Chapter 21: Inequality

Chapter authors: Per Krusell and José-Víctor Ríos-Rull

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Outline

1. Introduction
2. Data
3. The Labor Share and the Capital-Output Ratio
4. Wage Inequality
5. Wealth Inequality
6. Why Inequality Matters for Aggregates
7. Summary

Introduction

Why Inequality in Macroeconomics?

Traditionally absent from macro; today high on the research and policy agenda. Three reasons:

Why Inequality in Macroeconomics? (cont.)

1. **Concern about trends**: persistent, ongoing increases in earnings and wealth concentration since the late twentieth century — yet inequality is also a natural outcome of an efficient market economy, so we must understand what drives the trends
2. **Inequality is inherently macro**: general-equilibrium interactions shape both wage and wealth inequality
3. **Inequality affects aggregates**: policy transmission hinges on marginal propensities to consume, invest, and work across the population (Chapter 11: MPCs range from near 0 to near 1); heterogeneous-agent models match micro data and discipline counterfactuals

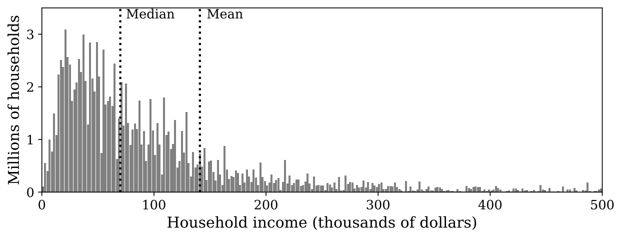
Why Inequality in Macroeconomics? (cont.)

Roadmap: data (21.1), theories of inequality (21.2: labor share, wage inequality, wealth inequality), why inequality matters for aggregates (21.3).

Data

The Income Distribution and the Lorenz Curve

Histogram of the US household income distribution, SCF 2022



Highly skewed: steep rise at 0, peak below $50,000, thick right tail extending far beyond $800,000. Mean far above median — true in all countries with reliable data.

The Income Distribution and the Lorenz Curve (cont.)

Stylized Lorenz curve

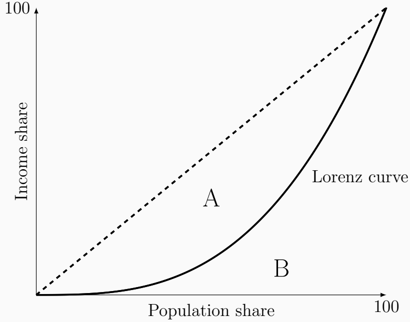
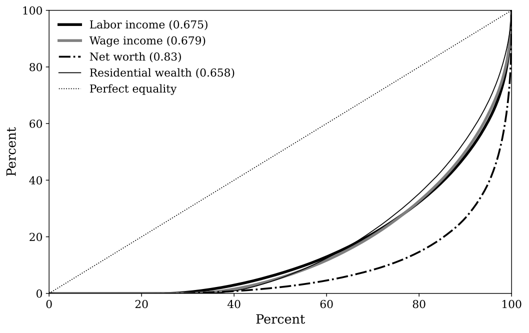


Figure 21.2: Lorenz curve

A point (x, y): the poorest x percent earn share y of total income. Perfect equality $=$ 45-degree line. **Gini coefficient** $= A/(A + B)$: 0 under perfect equality, $\rightarrow$ 1 when one agent holds everything.

US Lorenz Curves and Pareto Tails

Lorenz curves of labor earnings, wage income, residential wealth, and net worth, SCF 2022



Gini coefficients: net worth **0.83**; labor income 0.675; wage income 0.679; residential wealth 0.658.

US Lorenz Curves and Pareto Tails (cont.)

Wealth is far more dispersed than labor income — a fact that holds over time and across all economies studied.

US Lorenz Curves and Pareto Tails (cont.)

Pareto right tails: for a Pareto distribution, $\log x$ vs. $\log(1 - F(x))$ is linear with cdf $1 - (\underline{x}/x)^{\alpha}$; the inverse slope measures tail thickness. The wealth tail is significantly **thicker** than the earnings tail.

Measurement caveats: no wealth registry in the US; surveys undersample the richest; off-shore wealth; tax incentives to under-report private business values.

