon_W (r_t - r_0) = \log M(r_t, s_t) - \log M(r_0, s_0).$$

This scalar equation evaluates the observed share movements, the capital-depreciation adjustment, and tradable equity valuation at the solved return. The worker and owner semi-elasticities are held fixed separately, while $\lambda(r)$ and the aggregate semi-elasticity vary with the return and the asset demand weights. The resulting equation uses constant group semi-elasticity approximations to household asset demand around the baseline. It holds the other incidence objects and the group slopes fixed, so the statistic isolates the asset-market effect of the markup path before transition distributions and wealth accumulation are added.

E.5 The asset-demand semi-elasticity in the data

The elasticity that governs how much of the output cost the asset market absorbs is the asset-demand semi-elasticity $\epsilon_D = \partial \log D / \partial r$. In our calibration it is an equilibrium object, recovered by perturbing the return in the solved model, and it equals 16.2963 at the baseline (Table E1). The SCF ratio identifies the level $\lambda(r_0)$, not this slope. Its empirical counterpart is the semi-elasticity of household capital supply, equivalently asset demand, to the return. In a stationary equilibrium the capital stock and household assets move together, so $d \log K / dr$ and $\partial \log D / \partial r$ coincide up to the asset-to-capital ratio.

Moll, Rachel and Restrepo (2022) survey this semi-elasticity in their study of automation and wealth inequality, where it likewise sets how far the return moves as desired capital shifts. They observe that the available quasi-experimental estimates all lie below 35, far more inelastic than the

Table E1: Asset demand and equity value semi elasticities

State	r	All households	Workers	Business owners	Equity value
Calibrated baseline	6.00%	**16.2963**	16.46	15.49	9.09
Long run steady state at 2018 markup	4.98%	13.97	15.22	12.24	10.02

Notes: All households, Workers, and Business owners report local semi elasticities of desired asset holdings with respect to the annual interest rate. Equity value reports $-\partial \log Q(r)/\partial r$. Semi elasticities are expressed per unit change in the annual interest rate. Thus an entry of 16.2963 implies that a 100 basis point increase in the interest rate raises desired assets by approximately 16.2963 percent. The second row evaluates the local slopes in the steady state that holds the 2018 markup fixed.

value near 50 their own model implies. The estimates come from wealth and capital-income tax reforms: Zoutman (2018) and Jakobsen et al. (2020) from Dutch and Danish reforms, Brülhart et al. (2022) from the Swiss wealth tax, and Kleven and Schultz (2014) from Danish income-tax reforms, with implied semi-elasticities $d \log K/dr$ from roughly 1 to 35. Our equilibrium $\epsilon_D = 16.2963$ lies within this range. The mapping from ϵ_D to the mitigation share is transparent through the sufficient statistic (11): a more elastic asset market requires a smaller fall in the return to clear and mitigates less, while a more inelastic one mitigates more. The absorption we report rests on an elasticity within the measured range.

E.6 Asset demand sensitivity across steady states

The sufficient statistic holds the worker and business owner semi elasticities at their baseline values defined in Section 4.2, while their asset demand weights and the aggregate semi elasticity vary. A smaller aggregate semi elasticity requires a larger interest rate adjustment for a given shift in asset demand D or asset supply S.

Table E1 reports the local asset demand slopes at the calibrated steady state and at the long run steady state that holds the 2018 markup fixed. The final column reports the semi elasticity of equity values, $-\partial \log Q(r)/\partial r$, because changes in equity values alter IPO proceeds and thereby enter business owner asset demand.

At the long run steady state associated with the 2018 markup, the aggregate semi elasticity is 13.97, and the decline reflects the valuation of tradable equity rather than the direct saving response. These changes explain why fixed baseline group slopes need not reproduce the full nonlinear response.

E.7 The asset-demand semi-elasticity in the model: saving and valuation

At the long run steady state associated with the 2018 markup, the aggregate semi elasticity is 13.97. The business owner slope moves from 15.49 to 12.24, while the equity value semi elasticity moves from 9.09 to 10.02. Figure E2 shows the source of this movement. Business owner asset demand responds to the interest rate through two channels. A higher interest rate directly raises

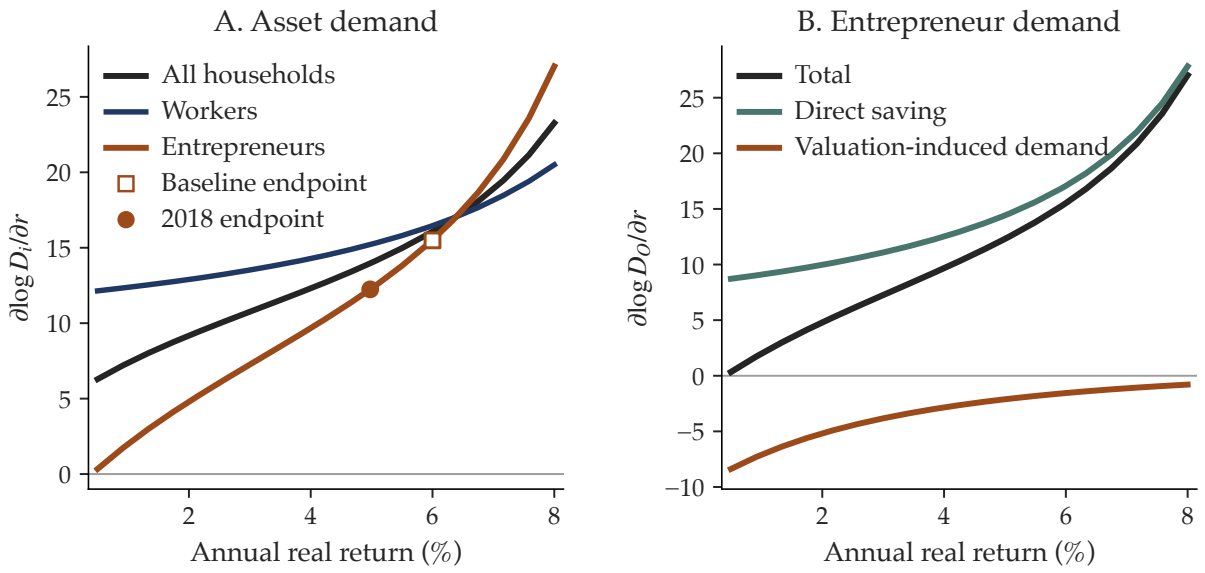


Figure E2: Asset demand semi elasticities and valuation. Panel A shows household semi elasticities in the cash flow environment of the long run equilibrium at the 2018 markup. The square and circle mark the baseline and long run business owner slopes. Panel B separates the business owner saving response, varying the saving return with claim prices fixed, from the valuation response, varying claim prices and incorporation transfers with the saving return fixed.

desired saving, holding incorporation proceeds fixed. At the same time, it lowers the value of future tradable equity and therefore the IPO proceeds received upon incorporation, partially offsetting the direct saving response. This valuation response becomes stronger at lower interest rates as the effective duration of the tradable equity increases.

At the calibrated baseline, the direct saving response is 17.04 and the valuation response is -1.55, yielding a total business owner semi elasticity of 15.49. At the long run steady state associated with the 2018 markup, the corresponding components are 14.37 and -2.13, for a total of 12.24. The sufficient statistic holds the worker and owner slopes fixed at their respective baseline values, while the nonlinear perfect foresight transition allows these slopes and the wealth distribution to evolve and incorporates anticipation of the future markup path. Despite these additional margins, the 2018 endpoints remain close.

E.8 Sensitivity to profit incidence

Figure E3 shows how the balance between Redistribution and Asset Creation varies with the two incidence parameters, λ and ω^{inc}. It reports the 2018 sufficient statistic response across $(\lambda_0, \omega^{\text{inc}})$ pairs while holding the worker and business owner semi elasticities fixed at 16.46 and 15.49, respectively. Each pair is normalized to clear the baseline asset market at the common interest rate r_0. The exercise therefore varies baseline profit incidence without re-solving household problems; $\lambda(r)$ and the aggregate asset demand semi elasticity vary endogenously.

A higher λ strengthens Redistribution by increasing the asset demand generated by the shift of income toward business owners, pushing the equilibrium interest rate further down. A higher ω^{inc} strengthens Asset Creation because more profit income is capitalized into tradable equity, expanding asset supply and pushing the equilibrium interest rate up. The baseline lies in the region where Redistribution dominates Asset Creation.

E.9 Dynamic sensitivity to selected $(\lambda, \omega^{\text{inc}})$ values

Figure E4 reports dated sufficient-statistic paths for 5 selected $(\lambda, \omega^{\text{inc}})$ combinations. Each path uses the cost-weighted markup series and the same fixed baseline worker and owner asset-demand semi-elasticities as Figure E3, while $\lambda(r)$ and the aggregate semi-elasticity vary endogenously. Panel A plots the return that clears the asset market. Panel B plots output and adds the representative household benchmark generated by the same markup path. The representative household line is common across points because λ and ω^{inc} enter asset-market pricing, while benchmark output depends only on the production-side markup movement. This diagnostic is distinct from the empirically recalibrated robustness exercises described above.

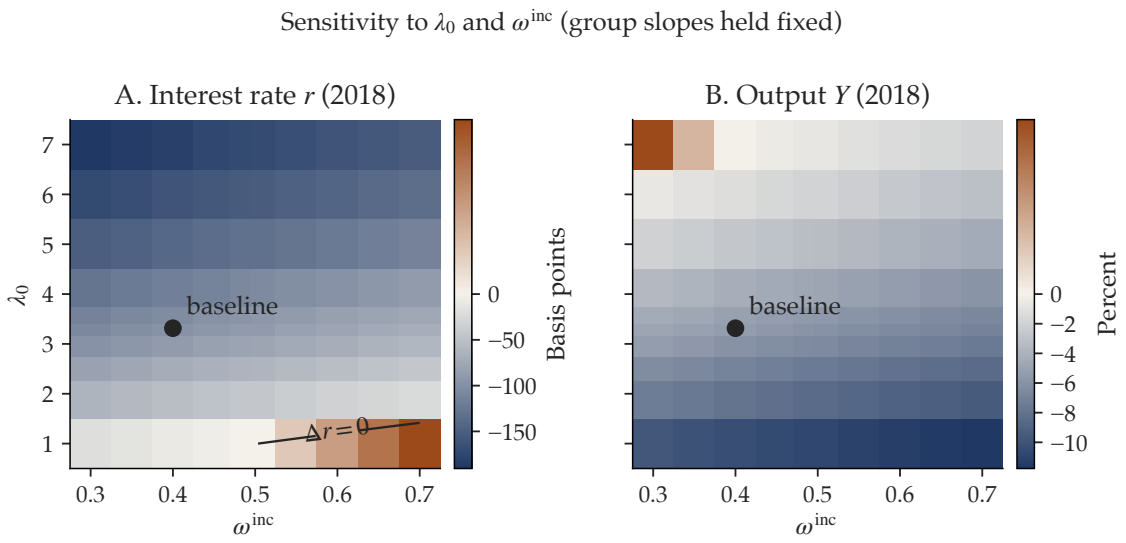


Figure E3: Incidence sensitivity of the 2018 markup counterfactual. Panels A and B show interest rate r and output Y changes from 1980, in basis points and percent, across baseline relative wealth-to-income ratios of owners to workers λ_0 and publicly incorporated profit shares ω^{inc}. Black points mark the baseline calibration. The publicly traded share is $\omega = (1 - \theta_F)\omega^{\text{inc}}$. Worker and business owner semi elasticities are held fixed; $\lambda(r)$ adjusts endogenously.

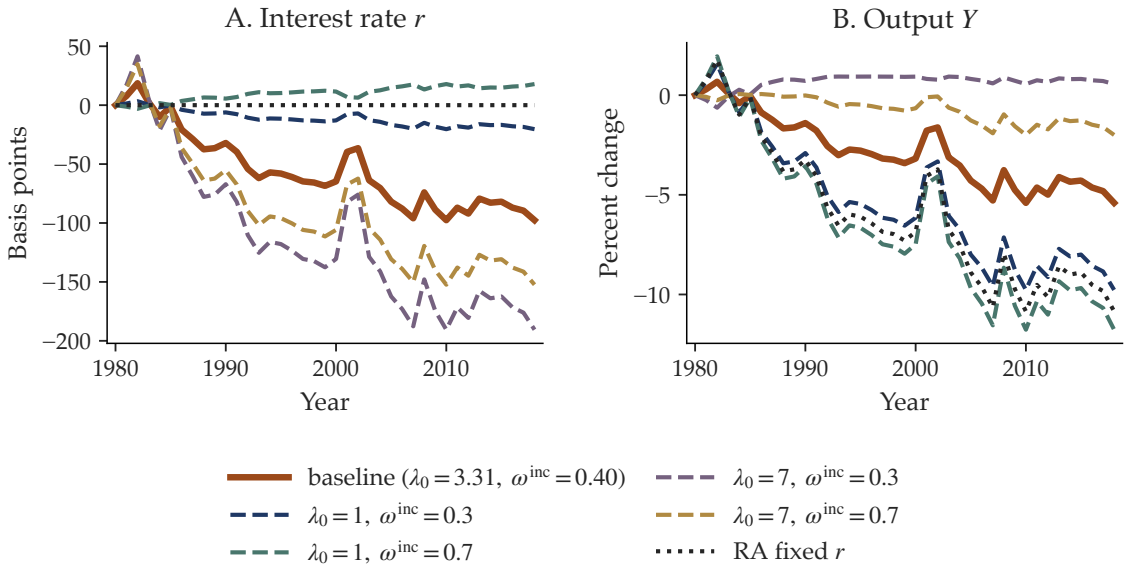


Figure E4: Incidence sensitivity along the markup path. Panels A and B show interest rate r and output Y changes relative to 1980, in basis points and percent, under selected $(\lambda_0, \omega^{\text{inc}})$ pairs and the representative household benchmark. Worker and business owner semi elasticities are held fixed, while $\lambda(r)$ adjusts endogenously. The publicly traded share is $\omega = (1 - \theta_F)\omega^{\text{inc}}$. The baseline uses $\lambda_0 = 3.31$ and $\omega^{\text{inc}} = 0.40$.

F Wealth Inequality

The baseline markup transition generates substantial increases in wealth concentration, while leaving its level below that observed in the Survey of Consumer Finances (SCF). Over 1983–2019, the model generates 81 percent of the observed increase in the Gini and 91 percent of the increase in the top 10 percent share. The top 1 percent share rises more than in the SCF, but remains lower in 2019 because the model starts with a smaller share. The calibration does not target these wealth statistics. The asset market channel generates a large rise in wealth concentration alongside the decline in the equilibrium interest rate.

The results use the baseline calibration with a 4 percent initial profit share, $\alpha = 1/3$, and an initial interest rate of 6 percent. Households have perfect foresight over the 1980–2018 markup path. For the comparison with the 2019 SCF, we use the model's 2019 outcome, with markups held at their 2018 level.

F.1 Measuring wealth in the model and data

We measure model wealth at the end of each period as saved assets plus the value of private businesses and retained equity. Retained equity is the stake an owner keeps after the firm goes public. We value business claims after the current profit payment, discounting future profits at the common equilibrium return.[21]

In the SCF, we use total household net worth: assets minus debt, including private business equity. Following the calibration, the main comparison covers households ages 25 to 64. Household age refers to the age of the member designated as the reference person by the survey.

To calibrate the relative wealth-to-income ratio of owners to workers, we use net worth excluding private business equity and total household income. The SCF target is 2.4017. When matching this target, we account for asset income included in SCF total income; the resulting model ratio is 3.31. The calibration does not target the Gini or the wealth shares reported here.[22]

Survey samples and the assets recorded differ across SCF waves. We report both wealth measures for all households as well as for ages 25 to 64. This lets us distinguish the effect of including older households from the effect of including private business equity.

The World Inequality Database (WID) measures wealth for individuals and splits wealth equally between the two adults in a couple. It includes pension wealth backed by accumulated assets, but excludes cars and other consumer durables, unfunded pension benefits, the value of future labor income, and future Social Security benefits. The SCF includes retirement accounts but does not add the value of future payments from defined benefit pensions or Social Security. The two sources therefore differ in both the assets they count and the people they cover.

[21] Under perfect foresight, business values in the initial period already reflect the anticipated markup path. Households can save from labor income, business income, and the proceeds from selling equity.

[22] The calibration sample defines business owners as active owners with business sales of at least $250,000 in 1983 dollars. Workers report no business income and hold no ownership stake in a private business.

Table F1: Wealth measures and samples

Source	Wealth measure	Sample
Model	Saved assets plus the value of private businesses and retained equity.	Workers and business owners in the model.
SCF	Total net worth, including private business equity.	Households ages 25 to 64 in the main comparison; also all households.
SCF	Net worth excluding private business equity.	Households ages 25 to 64, and all households.
WID	Assets minus debt, including private business and pension assets.	Adults ages 20 and older, with wealth divided equally within couples.

F.2 Wealth concentration in the model and data

Figure F1 compares changes in wealth concentration in the model with the SCF and WID. Between 1983 and 2019, the model's Gini rises by 0.083, compared with 0.103 in the SCF. The top 10 percent share rises by 12.28 percentage points, compared with 13.56 in the data. Table F2 reports their starting levels, ending levels, and changes together.

The top 1 percent share rises more in the model: 12.04 percentage points, compared with 7.15 in the SCF. Because it starts lower, the model's share remains below the SCF estimate in 2019: 31.74 percent compared with 37.90 percent.

Over 1980–2018, the model generates a similar increase in the top 1 percent share to that recorded in WID. The increases in the top 10 percent share and Gini are larger in the model, as Panel B of Table F2 shows.

The experiment holds the other determinants of saving and asset demand fixed and traces the equilibrium consequences of market power.

Panel C of Table F2 shows how the SCF results change when we exclude private business equity or include households of all ages. Each comparison changes both the wealth held by the richest households and the total wealth used to calculate their share. We rank households again under each wealth measure and within each sample.

The SCF and WID also draw on different evidence. The SCF records assets and debts reported by households and deliberately includes more wealthy households than a simple random sample would. WID combines tax information with aggregate wealth estimates and other evidence. Its U.S. series builds on Saez and Zucman's distributional macroeconomic accounts. Differences in how businesses are valued and how wealth is inferred from capital income matter especially for estimates at the top of the wealth distribution.

F.3 The distribution and the ownership of assets

Almost all of the model's increase in the top 10 percent wealth share goes to the top 1 percent (Figure F2, panel (c)). In the SCF, the next 9 percent also gains a substantial share.

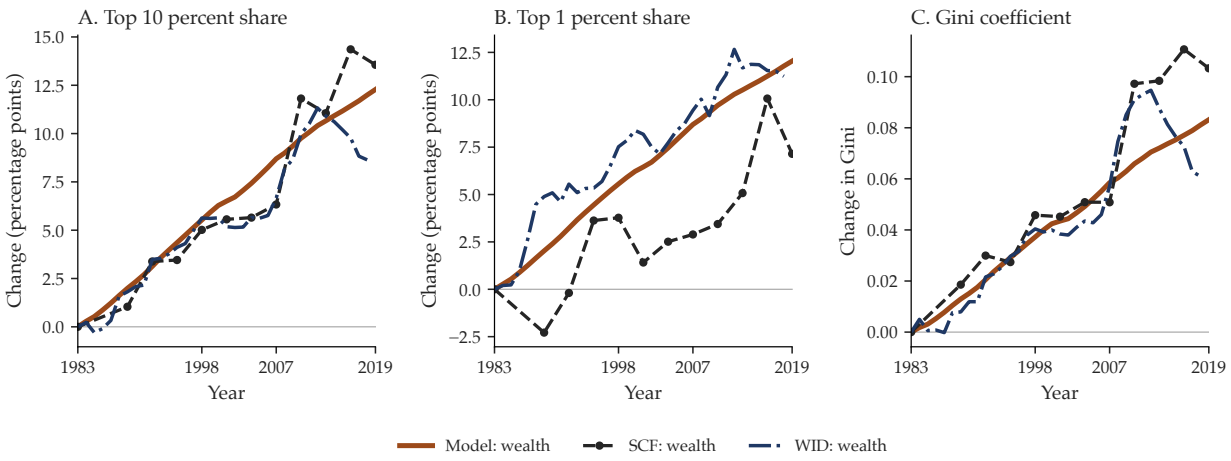


Figure F1: Changes in wealth concentration since 1983. Panels A–C show changes in the top 10 percent share, top 1 percent share, and Gini. Orange lines show the model; black dashed lines show SCF total net worth for households ages 25 to 64; blue dot-dashed lines show WID wealth for adults ages 20 and older, divided equally within couples. Model wealth includes saved assets, private businesses, and retained equity. The SCF lines connect survey years. Model and SCF series end in 2019; WID ends in 2018. Wealth share changes are in percentage points; Gini changes are in Gini units.

Between 1983 and 2019, the next 9 percent's share is nearly unchanged in the model, rising from 35.69 to 35.93 percent. In the SCF, it rises from 33.71 to 40.12 percent.

Business owners become substantially wealthier along the transition, while workers' wealth declines. Between 1980 and 2018, owners' wealth rises by 82.00 percent and workers' wealth falls by 15.91 percent (panel (d)). Owners hold 51.61 percent of total wealth in 2018, up from 33.01 percent in 1980. Workers remain workers and owners remain owners throughout the experiment, although households can move between wealth percentiles.

Owners accumulate wealth by saving from business income, and their wealth also changes as the value of their businesses and retained equity changes. When a firm goes public, its owner sells part of the business and receives proceeds that can be consumed or saved. The owner's wealth already includes the business claim before the sale; the proceeds take the place of the part sold.

F.4 Calculating wealth shares and the Gini

Let a_i be household wealth and w_i its population weight. We scale the weights to sum to one and rank households from least to most wealthy. The Lorenz curve $L(p)$ gives the share of total wealth held by the poorest fraction p of the population. If a percentile cutoff falls within an observation's population weight, we assign the same fraction of its wealth to that group. The wealth share of the richest fraction q and the Gini are

$$S_q = 1 - L(1-q), \qquad G = 1 - 2\int_0^1 L(p)\,dp. \tag{F1}$$

Table F2: Wealth concentration in the model and data

A. Common SCF window

	Model: total wealth			SCF: total wealth		
Statistic	1983	2019	Change	1983	2019	Change
Gini	0.686	0.769	0.083	0.762	0.865	0.103
Top 1 percent	19.70	31.74	12.04	30.75	37.90	7.15
Top 10 percent	55.39	67.68	12.28	64.46	78.02	13.56

B. Full transition and WID

	Model: total wealth			WID: total wealth		
Statistic	1980	2018	Change	1980	2018	Change
Gini	0.684	0.767	0.083	0.808	0.851	+0.043
Top 1 percent	19.28	31.48	12.20	23.23	35.20	+11.97
Top 10 percent	54.86	67.39	12.53	64.99	71.65	+6.66

C. SCF sensitivity: changes from 1983 to 2019

Wealth concept	Population	Gini	Top 1 percent	Top 10 percent
Nonbusiness	Ages 25 to 64	+0.123	+5.73	+16.01
Total net worth	Ages 25 to 64	+0.103	+7.15	+13.56
Nonbusiness	All households	+0.082	+3.16	+10.98
Total net worth	All households	+0.073	+5.69	+9.80

Notes: Wealth shares are in percent and their changes in percentage points. Gini coefficients and changes are in Gini units. Changes are computed before rounding. Panel A compares the model and SCF over 1983–2019; Panel B compares the model and WID over 1980–2018. Panel C shows how the SCF results change when private business equity is excluded or households of all ages are included. Households are ranked again in each comparison. From 1989 onward, SCF statistics average estimates from the five completed versions of each survey; 1983 uses one completed dataset and its full sample survey weights. Model wealth includes saved assets and business equity valued after the current profit payment. Markups remain at their 2018 level in the 2019 model observation. The calibration uses wealth excluding private business equity and total income to match the relative wealth-to-income ratio of owners to workers. It does not target the Gini or top wealth shares.