Distributional Shares (Table 21.1, SCF 2022)

2022 per-household shares of selected groups, sorted by each variable

	Bottom			Quintiles					Top		
	0–1	1–5	5–10	0–20	20–40	40–60	60–80	80–100	90–95	95–99	99–100
Earnings	0.00	0.00	0.00	-0.16	0.50	10	0.96	3.39	2.5	4.88	19.4
Income	0.00	0.08	0.12	0.14	0.30	0.50	0.82	3.24	2.5	4.45	22.4
Wealth	-0.2	-0.02	0	-0.01	0.05	0.19	0.50	4.70	2.48	6.48	35.1
Consumption				0.44	0.66	0.84	1.12	1.93			
Hours worked											
per household	0.07	1.05	2.25	9.31	12.64	16.84	23.54	37.66	8.18	8.04	7.65
per person	0.09	1.28	2.65	11.65	19.89	20.57	20.97	26.91	6.67	6.27	2.07

Source: Kuhn and Ríos-Rull (2025) for earnings, income, and wealth; BLS Consumer Expenditure Survey for consumption.

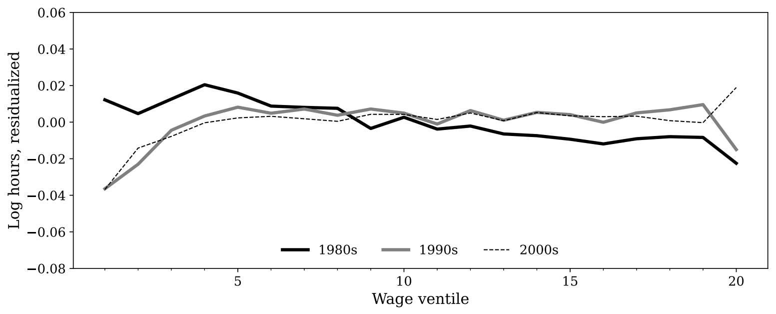
Reading Table 21.1

The earnings, income, and wealth rows are **ratios to the mean**: the five quintile entries sum to about 5. The hours rows are **percentage shares**: the five quintile entries sum to 100.

- For the top 1%, ratio-to-mean and percent share coincide numerically, which is why the text quotes 19.4, 22.4, and 35.1 as percentages
- The earnings- and wealth-poorest 10% have **zero** (or negative)
- The top 1% hold **19.4%** of earnings, **22.4%** of income, and a staggering **35.1%** of wealth
- Consumption is much less dispersed (permanent-income logic + private insurance, Krueger-Perri); hours are far less dispersed still, especially per person

Hours, Wages, and Portfolios

Residualized log hours worked by wage ventile, men, 1980s–2000s

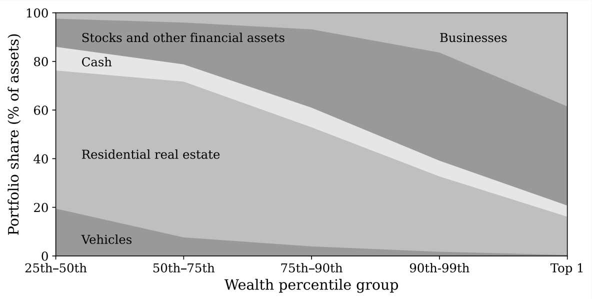


Hours are nearly flat across wage bins (controls: age, age^2, education, race); marked fall in hours of the wage-poorest over the last two decades.

Hours and wages are nearly uncorrelated $\Rightarrow$ given dispersed earnings, **wages must be highly dispersed**.

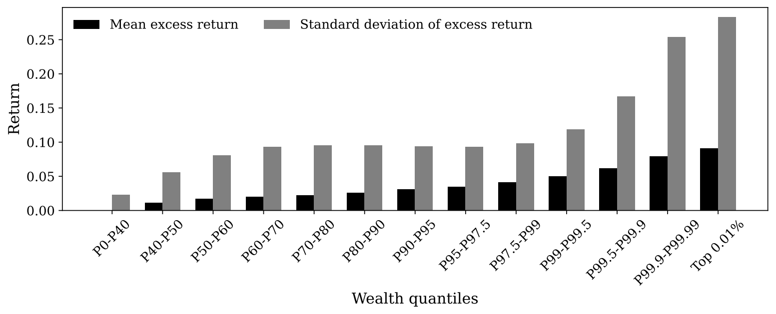
Hours, Wages, and Portfolios (cont.)

Portfolio shares across the wealth distribution, SCF 2022



From the 25th to the 90th percentile, residential real estate dominates; further right, risky financial wealth; at the very top, private businesses.

Mean and standard deviation of excess portfolio returns by wealth quantile (Hubmer-Krusell-Smith 2018; portfolio shares from Bach-Calvet-Sodini Swedish registry data)

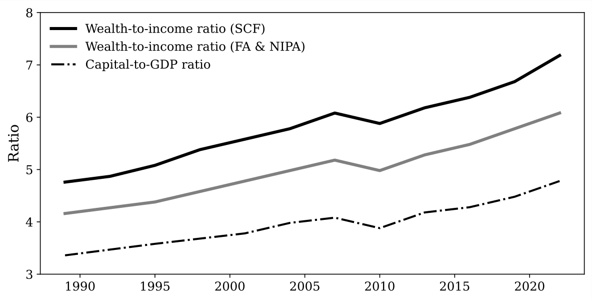


Heterogeneous Returns (cont.)

- Mean returns **rise** systematically with wealth rank — partly reverse causality, but largely systematic differences in portfolio composition
- Return **standard deviation shoots up** at the very top: extreme return realizations are a powerful source of wealth build-up
- Caveats: cash provides unmeasured liquidity services; housing returns exclude owner-occupied services

Trends: Ratios, Earnings, Wealth, and the Skill Premium

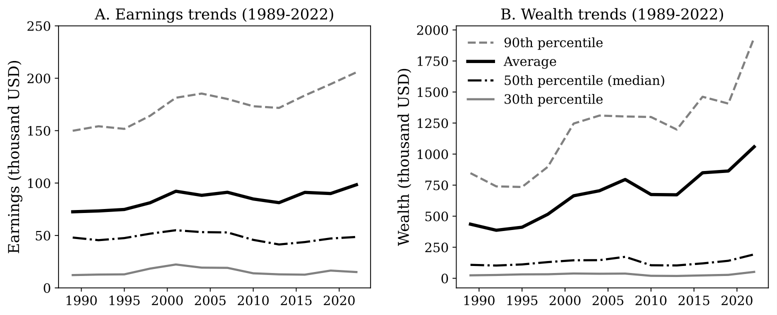
Wealth-to-income and capital-to-GDP ratios, 1989–2022



Capital/GDP stable around 3.5; wealth-to-income **up roughly 50%** (wealth includes land and claims on government).

Trends: Ratios, Earnings, Wealth, and the Skill Premium (cont.)

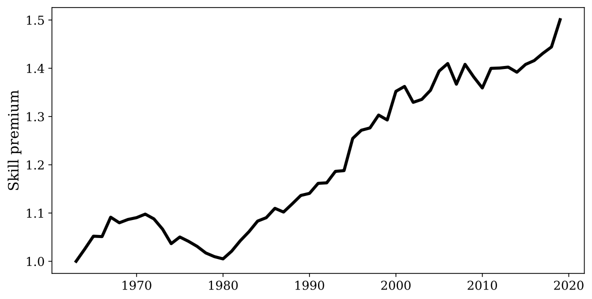
Earnings (A) and wealth (B) by percentile, 1989–2022



Median and 30th-percentile earnings flat since 1990; 90th percentile up from \$150k to \$200k+. Average wealth more than doubled; top wealth from ∼\$800k to ∼\$2M; no growth at the bottom.

Trends: Ratios, Earnings, Wealth, and the Skill Premium (cont.)

Skill premium over time (Ohanian et al. 2023)



College/non-college wage gap $\approx$ 50% in 1963; dips in the 1970s; rises another $\sim$50% steadily after 1980 — despite rapid growth in college graduates.

The Labor Share and the Capital-Output Ratio

The Labor Share

With Cobb-Douglas $A_t k_t^\alpha h_t^{1-\alpha}$ and perfect competition, shares are constant — but observed labor shares have declined. Consider CRS $F(A_{k,t}k_t, A_{h,t}h_t)$ with CES form (elasticity ρ):

$$\frac{r_t k_t}{y_t} = \frac{1}{1 + \left(\frac{1-\alpha}{\alpha}\right)^{\frac{1}{\rho}} \left(\frac{A_{h,t}h_t}{A_{k,t}k_t}\right)^{\frac{\rho-1}{\rho}}}$$

If $\rho > 1$ (more substitutable than Cobb-Douglas), a fall in $(A_h h)/(A_k k)$ — e.g., from **investment-specific technological change** making capital grow faster — **raises the capital share**. Karabarbounis-Neiman (2014): ρ slightly above 1 plus a falling relative price of capital.

The Labor Share (cont.)

Departures from perfect competition (markups, monopsony, union power) also move the labor share.