We include households whose debts exceed their assets. Their negative net worth enters both the ranking and the calculation of total wealth. Negative wealth can put the Lorenz curve below zero and the Gini above one, even when total wealth is positive. We calculate the Gini using the full weighted Lorenz curve.

For the SCF, we rank households by net worth and apply the survey weights. From 1989 onward, the SCF provides five completed versions of each survey to account for missing responses. We calculate each statistic in each version and then average the five estimates. For Lorenz curves, we average wealth shares at the same population percentiles. The 1983 wave has one completed dataset, for which we use the historical full sample weights. The comparison covers 12 surveys from 1983 through 2019.

For the model, we combine each household's saved assets with the value of its business claims and rank households by total wealth. The owner and worker wealth series in Figure F2 use the same measurement date and population weights as the wealth shares and Gini.

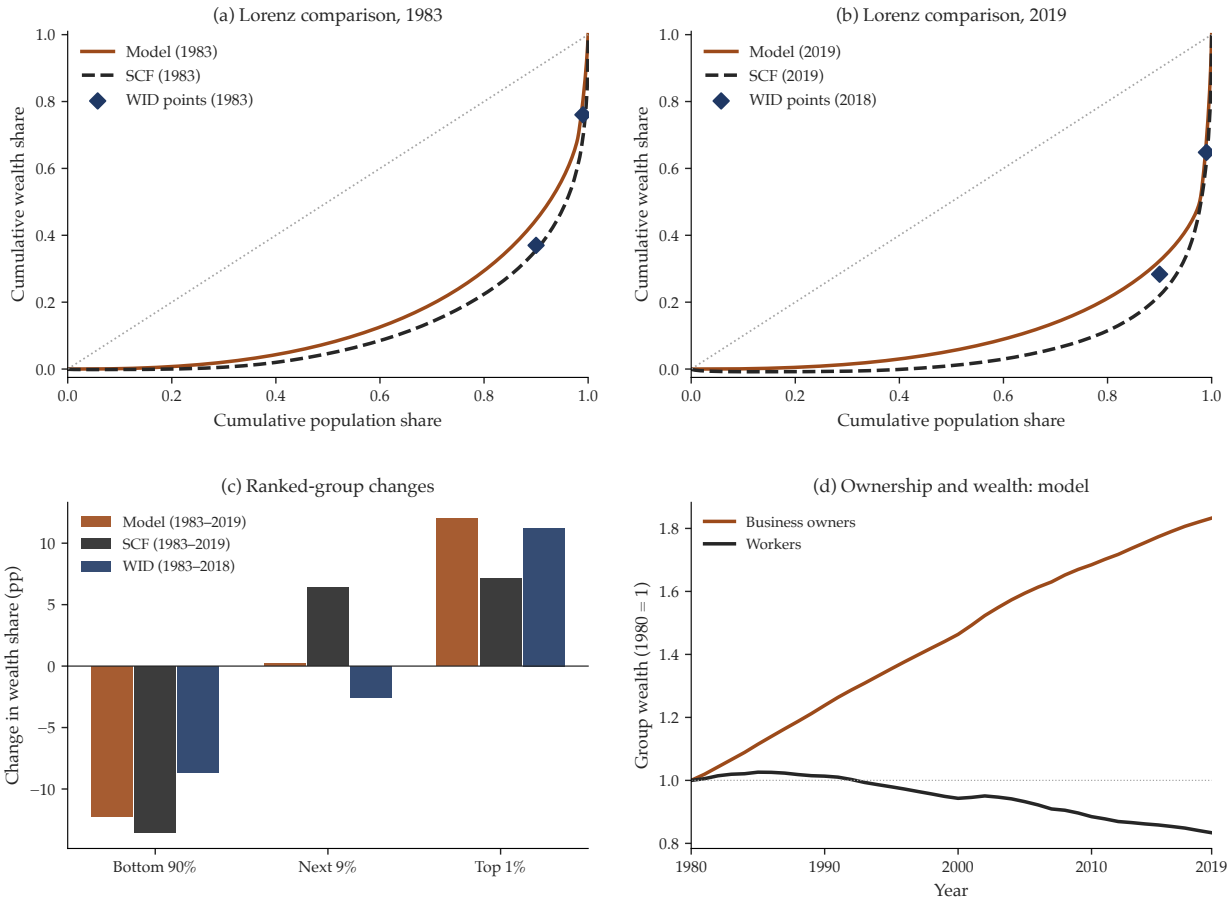


Figure F2: Wealth distribution and business ownership. Panels (a) and (b) compare model and SCF Lorenz curves in 1983 and 2019; the diagonal represents equal wealth for everyone. WID diamonds show the bottom 90 and 99 percent shares, calculated as one minus the published top shares, with 2018 as the final year. Panel (c) shows wealth share changes from 1983 to 2019 for the model and SCF, and to 2018 for WID. Households are ranked separately in each source and year. Panel (d) shows worker and business owner wealth in the model, with each group's 1980 wealth set to one. Household types stay fixed, while membership in the top wealth groups can change.

WID publishes the Gini and top wealth shares directly. We use the annual series through 2018 from the data and documentation dated September 1, 2026.

Sources. The empirical inputs are the Federal Reserve Board's Survey of Consumer Finances summary extracts and the World Inequality Database United States data, together with its series metadata. The WID codes dictionary defines which assets count as household wealth and how wealth is divided within couples. The U.S. wealth series draws on Saez and Zucman (2020); the WID wealth update describes later additions to the data. The Federal Reserve's discussion of SCF wealth concepts and Smith, Zidar, and Zwick (2023) discuss differences in pension coverage, private business values, and estimates of wealth at the top of the distribution.

G Extensions

This appendix asks whether three changes to the one-asset environment alter the asset market channel. Fiscal policy adds government debt and after-tax income; balanced growth changes both household normalization and the duration of tradable equity; and CES production makes factor shares respond endogenously to the return. In every case, the central question remains whether the redistribution of profit income toward entrepreneurs raises asset demand by more or less than the market value of tradable equity raises asset supply.

G.1 Common quantitative protocol

The quantitative comparisons use a matched-baseline design. Each extension is recentered, when necessary, to reproduce the common 1980 return and its extension-appropriate asset-market targets, and its household block is re-solved whenever the extension changes the 1980 household problem. We then feed in the same observed market-power path used in the main text through each extension's own sufficient statistic and report differences from the baseline computed the same way. For the growth and CES exercises, re-solving the exact stationary household problems at every date provides a check on that closure. None of these paths is a perfect-foresight transition.

Section G.2 studies fiscal policy. Section G.3 introduces balanced growth, and Section G.4 replaces Cobb–Douglas production with CES. Each extension states its exact asset-market equation, identifies the new calibration input, and verifies that shutting down the new margin recovers the corresponding one-asset benchmark.

G.2 Fiscal Policy in the One-Asset Economy

The main analysis abstracts from government debt and the taxes used to service it. Government debt is a quantitatively important component of asset supply and therefore potentially important for the equilibrium return. This appendix extends the one-asset sufficient statistic to include government bonds, after-tax factor income, and the tax-adjusted user cost of capital.

The fiscal closure creates a fiscal externality that amplifies the response of the equilibrium return. We hold the debt-to-GDP ratio fixed and let the labor income tax adjust to balance the government budget. When the return falls, interest payments on government debt decline relative to GDP. The government therefore requires less labor-tax revenue. The resulting increase in workers' after-tax income raises household asset demand, requiring a further decline in the return to clear the asset market. Thus the fiscal externality strengthens the decline in the equilibrium return, even as the lower labor tax cushions the decline in output.

We first show that proportional labor and profit taxes preserve the income-scaling property underlying the sufficient statistic and derive asset-market clearing with government debt. We then use the government budget to isolate the fiscal externality and derive its implications for output.

Finally, we calibrate the fiscal closure to 1980 and quantify the externality along the observed markup path.

G.2.1 After-tax income and capital taxation

Let τ_W denote the proportional tax on labor income. The GHH labor choice satisfies $v'(\ell) = (1-\tau_W)we$. The maximized labor surplus and aggregate after-tax labor income scale with the same object,

$$\widetilde{W} \equiv (1-\tau_W)W.$$

The normalization in the proof of Proposition 2 can therefore be repeated with $\widetilde{W}$ in place of W. Worker asset demand is

$$D_W(r, \widetilde{W}) = \bar{D}(r)\widetilde{W}. \tag{G1}$$

Let τ_Π denote the proportional tax on pure profits and define aggregate after-tax profit income $\widetilde{\Pi} = (1-\tau_\Pi)\Pi$. Because private profit income, retained profit income, and the equity sold at incorporation are all scaled by $1-\tau_\Pi$, the after-tax individual equity value is $q^\tau = (1-\tau_\Pi)q$. The entrepreneur problem remains homogeneous in $\widetilde{\Pi}$, including the sale proceeds, and hence

$$D_O(r, \widetilde{\Pi}) = \lambda(r)\bar{D}(r)\widetilde{\Pi}. \tag{G2}$$

Here $\lambda(r)$ is the relative wealth-to-income ratio of owners to workers, measured using after-tax profit income for owners and after-tax labor income for workers. The main text reports the corresponding ratio per dollar of gross income. At the calibration date the two are related by

$$\lambda^{\text{after}} = \lambda^{\text{gross}} \frac{1-\tau_{W,0}}{1-\tau_\Pi}. \tag{G3}$$

We use λ for the relative wealth-to-income ratio of owners to workers, measured using after-tax income, below.

Capital taxation affects both the marginal cost of installing capital and the average revenue collected from the corporate tax base. These are different objects. Let τ_K be the statutory corporate income-tax rate and let z^τ be the present value of tax depreciation deductions generated by one dollar of investment. With no inflation or investment tax credit, the one-asset user cost is

$$u_K(r) = (r+\delta_K)\frac{1-\tau_K z^\tau}{1-\tau_K}. \tag{G4}$$

For asset types j, the one-asset specification uses capital-stock weights ϑ_j and $z^\tau = \sum_j \vartheta_j z_j^\tau$. The tax term in (G4) is therefore the capital-stock-weighted average of the asset-specific user-cost wedges used by Barkai (2020).

The firm's capital first-order condition implies $s_K = u_K K/Y$. The part paid as a net return to

savers is therefore

$$\widetilde{s}_K \equiv \frac{rK}{Y} = \frac{r}{u_K(r)} s_K. \tag{G5}$$

Let T_K denote corporate income-tax receipts assigned to capital taxation and let $t_K = T_K/Y$. We do not infer t_K from the marginal wedge in (G4). Depreciation rules, the tax base, losses, and other provisions break that equivalence. The calibration uses the user-cost wedge for the firm's marginal condition and measured receipts for the government budget.

G.2.2 Government debt and the fiscal sufficient statistic

Let B be government debt held by the public and G government consumption and gross investment. Write $b = B/Y$ and $g = G/Y$. Let ξ denote residual net government revenue relative to GDP: unmodeled receipts net of transfers and other primary outlays, including differences in the coverage of the fiscal sources. Because the exercise compares stationary economies without trend growth, maintaining a constant debt-to-GDP ratio requires interest payments equal to rb. The government budget is therefore

$$\tau_W s_W + t_K + \tau_\Pi s_\Pi + \xi = g + rb. \tag{G6}$$

The fiscal closure fixes b, g, ξ, τ_Π, and the capital tax system. The labor tax is the rate that balances the budget:

$$\tau_W = \frac{g + rb - t_K - \tau_\Pi s_\Pi - \xi}{s_W}. \tag{G7}$$

The model has no structural measure of taxable corporate income. The benchmark holds capital-tax receipts fixed relative to GDP, $t_{K,t} = t_{K,0}$, while retaining the separately measured marginal user-cost wedge in (G4). This is a fiscal closure, not a claim that a fixed statutory rate delivers constant receipts.

Define the after-tax income shares

$$\widetilde{s}_W = (1 - \tau_W) s_W, \qquad \widetilde{s}_\Pi = (1 - \tau_\Pi) s_\Pi, \tag{G8}$$

and let $Q(r) = 1/(r + \delta_C)$ as in the main text.

Proposition 5 (Fiscal sufficient statistic)**.** *Under the conditions of Proposition 2, proportional labor and profit taxes preserve the linearity of household asset demand. In a stationary one-asset equilibrium with government debt, asset-market clearing is*

$$\bar{D}(r) \left[\widetilde{s}_W + \lambda(r) \widetilde{s}_\Pi\right] = \frac{\widetilde{s}_K}{r} + Q(r) \omega \widetilde{s}_\Pi + b. \tag{G9}$$

Together, (G6) and (G9) determine the labor tax and the return from after-tax factor shares, the bond stock, and the same incidence objects as in Theorem 1.

Proof. Proportional labor taxation preserves the worker normalization in (G1), while proportional profit taxation scales private and retained profit income and sale proceeds by $1 - \tau_\Pi$. Equation (G2) follows by dividing entrepreneur assets and consumption by $\widetilde{\Pi}$. Aggregate household asset demand is therefore

$$\bar{D}(r)\left[\widetilde{W} + \lambda(r)\widetilde{\Pi}\right].$$

Asset supply consists of physical capital, after-tax tradable equity, and government bonds:

$$K + Q(r)\omega\widetilde{\Pi} + B.$$

Equating demand and supply and dividing by Y gives (G9), since $K/Y = \widetilde{s}_K/r$. Equation (G6) supplies the labor tax that enters $\widetilde{s}_W$. □

The left side of (G9) is the asset demand generated by after-tax labor and profit income. The right side is the supply of physical capital, tradable equity, and government bonds. The government budget links these two sides by determining the labor tax.

G.2.3 Fiscal externality

Substituting (G6) into after-tax worker income gives

$$\widetilde{s}_W = s_W + t_K + \tau_\Pi s_\Pi + \xi - g - rb. \tag{G10}$$

The income term that generates household asset demand can therefore be written

$$\widetilde{s}_W + \lambda\widetilde{s}_\Pi = s_W + t_K + \xi - g - rb + [\tau_\Pi + \lambda(1 - \tau_\Pi)]\, s_\Pi. \tag{G11}$$

Holding b, g, ξ, τ_Π, and λ locally fixed,

$$d(\widetilde{s}_W + \lambda\widetilde{s}_\Pi) = ds_W + dt_K + [\tau_\Pi + \lambda(1 - \tau_\Pi)]\, ds_\Pi - b\, dr. \tag{G12}$$

The term $-b\, dr$ is the fiscal externality. When market power lowers the return, $dr < 0$, interest payments on government debt decline. Because the labor tax balances the budget, lower debt service permits a lower labor tax and leaves workers with more after-tax labor income. Household asset demand rises, so a further decline in the return is required to clear the asset market. Holding the debt-to-GDP ratio fixed therefore amplifies the return response through the government budget.

The profit tax changes the incidence of rents. Its coefficient in (G12) is

$$\tau_\Pi + \lambda(1 - \tau_\Pi) = \lambda - \tau_\Pi(\lambda - 1).$$

For $\lambda > 1$, this coefficient lies between one and λ. Taxing profits removes income from entrepreneurs with greater asset demand per dollar of income, while the associated revenue lowers

the balancing labor tax. The profit tax therefore attenuates the redistribution force rather than eliminating it. A closure in which capital-tax receipts track a modeled tax base would enter through dt_K; the benchmark instead holds t_K fixed relative to GDP.

Combining the firm's Cobb–Douglas first-order conditions with GHH labor supply gives the output response

$$\Delta \log Y = \varphi \Delta \log(1 - \tau_W) - \frac{\alpha + \varphi}{1 - \alpha} \Delta \log \mu - \frac{\alpha(1 + \varphi)}{1 - \alpha} \Delta \log u_K. \tag{G13}$$

The lower labor tax raises labor supply, while the return response changes capital demand through the tax-adjusted user cost. The fiscal externality can therefore amplify the decline in the return even as the lower labor tax cushions the decline in output.

Setting $b = 0$ removes government bonds from asset supply and the fiscal externality $-b\,dr$ from (G12); taxes and government purchases may still remain. If all fiscal objects are shut down—$b = g = \xi = \tau_W = \tau_\Pi = 0$, $t_K = 0$, and $u_K = r + \delta_K$—Proposition 5 reduces to Theorem 1.

G.2.4 Calibration and quantitative illustration

The quantitative exercise is a comparative-static fiscal closure, not a reconstruction of complete government accounts. Federal debt, government purchases, capital-tax receipts, and residual net revenue are held fixed relative to GDP at their 1980 values; the profit-tax scenario and marginal capital-tax system are also held fixed. The labor tax adjusts to balance the budget as the observed cost-weighted markup path changes. The residual ξ reconciles fiscal flows that the model does not represent separately. Table G1 summarizes the inputs.

Government debt and the tax wedges change the 1980 asset supply per unit of after-tax income, so we re-solve the household discount factors so that the full fiscal economy clears at $r_0 = 6.00$ percent in 1980 with the same wealth ratio, and we measure the asset-demand semi-elasticity at that calibration: $\epsilon_D = 17.9162$, against 16.2963 in the main calibration. For the quantitative comparison, the *full fiscal closure* contains all of the objects in Table G1. The *matched no-debt benchmark* sets $b = 0$, retains the other fiscal wedges and the same household block, adjusts ξ to preserve the initial labor tax, and recenters $\bar{D}(r)$ to the same initial return, so it isolates the debt term in asset supply and the debt service in the budget. The *matched no-fiscal benchmark* removes taxes, debt, purchases, residual revenue, and the corporate user-cost wedge, uses the gross-income value of λ, and recovers the main calibration's discount factors and semi-elasticity, so it reproduces the main-text sufficient statistic. These are response comparisons around a common 1980 equilibrium, not level effects of adding or removing government debt.

Table G2 reports the response to the observed markup path. By 2018, the full fiscal closure lowers the return by 96.1 basis points, compared with 90.4 basis points in the matched no-debt benchmark. Their difference, -5.7 basis points, is the fiscal externality. The balancing labor tax declines from 26.4 to 25.6 percent. Relative to the matched no-fiscal benchmark, the labor tax and

Table G1: Fiscal inputs for the 1980 closure

Object	Symbol	Value	Source or role
Federal debt held by the public / GDP	b	26.2%	Congressional Budget Office (2020)
Average effective labor tax	$\tau_{W,0}$	26.4%	McDaniel (2007)
Government purchases / GDP	g	20.63%	BEA NIPA Table 1.1.5
Corporate income-tax receipts / GDP		2.39%	BEA NIPA Table 1.14
Pure-profit tax rate	τ_{Π}	20%	Scenario
Capital-tax receipts / GDP	t_K	1.59%	Corporate receipts net of the pure-profit component
Residual net revenue / GDP	ξ	2.92%	Balances omitted receipts and primary outlays
Statutory corporate income-tax rate	τ_K	49.91%	Barkai (2020) replication files
Marginal user-cost tax factor	$(1-\tau_K z^{\tau})/(1-\tau_K)$	1.331	Capital-stock-weighted tax wedge
Relative wealth-to-income ratio of owners to workers (after-tax income)	λ	3.05	Equation (G3)
Asset-demand semi-elasticity	ϵ_D	17.9162	Re-solved household block; 16.2963 in the main calibration

Notes: The pure-profit tax assigns 0.80% of GDP to profit-tax receipts; the remaining 1.59% is assigned to capital taxation. The residual ξ has no separate structural interpretation. The present values of depreciation allowances are 0.753 for equipment, 0.438 for structures, and one for intellectual property and inventories. The tax rate and depreciation allowances determine the marginal user-cost wedge, whereas t_K is the measured average receipt share used in the government budget.

user-cost responses raise output by 0.41 percentage points in 2018.

G.3 Balanced Growth

The baseline is stationary in levels. This subsection instead places the same one-asset economy on a balanced-growth path. Growth does not remove the asset market channel: the markup still reallocates income toward entrepreneurs and creates tradable equity. It does, however, change both the household normalization and the duration of that equity, so it cannot be introduced by changing a denominator in the baseline sufficient statistic while leaving household demand fixed.

The matched balanced-growth calculation below re-solves the household calibration at growth rate $g = 2\%$ and then applies the same market-power path as in the main text. The stationary 2018 return change is -87.2 basis points, compared with -97.6 basis points in the matched no-growth economy. Growth therefore changes the magnitude of the markup effect without eliminating it: in the calibrated comparison it moderately attenuates the decline in the return.

We first detrend the household problems and identify the two places where growth enters asset demand. We then derive the exact discrete-time valuation of a growing tradable equity and the corresponding sufficient statistic. Finally, we recalibrate the initial stationary economy and compare the stationary paths with and without trend growth.

Table G2: Matched fiscal benchmark responses in 2018

Economy	Return (basis points)	Output (percent)
Matched no-fiscal benchmark	−97.6	−5.40
Matched no-debt benchmark	−90.4	−5.61
Full fiscal closure	−96.1	−5.00

G.3.1 Environment and detrended household demand

Let $G \equiv 1 + g$ and suppose aggregate output, labor income, and pure-profit income grow at the common deterministic rate g:

$$Y_{t+1} = GY_t, \qquad W_{t+1} = GW_t, \qquad \Pi_{t+1} = G\Pi_t.$$

The factor shares are therefore stationary conditional on the markup. To display the household normalization, write the worker budget as

$$c_t + a_{t+1} = (1 + r)a_t + W_t\widetilde{e}_t, \qquad a_{t+1} \geq 0. \tag{G14}$$

Define contemporaneous-income consumption $\widehat{c}_t = c_t/W_t$ and beginning-of-period assets in lagged-income units $b_t = a_t/W_{t-1}$. Dividing (G14) by W_t yields

$$\widehat{c}_t + b_{t+1} = \check{R}b_t + \widetilde{e}_t, \qquad \check{R} \equiv \frac{1+r}{1+g}. \tag{G15}$$

With CRRA curvature σ, the detrended Bellman problem has effective discount factor

$$\beta_i^g = \beta_i(1+g)^{1-\sigma}, \qquad i \in \{W, O\}. \tag{G16}$$

Thus growth affects household policies through both the detrended gross return $\check{R}$ and β_i^g. It also affects the reported asset–income ratio through timing: $a_t/W_t = b_t/(1+g)$.