The Capital-Output Ratio

On a balanced growth path, $sy_t = (\delta + g)k_t$ implies

$$\frac{k_t}{y_t} = \frac{s}{\delta + g}$$

A higher long-run growth rate lowers k/y, but g is small relative to δ. In transition, k/y rises (falls) toward its steady-state value when k starts below (above) it.

The Capital-Output Ratio (cont.)

$k/y \approx 3$ annually; broader wealth measures are at least twice that — land, claims on government, and assets with fluctuating prices. A full general-equilibrium treatment requires explicit land and housing, firm values with adjustment costs (Lucas-tree-like fluctuations), and a financial sector — and confronts the asset-pricing puzzles of Chapter 16. Return processes are therefore treated as exogenous below.

Wage Inequality

Katz-Murphy: Skill-Biased Technological Change

Production $F(k, G(A_u u, A_s s))$ — capital does not affect relative wages. With G CES (elasticity ρ):

$$\log\left(\frac{w_s}{w_u}\right) = -\frac{1}{\rho}\log\left(\frac{s}{u}\right) + \frac{\rho-1}{\rho}\log\left(\frac{A_s}{A_u}\right) + \text{constant}$$

- Higher relative skill supply s/u **lowers** the premium
- Skill-biased technical change raises the premium **iff** $\rho > 1$ (with Cobb-Douglas, the productivity and "need" effects cancel exactly)

Katz-Murphy: Skill-Biased Technological Change (cont.)

Imposing $A_s/A_u = (1+\gamma)^t$ and regressing:

$$\log(w_s/w_u) = -\beta_1 \log(s/u) + \beta_2 t + \text{constant} + \epsilon$$

CPS 1967–1987, college vs. non-college cells: $\rho \approx 1.4$ and skill-biased technical change of roughly **10% per year —** a very rapid counteracting demand force against the rising college supply.

Endogenous Directed Technical Change (Acemoglu)

Make A_s/A_u respond to supplies. Society chooses the direction of technology:

$$\max_{\{A_s,A_u\}} \left[(A_s s)^\sigma + (A_u u)^\sigma\right]^{1/\sigma}$$

$$\text{s.t.} \quad \left[\lambda A_s^\phi + (1-\lambda)A_u^\phi\right]^{1/\phi} = 1, \qquad \phi > 1$$

where $\rho = 1/(1-\sigma)$. The FOC yields:

$$\frac{A_s}{A_u} = \frac{\lambda}{1-\lambda}\left(\frac{s}{u}\right)^{\sigma/(\phi-\sigma)}$$

Endogenous Directed Technical Change (Acemoglu) (cont.)

A larger skilled workforce attracts more R&D targeted at it (market-size effect). Substituting into relative wages:

$$\log\left(\frac{w_s}{w_u}\right) \propto \frac{\sigma - \phi(1-\sigma)}{\phi - \sigma} \log\left(\frac{s}{u}\right)$$

The premium **rises** in s/u iff $\rho - 1 = \frac{\sigma}{1-\sigma} > \phi > 1$ (requires $\rho > 2$): a college boom can ultimately **raise** the college premium.

Capital-Skill Complementarity

Nest capital asymmetrically: $F(u, G(k, s))$ with higher substitutability in F than in G. Simple example:

$$F(k, u, s) = u + s^{\nu} k^{1-\nu}$$

Higher k raises the marginal product of **skilled** labor; unskilled MPL unaffected. With both nests CES and the outer elasticity larger, the skill premium **rises with** k.

Capital-Skill Complementarity (cont.)

Krusell-Ohanian-Ríos-Rull-Violante (2000): rapid **investment-specific** technical change (equipment capital) coincided with the rising premium $\Rightarrow$ a directly measurable source of skill bias. Ohanian et al. (2023): outer elasticity slightly below 2, inner slightly above 0.5.

Alternative nesting $F(s, G(k, u))$ (e.g., $s^{\nu}(k+u)^{1-\nu}$): capital growth can make w_u **fall** — consistent with stagnant wages since the 1970s. Greenwood-Yorukoglu: capital complements human capital especially in periods of rapid technical change (adaptability).

Human Capital and Task-Based Models

Human capital: general vs. specific skills; multi-dimensional skills imply **sorting** (Roy 1951: individuals with skill vectors choose jobs maximizing returns).

- **Mincer**: log wage linear in schooling years and experience; return to schooling ≈ 0.1
- **Ben-Porath**: time split between work and accumulation; specialization in learning early, working late, interior midlife
- With perfect credit markets, human capital maximizes present-value income, separate from consumption; with frictions, wealth matters and **low-skill traps** are possible (Griffy 2021)

Human Capital and Task-Based Models (cont.)