Let $\mathcal{D}_W(\check{R}, \beta_W^g)$ denote mean beginning-of-period worker assets in lagged-income units, with the remaining normalized household states suppressed. The worker asset-demand coefficient in current-income units is

$$\bar{D}(r,g) = \frac{1}{1+g}\,\mathcal{D}_W\left(\frac{1+r}{1+g}, \beta_W(1+g)^{1-\sigma}\right). \tag{G17}$$

The owner problem is detrended in the same way. The relative wealth-to-income ratio of owners to workers is $\lambda(r,g)$, so aggregate household demand remains linear in the two income flows:

$$D_t = \bar{D}(r,g)\left[W_t + \lambda(r,g)\Pi_t\right]. \tag{G18}$$

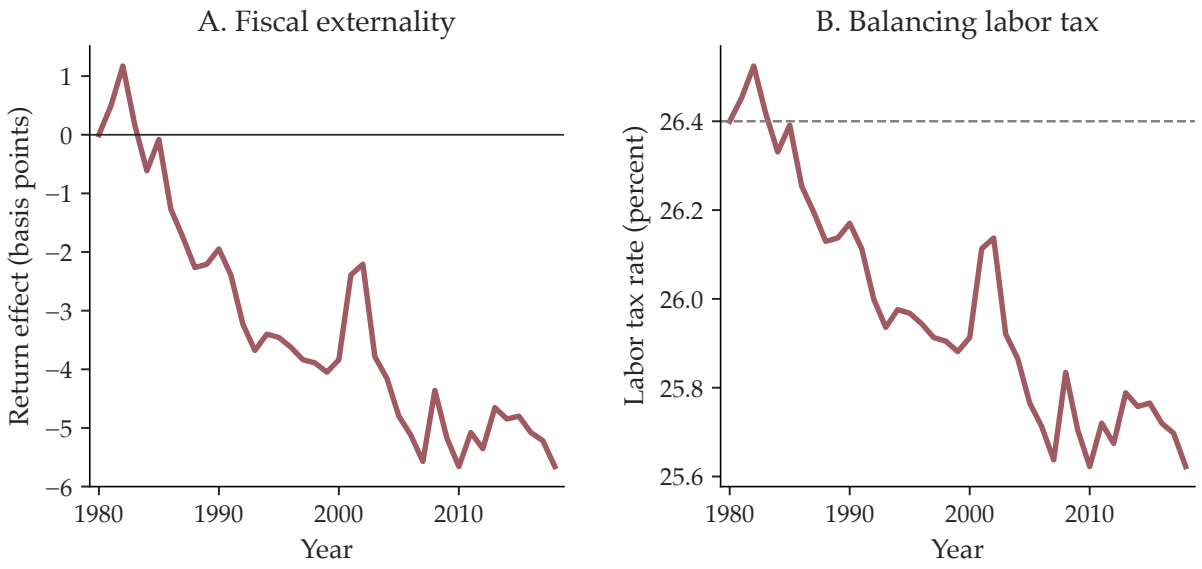


Figure G1: Fiscal externality under the balancing labor tax closure. Panel A shows the interest rate r in the full fiscal economy minus its matched no-debt benchmark, in basis points. Panel B shows the labor tax rate required to balance the budget. The benchmark retains the other fiscal wedges, preserves the initial labor tax, and shares the initial interest rate.

G.3.2 Balanced-growth sufficient statistic

Growth treats reproducible capital and tradable equity differently. The relative price of installed capital remains one because output can be transformed into capital. Its no-arbitrage condition therefore continues to imply

$$\frac{K}{Y} = \frac{s_K}{r + \delta_K}. \tag{G19}$$

Tradable equity has no reproduction technology. It pays next period's publicly traded profit income and survives with probability $1 - \delta_C$. When its price is proportional to the contemporaneous publicly traded profit income flow, its exact discrete-time valuation multiple under balanced growth is

$$Q^g(r, g) = \frac{(1+g)}{r - g + \delta_C(1+g)}, \qquad r - g + \delta_C(1+g) > 0. \tag{G20}$$

Proposition 6 (Balanced-growth sufficient statistic)**.** *Under the conditions of Proposition 2, a stationary balanced-growth equilibrium satisfies*

$$\bar{D}(r, g)\,[s_W + \lambda(r, g) s_\Pi] = \frac{1}{r + \delta_K} s_K + Q^g(r, g)\omega s_\Pi. \tag{G21}$$

Proof. The detrended household problems imply (G18). Asset supply consists of physical capital and tradable equity backed by growing publicly traded profit income, $K + \omega Q^g \Pi$. Equating demand and supply, dividing by Y_t, and using (G19) gives (G21). □

Table G3: Matched baseline calibration with and without growth

Economy	g (%)	β_W	β_O	$\partial \log D / \partial r$	Q_0	A_0/Y_0
Matched no-growth	0.0	0.8872	0.9032	16.296	9.09	2.61
Balanced growth	2.0	0.9233	0.9389	16.680	11.21	2.64

Notes: Both economies match the common initial return and direct relative wealth-to-income ratio of owners to workers measured in the SCF and clear their initial asset markets. Because growth changes the detrended household problem, the discount factors and baseline local asset-demand semi-elasticity are re-solved separately.

G.3.3 Mechanism

The supply-side effect of growth is transparent. With $\Delta_C(r,g) \equiv r - g + \delta_C(1+g)$,

$$\frac{\partial Q^g}{\partial g} = \frac{(1+r)}{\Delta_C(r,g)^2} > 0, \qquad \frac{\partial Q^g}{\partial r} = -\frac{(1+g)}{\Delta_C(r,g)^2} < 0. \tag{G22}$$

Growth raises the value and duration of tradable equity, expanding the asset supply created by a given profit share. This tends to attenuate the decline in the clearing return. The demand-side effect has no general sign: growth lowers the detrended return, changes the effective discount factor when $\sigma \neq 1$, and changes the timing conversion in (G17). This is why a balanced-growth exercise must re-solve the household block rather than combine Q^g with the zero-growth demand slope.

G.3.4 Calibration and quantitative illustration

We set trend growth to 2% and retain the main calibration's markup path, factor-share mapping, depreciation rates, incorporated profit share, founder retention, household risk, and entrepreneur definition. For the growth economy, we jointly re-solve (β_W, β_O) so that the 1980 stationary equilibrium clears at $r_0 = 6.00\%$ and matches the direct SCF target $\lambda(r_0, g) = 3.31$. The entrepreneur asset share and the aggregate asset–output ratio remain untargeted implications. The matched no-growth comparison is solved under the same protocol with $g = 0$.

For each date, the observed markup determines the factor shares and we solve (G21) with the local closure recovered from the corresponding matched baseline; re-solving the nonlinear stationary household-demand schedules at each date provides the check reported alongside. Specifically, the local closure uses

$$\bar{D}^{\text{loc}}(r,g) = \bar{D}_0^g \exp\{\epsilon_W^g (r - r_0)\}, \qquad \lambda^{\text{loc}}(r,g) = \lambda_0 \exp\{(\epsilon_O^g - \epsilon_W^g)(r - r_0)\}, \tag{G23}$$

where ϵ_W^g and ϵ_O^g are the worker and business owner asset-demand semi-elasticities computed from the exact household blocks at the matched baseline. The worker demand coefficient $\bar{D}^{\text{loc}}(r,g)$ follows the worker slope, while $\lambda^{\text{loc}}(r,g)$ adjusts with the difference between the owner and worker slopes. As in the main sufficient-statistic calculation, we hold these group slopes fixed separately; $\lambda(r,g)$ and the aggregate asset-demand semi-elasticity vary endogenously with the return and demand weights. The local statistic is the reported result, as in the main text; the exact stationary

Table G4: Balanced growth and the stationary 2018 endpoint

Economy	r_{2018} (%)	Δr (bp)	Exact HA Δr (bp)	A_{2018}/Y_{2018}	Q^g_{2018}
Matched no-growth	5.02	-97.6	-102.1	2.88	9.98
Balanced growth	5.13	-87.2	-91.2	2.96	12.40

Notes: r_{2018}, Δr, A/Y, and Q^g come from the sufficient statistic evaluated with the slope from the corresponding matched baseline. "Exact HA" re-solves the nonlinear stationary household problems at every date and is reported as a check. The endpoint is associated with the 2018 value of the common market-power path, not the dated perfect-foresight outcome.

calculation checks how much of it survives re-solving both household problems. Neither path incorporates anticipation or transitional wealth distributions.

Nesting check. Setting $g = 0$ gives $\check{R} = 1 + r$, $\beta_i^g = \beta_i$, and $Q^g(r, 0) = 1/(r + \delta_C) = Q(r)$. Equations (G17) and (G21) then reduce to the stationary household demand and one-asset clearing equation used in the main text. This nesting check separates the effect of trend growth from differences in initial calibration.

G.4 CES Production and the Markup Experiment

The baseline uses Cobb–Douglas production, under which a movement in the return does not change the technological split between capital and labor. With CES production, factor shares depend on the capital–labor ratio and hence on the user cost. The observed markup path therefore changes the asset market through a third force: in addition to redistributing income and creating tradable equity, it changes capital intensity and the division of non-profit income between workers and capital.

The empirically preferred specification uses $\sigma_{KL} = 0.7$. Its stationary 2018 return and output changes are -95.6 basis points and -5.32 percent, respectively, compared with -97.6 basis points and -5.40 percent under Cobb–Douglas. The representative household CES benchmark instead holds $r_t = r_0$ and gives an output change of -9.71 percent in the preferred CES specification. The quantitative issue is therefore whether endogenous factor shares materially amplify or dampen the asset-market channel, not whether CES production removes that channel.

We first parameterize the CES share functions using the observed 1980 shares, avoiding the need to separately identify a distribution parameter and productivity normalization. We then derive the implicit scalar sufficient statistic, isolate the capital-share mechanism, and map the stationary return into output. Finally, we solve matched stationary economies over an empirically disciplined range of substitution elasticities.

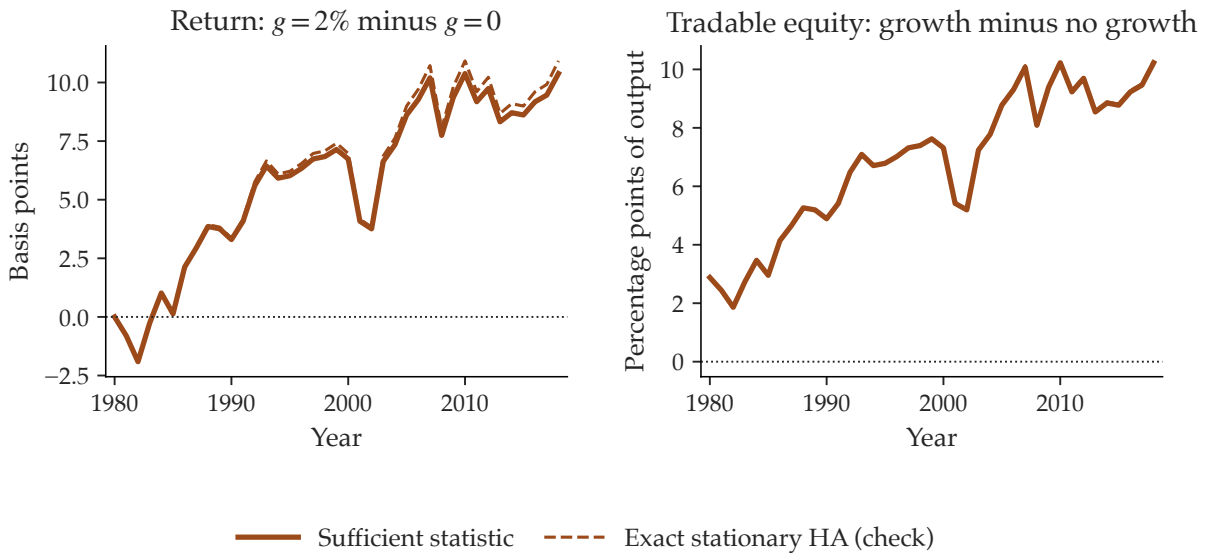


Figure G2: Incremental effects of balanced growth. Panels A and B show growth-minus-no-growth differences in the interest rate r (basis points) and tradable equity relative to output (percentage points). Both economies use the same markup path and initial interest rate. Solid lines show the sufficient statistic; dashed lines re-solve the exact stationary household problems. These are stationary comparisons, not perfect foresight transitions.

G.4.1 Environment and factor-share mapping

Let production be constant returns to scale and CES:

$$Y = Z\left[\alpha K^{\rho} + (1-\alpha)L^{\rho}\right]^{1/\rho}, \qquad \rho = \frac{\sigma_{KL}-1}{\sigma_{KL}}, \tag{G24}$$

where σ_{KL} is the capital–labor elasticity of substitution and is distinct from household CRRA curvature. A firm with gross markup μ_t pays each factor $1/\mu_t$ times its value marginal product. Constant returns then imply

$$s_{\Pi,t} = 1 - \frac{1}{\mu_t}, \qquad s_{W,t} + s_{K,t} = \frac{1}{\mu_t}. \tag{G25}$$

Normalize the CES economy to reproduce the observed capital share $s_{K,0}$ at the initial pair (r_0, μ_0). The capital first-order condition then gives the exact share mapping

$$\boxed{s_{K,t}(r) = s_{K,0}\left(\frac{\mu_t}{\mu_0}\right)^{-\sigma_{KL}}\left(\frac{r+\delta_K}{r_0+\delta_K}\right)^{1-\sigma_{KL}}} \tag{G26}$$

and

$$s_{W,t}(r) = \frac{1}{\mu_t} - s_{K,t}(r), \qquad \frac{K_t}{Y_t} = \frac{s_{K,t}(r)}{r+\delta_K}. \tag{G27}$$

This representation absorbs (α, Z) into one observed reference share. The factor $(\mu_t/\mu_0)^{-\sigma_{KL}}$ is essential: a formula that conditions on a fixed markup is not valid for the historical markup experiment.

Conditional on the return, CES production does not alter either *normalized* household saving problem. Consequently $\bar{D}(r)$ and $\lambda(r)$ are the same nonlinear stationary demand schedules, measured per unit of contemporaneous group income, as in the calibrated one-asset model. What changes is that the income-share weights and capital intensity in the clearing equation are functions of the return.

G.4.2 CES sufficient statistic

Proposition 7 (CES sufficient statistic)**.** *Under the conditions of Proposition 2 and production technology* (G24)*, the stationary return at date t solves*

$$\bar{D}(r)\left[s_{W,t}(r) + \lambda(r) s_{\Pi,t}\right] = \frac{1}{r+\delta_K} s_{K,t}(r) + Q(r)\omega s_{\Pi,t}, \tag{G28}$$

where the shares are given by (G25)*–* (G27)*. Thus CES production makes the sufficient statistic implicit through the share functions but leaves it a scalar equation in r.*

Proof. Household homogeneity gives aggregate demand $\bar{D}(r)[s_{W,t}(r) + \lambda(r)s_{\Pi,t}]Y_t$. Physical capital is $s_{K,t}(r)Y_t/(r+\delta_K)$, and tradable equity is $Q(r)\omega s_{\Pi,t}Y_t$. Equating demand and supply and dividing by Y_t gives (G28). □

G.4.3 Mechanism and output mapping

Two derivatives summarize the new force. Holding the return fixed while the markup moves,

$$\frac{\partial s_K}{\partial \mu} = -\sigma_{KL}\frac{s_K}{\mu}, \qquad \frac{\partial s_\Pi}{\partial \mu} = \frac{1}{\mu^2}, \qquad \frac{\partial s_W}{\partial \mu} = -\frac{1}{\mu^2} + \sigma_{KL}\frac{s_K}{\mu}. \tag{G29}$$

A higher markup compresses the capital share and capital intensity at a fixed return. The worker share also moves because $s_W = 1/\mu - s_K$; its response depends on the substitution elasticity and the initial shares. These movements jointly change the income-demand weights and asset supply per unit of output at the initial return. Along the equilibrium response,

$$\frac{\partial s_K}{\partial r} = (1-\sigma_{KL})\frac{s_K}{r+\delta_K}, \qquad \frac{\partial \log(K/Y)}{\partial r} = -\frac{\sigma_{KL}}{r+\delta_K}. \tag{G30}$$

When $\sigma_{KL} < 1$, capital and labor are complements: capital intensity responds less to the decline in r, and the induced share movement tends to require a somewhat larger decline to clear the asset market. When $\sigma_{KL} > 1$, capital intensity is more return-elastic and tends to stabilize the equilibrium.

Equation (G28) measures the net of the initial capital-intensity compression and this equilibrium feedback.

The return solution maps into an exact stationary output level using the same GHH labor supply as in the main model. Let $M_t \equiv \mu_t/\mu_0$, $U_t \equiv (r_t + \delta_K)/(r_0 + \delta_K)$, and define the baseline technological shares $\eta_{K,0} \equiv \mu_0 s_{K,0}$ and $\eta_{L,0} \equiv \mu_0 s_{W,0}$. Normalizing the common 1980 economy to $Y_0 = 1$, the CES unit-cost equation and GHH labor supply give

$$M_t^{\sigma_{KL}-1} = \eta_{K,0} U_t^{1-\sigma_{KL}} + \eta_{L,0} \left(\frac{w_t}{w_0}\right)^{1-\sigma_{KL}}, \qquad \frac{L_t}{L_0} = \left(\frac{w_t}{w_0}\right)^{\varphi},$$
$$\frac{Y_t}{Y_0} = M_t^{\sigma_{KL}} \left(\frac{w_t}{w_0}\right)^{\sigma_{KL}+\varphi}, \qquad \frac{K_t}{K_0} = \frac{K_t/Y_t}{K_0/Y_0}\frac{Y_t}{Y_0}. \tag{G31}$$

At $\sigma_{KL} = 1$, the continuous limit is $\log(w_t/w_0) = [-\log M_t - \eta_{K,0} \log U_t]/\eta_{L,0}$. This closure holds aggregate productivity, the labor wedge, the GHH labor-supply shifter, and the composition of worker efficiency units fixed. The last equality reconciles the output normalization with the capital intensity already used in asset-market clearing; it does not introduce a second capital quantity. Equation (G31) is exact for finite changes between matched stationary economies. Its local differential around the baseline is

$$d \log Y = -\varphi \, d \log \mu - (\sigma_{KL} + \varphi) \frac{s_K}{s_W} d \log[\mu(r + \delta_K)] \, . \tag{G32}$$

The first term is the wage-induced GHH labor-supply contraction. The second is the CES capital-intensity channel: the equilibrium decline in r lowers the user cost and offsets part of the markup loss. Equation (G32) is used to interpret the level mapping (G31), not to construct the reported output column.

The representative household CES benchmark sets $r_t = r_0$ and recomputes the CES shares and K_t/Y_t at that return; it need not clear the asset market in the heterogeneous household economy. In that stationary equilibrium, summing household budget constraints and using firm accounting, capital accumulation, and asset-market clearing also delivers goods-market clearing; security trades and equity transfers cancel.

This exercise is distinct from Appendix A.2. That appendix holds the aggregate wedge fixed and asks whether a Hicks-neutral misallocation shock affects the asset market through CES factor shares. Here productivity is fixed and the observed markup itself moves. The term $(\mu_t/\mu_0)^{-\sigma_{KL}}$ in (G26) is therefore specific to the experiment studied in this subsection.

G.4.4 Calibration and quantitative illustration

We use $\sigma_{KL} = 0.7$ as the preferred CES calibration and report a grid spanning complementary, Cobb–Douglas, and high-substitution specifications. This choice gives greatest weight to estimates below one based on plant-level and aggregate manufacturing variation (Oberfield and Raval, 2021),

Table G5: CES calibration and reference normalization

Specification	σ_{KL}	r_0 (%)	$s_{K,0}$ (%)	$s_{W,0}$ (%)	$s_{\Pi,0}$ (%)
Low elasticity	0.50	6.00	32.00	64.00	4.00
Preferred	0.70	6.00	32.00	64.00	4.00
Cobb–Douglas	1.00	6.00	32.00	64.00	4.00
High elasticity	1.25	6.00	32.00	64.00	4.00

Notes: Each specification is normalized at the same initial return, markup, factor shares, and output level $Y_0 = 1$. The preferred elasticity and robustness grid are read from the extension configuration; no CES result is calibrated to the endpoint return.

while retaining the higher elasticity used in the aggregate factor-share literature as a robustness case (Karabarbounis and Neiman, 2014). The generated table reports the precise grid used in the calculation.

Every CES economy is normalized to reproduce the same 1980 return, markup, factor shares, and output level. Since the normalized household problems and initial asset supplies per unit of output are unchanged, the main calibration's (β_W, β_O) and direct SCF target $\lambda(r_0) = 3.31$ carry over without recalibration. At every subsequent date, the common market-power path supplies μ_t, equations (G26)–(G27) update the shares at the candidate return, and (G28) determines the stationary equilibrium.

We solve (G28) with the local sufficient statistic, using the baseline worker and business owner asset-demand semi-elasticities and the CES share mapping in (G26). As in (G23) with $g = 0$, the worker demand coefficient follows ϵ_W, while $\lambda(r) = \lambda_0 \exp\{(\epsilon_O - \epsilon_W)(r - r_0)\}$. The worker and owner slopes are held fixed separately; $\lambda(r)$ and the aggregate asset-demand semi-elasticity vary endogenously. Re-solving both nonlinear stationary household problems at every date provides the check reported in Table G6; the two return columns differ only in their treatment of household demand away from the common baseline. The output column applies the exact CES–GHH mapping (G31) to the statistic's return. It is not a local output approximation.

Nesting check. At $\sigma_{KL} = 1$, equation (G26) becomes $s_{K,t} = s_{K,0}(\mu_t/\mu_0)^{-1}$, the Cobb–Douglas capital-share path, while $s_{W,t} = 1/\mu_t - s_{K,t}$ and $s_{\Pi,t} = 1 - 1/\mu_t$. Hence (G28) reduces exactly to the one-asset stationary equilibrium used as the comparison row. This nesting restriction is imposed directly in the generated results rather than checked only after rounding.

Table G6: CES production: stationary 2018 responses and outcomes

	2018 responses				2018 outcomes	
σ_{KL}	Δr (bp)	ΔY (%)	Exact HA Δr (bp)	$\Delta r-$CD (bp)	s_K (%)	K/Y
0.50	-93.9	-5.25	-99.2	3.7	29.43	2.47
0.70	-95.6	-5.32	-100.5	2.0	29.32	2.46
1.00	-97.6	-5.40	-102.1	0	29.19	2.46
1.25	-99.0	-5.46	-103.2	-1.4	29.11	2.45

Notes: All rows match the same 1980 return, factor shares, output normalization, and GHH labor-supply schedule and use the same household calibration and market-power path. Δr is the sufficient statistic and $\Delta Y = 100(Y_{2018}/Y_0 - 1)$ applies (G31) at that return, where $Y_0 = 1$ in the common 1980 economy. "Exact HA" re-solves the nonlinear stationary household problems at every date and is reported as a check. "$\Delta r-$CD" subtracts the $\sigma_{KL} = 1$ response of the same method. The last two columns are the capital share and capital–output ratio at the statistic's 2018 return. These are matched stationary comparisons, not a perfect-foresight transition.