Task-based models (Acemoglu-Autor): production = a set of complementary tasks; inputs are substitutes within tasks. The aggregate production function is **derived**, not assumed. Gives concrete content to **automation** (tasks shifting from labor to capital), the **hollowing out** of middle-skill employment, robots, and outsourcing. Empirics use O*NET task descriptors (abstract/routine/manual).

Departures from wage = marginal product:

Labor Markets in Practice (cont.)

- **Search frictions** (Chapter 20): identical workers earn different wages; large residual wage dispersion, but unobserved characteristics confound measurement
- **Compensating differentials**: workers value amenities (e.g., remote work post-Covid) and accept lower wages; selection matters; amenity-driven dispersion is arguably *desirable*
- **Monopsony**: costly job switching lets firms pay below marginal product; rising firm concentration has renewed attention
- **Unions**: US membership peaked above 30% in the 1950s, now below 10%; in Europe collective agreements cover many non-members; changing union influence is broadly viewed as important for wage inequality

Wealth Inequality

The Frictionless Dynastic Benchmark: Indeterminacy

Identical preferences, different initial wealth and labor efficiency ϵ_i ($\sum_i \epsilon_i = 1$), inelastic labor, no uncertainty:

$$\max \sum_{t=0}^{\infty} \beta^t u(c_{i,t}) \quad \text{s.t.} \quad c_{i,t} + a_{i,t+1} = (1 + r - \delta) a_{i,t} + \epsilon_i w$$

The Frictionless Dynastic Benchmark: Indeterminacy (cont.)

All Euler equations hold with $c_{i,t} = c_{i,t+1}$ iff $\beta(1 + r - \delta) = 1$, pinning down k and w. The remaining equations are the budget constraints:

$$c_i = (r - \delta)a_i + \epsilon_i w$$

one equation, two unknowns per agent: the steady-state wealth (and consumption) distribution is **indeterminate** — entirely inherited from time-zero wealth. Standard permanent-income logic: each agent maintains initial assets forever, consuming earnings plus net interest (MPC $= r - \delta$).

With fully insurable idiosyncratic shocks: same result — the initial distribution persists.

Departures: OLG, Altruism, Warm Glow

OLG without bequests: agents start and end with zero wealth; the wealth distribution is **determinate**, reflecting the **timing** of lifetime earnings (early earners save and become wealthy; late earners borrow).

Departures: OLG, Altruism, Warm Glow (cont.)

OLG + **altruism**: with bequests a_{t+1} and dynastic value

$$V(a_t) = \max_{R_{y,t}, a_{t+1}} u(R_{y,t}) + \beta V(a_{t+1})$$

$$\text{s.t.} \quad R_{y,t} + a_{t+1} = a_t(1 + r - \delta) + w\hat{\epsilon}$$

the problem is again a permanent-income model $\Rightarrow$ **indeterminacy returns**. Altruism is the crucial assumption.

Warm glow: bequests yield utility through an **exogenous** function $\hat{V}$ — unlike the endogenous V, it does not respond to returns, policy, or offspring earnings. Non-Arrow-Debreu (welfare theorems fail); long-run inequality hinges on the curvature of $\hat{V}$ relative to u.

Discount Factors, Taxes, Borrowing Constraints, Returns

Discount factor heterogeneity: the most patient agent i^* pins down $\beta_{i^*}(1 + r - \delta) = 1$; all others' consumption converges to **zero**, with wealth $a_i = -\epsilon_i w/(r - \delta) < 0$. Extreme but determinate — and inequality by **choice**.

Progressive capital taxation $\tau(a)$, $\tau' > 0$: Euler equations cannot hold for all wealth levels; the distribution converges to **full equality** (progressivity eats wealth differentially). Hubmer et al.: declining tax progressivity since Reagan is a key driver of rising US wealth concentration.

Discount Factors, Taxes, Borrowing Constraints, Returns (cont.)

Borrowing constraints lower asset inequality: two agents with alternating endowments $\bar{y}, \underline{y}$; unconstrained: $q = \beta$ and full smoothing via alternating borrowing/lending. With a binding limit $a_{t+1} \geq \underline{a}$, the equilibrium price solves

$$qu'(\bar{y} + \underline{a}(1+q)) = \beta u'(\underline{y} - \underline{a}(1+q))$$

Asset inequality here signals a **well-functioning** market for consumption smoothing.