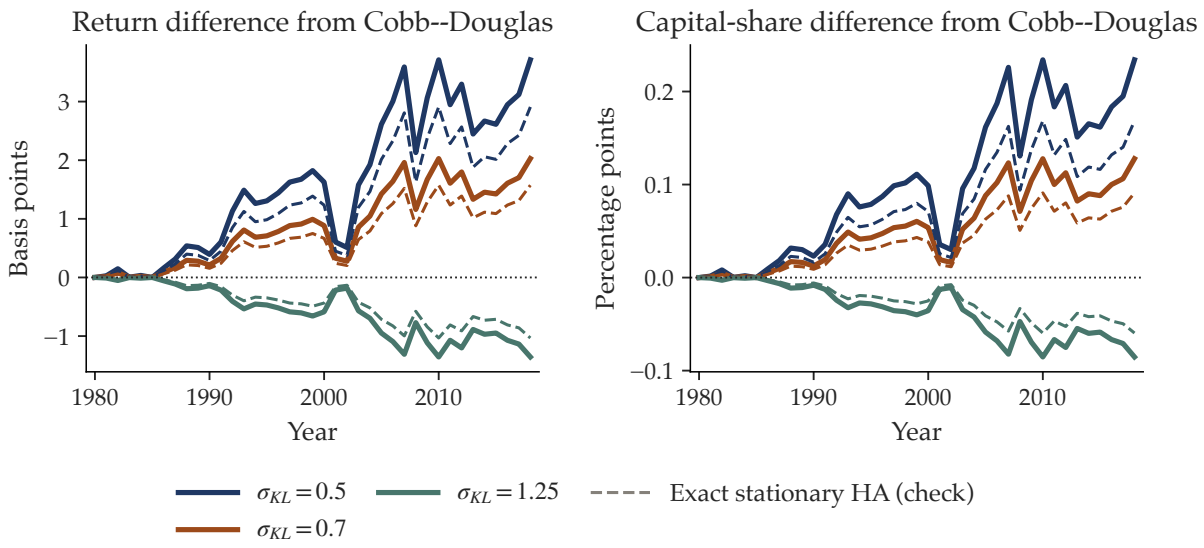


Figure G3: Incremental effects of CES production. Panels A and B show CES-minus-Cobb–Douglas differences in the interest rate r (basis points) and capital share (percentage points). Specifications share the markup path and initial calibration. Solid lines show the sufficient statistic; dashed lines re-solve the exact stationary household problems. These are stationary comparisons, not perfect foresight transitions.

H Multiple Assets

The main text compresses all household wealth and all firm claims into one asset, so it cannot separate the safe return from the required return on equity. This appendix splits the asset market in two and carries the fiscal closure of Appendix G.2 with it, so that government debt sits explicitly inside safe-asset supply. The scalar clearing condition becomes two market-clearing equations in $\mathbf{r} = (r^b, r^e)'$.

Adding the two equations preserves the aggregate accounting of the one-asset model: household demand generated by after-tax income on one side, installed capital, tradable equity backed by aggregate profit income, and government debt on the other. It does not reproduce the one-asset condition term by term, because physical capital is now discounted at the cost of capital while tradable equity backed by aggregate profit income, which is residual equity, is discounted at r^e. With a positive equity premium the same profit income flow supports a smaller stock of tradable equity, so asset creation offsets less of the redistribution that market power generates. This valuation margin, rather than portfolio substitution, accounts for most of the difference between the one-asset and two-asset cost of capital. The second equation is what determines composition, and with it the premium at which households absorb the extra equity; the statistic it requires is the long-run response of the equity share to the equity premium, which we take from Fagereng, Guiso and Ring (2026).

H.1 Asset demand with multiple assets

There are J traded assets. Let s denote a household's idiosyncratic state and Z the aggregate state, and write $\mathbf{s} = (s, Z)$ for the full state. A household in group g enters the period with financial wealth a. Its non-financial income is

$$X_g y_g(\mathbf{s}; \mathbf{r}),$$

where X_g is the group-specific income scale, and y_g may incorporate static intratemporal choices, such as GHH labor supply.

$$\mathbf{r} = (r^1, \ldots, r^J)$$

is the vector of required returns common to all households. Let $\mathbf{R}' = (R^{1\prime}, \ldots, R^{J\prime})$ denote next period's realized gross returns. Conditional on the current state and $\mathbf{r}$, the household faces a joint law for future states, returns, and income growth,

$$\left(\mathbf{s}', \mathbf{R}', \frac{X_g'}{X_g}\right) \sim P_g(\cdot \mid \mathbf{s}; \mathbf{r}).$$

All households trade the same securities and therefore face the same market returns. Their idiosyncratic income risks and their exposure to market risk may differ across groups. The household chooses consumption c, total financial investment $\widetilde{a}$, and portfolio shares $\boldsymbol{\phi} = (\phi_1, \ldots, \phi_J)$, with

$\sum_{j=1}^{J} \phi_j = 1$. Given realized returns, these choices induce next-period financial wealth

$$a' = \widetilde{a}\,\boldsymbol{\phi} \cdot \mathbf{R}'. \tag{H1}$$

The recursive problem is

$$\begin{aligned} V_g(a, \mathbf{s}; X_g, \mathbf{r}) = \max_{c, \widetilde{a}, \boldsymbol{\phi}} \quad & \mathcal{U}_g\Big(c, \Big\{V_g(a', \mathbf{s}'; X_g', \mathbf{r})\Big\}; \boldsymbol{\phi}, \mathbf{s}\Big) \\ \text{s.t.} \quad & c + \widetilde{a} = a + X_g y_g(\mathbf{s}; \mathbf{r}), \\ & \widetilde{a} \geq -\underline{\ell}_g(\mathbf{s}) X_g, \qquad \boldsymbol{\phi} \in \mathcal{P}_g(\mathbf{s}), \end{aligned} \tag{H2}$$

where $\underline{\ell}_g(\mathbf{s}) \geq 0$ is the borrowing limit per unit of group income and $\mathcal{P}_g(\mathbf{s})$ is the set of admissible portfolio shares. The portfolio set may incorporate short-sale, leverage, participation, or other state-dependent portfolio restrictions.

Assumption 2 (Multi-asset homogeneity)**.** *For each group g, the recursive aggregator is homogeneous of degree one in current consumption and continuation utility,*

$$\mathcal{U}_g\left(tc, \{tV'\}; \boldsymbol{\phi}, \mathbf{s}\right) = t\,\mathcal{U}_g\left(c, \{V'\}; \boldsymbol{\phi}, \mathbf{s}\right), \qquad t > 0; \tag{H3}$$

Assumption 2 includes consumption-equivalent representations of time-additive CRRA and Epstein–Zin preferences. Importantly. dependence of $\mathcal{U}_g$ on $\boldsymbol{\phi}$ also permits nonpecuniary portfolio frictions that is necessary to match empirically observed pattern of portfolio holding.

Proposition 8 (Multi-asset homogeneity)**.** *Under Assumption 2, desired holdings of each traded asset are linear in the group income scale:*

$$D_{g,j}(\mathbf{r}, X_g) = X_g\, \overline{D}_{g,j}(\mathbf{r}), \qquad j = 1, \ldots, J, \tag{H4}$$

whenever the relevant first moments exist. Hence, writing $\overline{\mathbf{D}}_g(\mathbf{r})$ for asset demand per dollar of group income, aggregate asset-market clearing is

$$\mathbf{D}(\mathbf{r}) \equiv \sum_g X_g\, \overline{\mathbf{D}}_g(\mathbf{r}) = \mathbf{S}(\mathbf{r}). \tag{H5}$$

Proof. Let $b = \frac{a}{X_g}, \widetilde{b} = \frac{\widetilde{a}}{X_g}, \widehat{c} = \frac{c}{X_g}, G_g' = \frac{X_g'}{X_g}$. After dividing by X_g, the budget and wealth transition become

$$\widehat{c} + \widetilde{b} = b + y_g(\mathbf{s}; \mathbf{r}), \qquad \frac{a'}{X_g'} = \frac{\widetilde{b}\,\boldsymbol{\phi} \cdot \mathbf{R}'}{G_g'}.$$

The normalized problem therefore contains no X_g. Homogeneity of $\mathcal{U}_g$ implies

$$V_g(a, \mathbf{s}; X_g, \mathbf{r}) = X_g v_g(b, \mathbf{s}; \mathbf{r}), \qquad \widetilde{a} = X_g g_g(b, \mathbf{s}; \mathbf{r}),$$

while the optimal portfolio shares depend only on normalized states. Thus the dollar position in every asset scales one-for-one with X_g. Integrating over the normalized household distribution gives (H4); summing across groups gives (H5). □

Two-asset specialization. For the empirical application, we specialize to two traded assets: a class of safe asset (e.g., treasury, safe corporate debt) and equity, with common required-return vector $\mathbf{r} = (r^b, r^e)$. The two household groups are workers and entrepreneurs as before. With proportional taxes, their income scales are

$$X_W = \widetilde{W} = (1 - \tau_W)W, \qquad X_O = \widetilde{\Pi} = (1 - \tau_\Pi)\Pi.$$

The GHH intratemporal problem makes worker resources scale with $\widetilde{W}$, while private and retained profit income and incorporation proceeds scale with $\widetilde{\Pi}$. Proposition 8 therefore applies to both groups. For $g \in \{W, O\}$, define total asset demand per dollar of group income and the equity share by

$$\overline{D}_g(\mathbf{r}) \equiv \overline{D}_{g,b}(\mathbf{r}) + \overline{D}_{g,e}(\mathbf{r}), \qquad \phi_g(\mathbf{r}) \equiv \frac{\overline{D}_{g,e}(\mathbf{r})}{\overline{D}_g(\mathbf{r})}.$$

Taking workers as the reference group, let

$$\bar{D}(\mathbf{r}) \equiv \overline{D}_W(\mathbf{r}), \qquad \lambda(\mathbf{r}) \equiv \frac{\overline{D}_O(\mathbf{r})}{\overline{D}_W(\mathbf{r})}.$$

Here $\lambda(\mathbf{r})$ is the relative wealth-to-income ratio of owners to workers, measured using after-tax income. Total group asset demand is therefore

$$D_W(\mathbf{r}, \widetilde{W}) = \bar{D}(\mathbf{r})\widetilde{W}, \qquad D_O(\mathbf{r}, \widetilde{\Pi}) = \lambda(\mathbf{r})\bar{D}(\mathbf{r})\widetilde{\Pi}, \tag{H6}$$

with safe and equity positions

$$\begin{aligned} D_W^b &= [1 - \phi_W(\mathbf{r})]\bar{D}(\mathbf{r})\widetilde{W}, & D_W^e &= \phi_W(\mathbf{r})\bar{D}(\mathbf{r})\widetilde{W}, \\ D_O^b &= \lambda(\mathbf{r})[1 - \phi_O(\mathbf{r})]\bar{D}(\mathbf{r})\widetilde{\Pi}, & D_O^e &= \lambda(\mathbf{r})\phi_O(\mathbf{r})\bar{D}(\mathbf{r})\widetilde{\Pi}. \end{aligned} \tag{H7}$$

Fiscal closure and asset supply. Government debt is a part of the safe asset and pays r^b. As in Appendix G.2, let $b = B/Y$ denote government debt relative to output. The government budget is

$$\tau_W s_W + t_K + \tau_\Pi s_\Pi + \xi = g + r^b b, \qquad \tau_W(\mathbf{r}) = \frac{g + r^b b - t_K - \tau_\Pi s_\Pi - \xi}{s_W}. \tag{H8}$$

Define after-tax income shares

$$\widetilde{s}_W = (1 - \tau_W)s_W, \qquad \widetilde{s}_\Pi = (1 - \tau_\Pi)s_\Pi.$$

Firms finance installed capital with a fraction θ of bond-like claims (corporate bonds) and $1-\theta$ of equity. Their net cost of capital is

$$r^c(\mathbf{r}) = \theta r^b + (1-\theta) r^e. \tag{H9}$$

Retaining the capital-tax treatment of Appendix G.2,

$$u_K(\mathbf{r}) = [r^c(\mathbf{r}) + \delta_K] \frac{1-\tau_K z^\tau}{1-\tau_K}, \qquad \frac{K}{Y} = \frac{s_K}{u_K(\mathbf{r})}. \tag{H10}$$

Tradable equity backed by aggregate profit income has valuation multiple

$$Q^\Pi(r^e) = \frac{1}{r^e + \delta_C} \tag{H11}$$

per dollar of aggregate after-tax publicly traded profit income. Asset supplies per unit of output are therefore

$$\frac{S^b}{Y} = \theta \frac{s_K}{u_K(\mathbf{r})} + b, \qquad \frac{S^e}{Y} = (1-\theta) \frac{s_K}{u_K(\mathbf{r})} + Q^\Pi(r^e) \omega \widetilde{s}_\Pi. \tag{H12}$$

Proposition 9 (Two-asset sufficient statistic)**.** *Two-asset market clearing is*

$$\bar{D}(\mathbf{r}) \begin{pmatrix} [1-\phi_W(\mathbf{r})] \widetilde{s}_W + \lambda(\mathbf{r}) [1-\phi_O(\mathbf{r})] \widetilde{s}_\Pi \\ \phi_W(\mathbf{r}) \widetilde{s}_W + \lambda(\mathbf{r}) \phi_O(\mathbf{r}) \widetilde{s}_\Pi \end{pmatrix} = \begin{pmatrix} \theta \frac{s_K}{u_K(\mathbf{r})} + b \\ (1-\theta) \frac{s_K}{u_K(\mathbf{r})} + Q^\Pi(r^e) \omega \widetilde{s}_\Pi \end{pmatrix}. \tag{H13}$$

The first row clears the safe-asset market and the second the equity market.

Equation (H13) follows by summing the group positions in (H7), dividing by output, and equating them to (H12). Adding the two rows eliminates portfolio composition:

$$\bar{D}(\mathbf{r}) [\widetilde{s}_W + \lambda(\mathbf{r}) \widetilde{s}_\Pi] = \frac{s_K}{u_K(\mathbf{r})} + Q^\Pi(r^e) \omega \widetilde{s}_\Pi + b. \tag{H14}$$

This preserves the aggregate accounting of the one-asset model, but with some differences: physical capital is discounted through $r^c(\mathbf{r})$, while tradable equity is discounted at r^e. Under the common-return limit $r^b = r^e = r$, however, (H14) reduces exactly to the one-asset benchmark, as in (G9).

Risky steady state. To study the effect of market power, we compare risky steady states as market power changes. A risky steady state is the allocation reached after a long sequence of mean aggregate shock realizations, while households continue to expect future aggregate and idiosyncratic risk. Hence $\overline{D}_g(\mathbf{r})$ and $\phi_g(\mathbf{r})$ incorporate precautionary saving, portfolio risk, and hedging motives, and the common required-return vector $\mathbf{r} = (r^b, r^e)$ clears the asset markets at the mean aggregate state.

Across these comparisons, we hold fixed the stochastic environment, including the process for future aggregate and idiosyncratic risk. The sufficient-statistic implementation then approximates household demand locally around the baseline risky steady state, with return vector $\mathbf{r}_0$, allowing household policies and the stationary cross-sectional distribution to adjust with $\mathbf{r}$. For each group,

$$\begin{pmatrix} d\log \overline{D}_g \\ d\phi_g \end{pmatrix} = \begin{pmatrix} \epsilon_g(1-\phi_{g,0}) & \epsilon_g\phi_{g,0} \\ -\eta_g & \eta_g \end{pmatrix} \begin{pmatrix} dr^b \\ dr^e \end{pmatrix}. \tag{H15}$$

Thus ϵ_g governs total asset demand with respect to the return on the baseline reference portfolio, while η_g governs portfolio substitution with respect to the equity premium. The first row imposes that a spread change that leaves the baseline portfolio return unchanged has no additional first-order effect on total asset demand.

This separation is consistent with and inspired by Ring (2025). In his empirical setting, a marginal wealth tax shifts after-tax returns on different assets simultaneously. The paper finds that financial saving responds substantially, while portfolio shares move little. This supports treating common return movements as an amount response and changes in relative returns as a portfolio response. The calibration below therefore disciplines the two margins separately.

H.2 Calibration and results

Fiscal block. We carry over the fiscal calibration of Appendix G.2: federal debt held by the public is 26.2 percent of GDP, the baseline effective labor tax is 26.4 percent, the marginal user-cost tax factor is 1.331, and the relative wealth-to-income ratio of owners to workers, measured using after-tax income, is $\lambda = 3.05$. The only adjustment is the residual ξ. Debt service is now $r_0^b b$ rather than $r_0 b$, so leaving the residual unchanged would lower the initial labor tax to 25.03 percent. We therefore recenter ξ from 2.92 to 2.05 percent of GDP, preserving the common 26.4-percent labor tax in 1980.

Household demand. For the amount margin, we use the group-specific asset demand semi-elasticities measured at the re-solved fiscal household calibration of Appendix G.2: 18.13 for workers and 16.89 for entrepreneurs. We set the initial worker and owner equity shares to

$$\phi_{W,0} = 60.06\%, \qquad \phi_{O,0} = 63.40\%,$$

to clear the initial asset markets while preserving the difference between owners and workers measured in the SCF. We measure this difference using gross financial wealth, averaging the 12 waves from 1989 to 2022 with equal weights and using the same age and wealth selection as for λ in Appendix D. We normalize $\bar{D}(\mathbf{r}_0) = 3.9282$ so that total initial asset demand equals asset supply. Together, these objects determine each group's local response of total desired assets to the return on its baseline reference portfolio.

Portfolio composition. For the composition margin, we use the long-run response of equity holdings to the equity premium estimated by Fagereng, Guiso and Ring (2026). Their setting exploits the 1998 abolition of preferential wealth-tax treatment of equity in Norway, which changed the after-tax equity premium. Because we compare risky steady states, we use their long-run estimate,

$$\eta_g = \frac{\partial \phi_g}{\partial (r^e - r^b)} = 6.9.$$

Thus a 100-basis-point increase in the equity premium raises the equity share by 6.9 percentage points. We use the same slope for workers and entrepreneurs.

Baseline returns and θ. We set the baseline cost of capital to the 6.00 percent 1980 target used in the main text. We set the initial equity premium to 5.00 percentage points. Given the premium, (H9) implies

$$r_0^b = r_0 - (1-\theta)(r_0^e - r_0^b),$$

where we fix $\theta = 0.33$. The resulting baseline returns are $r_0^b = 2.65\%, r_0^e = 7.65\%$. The equity required return therefore exceeds the cost of capital by $r_0^e - r_0^c = \theta(r_0^e - r_0^b) = 1.65\%$. Holding the claim decay rate fixed, the higher equity required return lowers the value of profit claims. In this calibration, we use an effective claim decay rate of $\delta_C = 0.03148477$ for valuation, retaining the household exit and incorporation parameters underlying asset demand. The resulting initial valuation multiple is $1/(0.0765 + 0.03148477) = 9.2606$, close to $1/(0.06 + 0.05) = 9.0909$ in the one-asset benchmark.

The historical exercise solves (H13) in levels along the observed markup path. For a candidate pair of required returns, the government budget determines the balancing labor tax, while household demand, portfolio composition, the cost of capital, and equity values adjust accordingly. Away from the baseline, we extend the amount response using the calibrated asset demand semi-elasticities and the composition response using a logit schedule that matches the baseline portfolio substitution elasticity.

Figure 13 reports the 2018 endpoint. The safe return changes by -123.8 basis points and the equity required return by -80.5 basis points, so the equity premium widens by 43.3 basis points and the aggregate desired equity share rises to 64.38 percent. The cost of capital changes by -94.8 basis points, compared with -96.1 basis points in the one-asset economy. The corresponding output response is -5.00 percent, compared with -5.00 percent.

Across the portfolio slopes in Figure 13, portfolio substitution contributes little to the cost-of-capital response. Its main role is to determine the premium at which households are willing to hold the additional equity. Rising market power adds tradable equity backed by aggregate profit income to equity supply but not to safe supply. Given the estimated portfolio slope, households readily rebalance toward equity, so the premium widens by only 43.3 basis points and the safe rate carries most of the adjustment. This matters for the fiscal closure because debt service is $r^b b$: the balancing

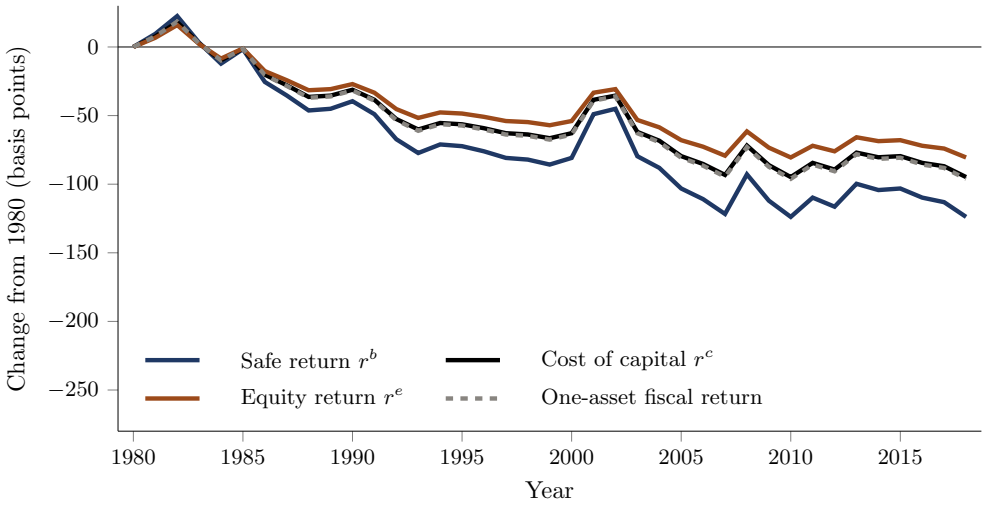


Figure H1: Returns in the two asset markup counterfactual. Changes in the safe return, equity required return, cost of capital, and matched one asset fiscal return, in basis points relative to the calibrated 1980 economy. The curves are stationary sufficient statistic comparisons, not nonlinear transition paths.

labor tax falls to 25.50 percent by 2018, compared with 25.6 percent in the one-asset economy.

Figure H1 plots the required return paths under the baseline portfolio slope, $\eta = 6.9$. The two required returns straddle the one asset benchmark, and the gap between them widens along the market power path.