Permanent return differences: the highest-r_i agent ends up holding the entire capital stock. Structurally: entrepreneurs who must self-finance high-return projects (Quadrini 2000).

Idiosyncratic Uninsurable Shocks: Determinacy

With idiosyncratic, uninsurable earnings shocks and a riskless asset only (Aiyagari, Huggett; first: Imrohoroğlu 1989), the steady-state wealth distribution becomes **determinate**.

Huggett: $c_t + q_t a_{t+1} = \epsilon_t + a_t$, $a_{t+1} \geq \underline{a}$, zero net supply. Mean-reverting ϵ generates borrowing and lending; $\underline{a} = 0$ delivers autarky (Chapter 17); the natural borrowing limit maximizes asset inequality — dispersed wealth here reflects **risk sharing**, not dysfunction.

Idiosyncratic Uninsurable Shocks: Determinacy (cont.)

Quantitative shortfall: an AR(1) earnings process gives wealth more dispersed than earnings, but **far less top concentration than the data**:

- The rich barely value insurance (their buffer is large)
- $r < \rho$ in equilibrium $\Rightarrow$ well-insured agents **decumulate**

The right tail dies off.

Castañeda et al. (2003): a "superstar" earnings process — huge upside shocks plus real risk of crashing far down — keeps the precautionary motive alive at the top and matches a wealth Gini of 0.8.

Random Discount Factors, Random Returns, Kesten Processes

Random β (cohort frequency: dynasty heads differ): spreads the distribution. **Random returns**: idiosyncratic portfolio-return shocks spread it further, more so with higher variance and persistence.

Random growth (Kesten 1973):

$$a_{t+1} = s_t a_t + \epsilon_t$$

with s_t, ϵ_t i.i.d.: if there exists $\zeta > 0$ with $\mathbb{E}[s^\zeta] = 1$ (and $\mathbb{E}[\epsilon^\zeta] < \infty$), the stationary distribution has a **Pareto right tail**: $\lim_{a\to\infty} \Pr(A > a) \propto a^{-\zeta}$ — exactly the shape in the data.

Random Discount Factors, Random Returns, Kesten Processes (cont.)

Hubmer et al. (2018): with CRRA utility, optimal saving at high wealth is well approximated by random growth, where s combines the **discount-factor shock** and the **return shock** (ϵ carries earnings). Earnings shocks alone do **not** generate Pareto tails (unless themselves Pareto).

Welfare distinction: random $\beta \Rightarrow$ inequality by choice (insurance would not be valued); random returns $\Rightarrow$ inequality by **luck** (insurance would be highly valued).

Hours Worked and the Left Tail

Endogenous hours: labor supply is an extra insurance margin. Wage shocks with strong income effects rationalize the puzzling **near-zero correlation** between hours and wages or wealth: income effects make the wealthy work less, while intertemporal substitution makes high-current-wage workers work more (Domeij-Floden 2006; Pijoan-Mas 2006).

Hours Worked and the Left Tail (cont.)

Why are so many so poor? The baseline Aiyagari model predicts *too few* households at the bottom (agents save their way out). Missing elements:

- **Consumption floors**: government transfers, food stamps, family support — make zero wealth much less costly
- Savings **garnishable** by creditors after default without bankruptcy
- Wealth **concealment** within informal sharing networks
- Mental health, addiction, behavioral factors; crime and incarceration — the very poorest are understudied in macroeconomics

Quantitative Comparison of Wealth-Inequality Theories

Steady states of Aiyagari-model variants:

1. **Baseline** (AR(1) income, PSID): income Gini 0.37, wealth Gini **0.67**; $r = 2\%$, $k/y = 3$; top 1% hold **9%** (data: ∼40%); average MPC 0.17, bottom-decile MPC 0.78
2. **Superstar earnings** (Castañeda et al.): wealth Gini **0.8** (income Gini 0.67), same r, k/y; top 1% hold **over 40%** (overshoots) — but the MPC distribution barely changes
3. **Stochastic** β (3 values, ∼75-year duration, 10/80/10 split, matched to wealth Gini 0.8): top 1% hold only **19%**; r falls to **0.5%**; average MPC rises to **0.29**
4. **Random i.i.d. returns** (matched to Gini 0.8): $r = 3\%$, k/y just below 3; top 1% ≈ **30%**; MPCs back near baseline

Quantitative Comparison of Wealth-Inequality Theories (cont.)

Different theories of the same wealth Gini imply very different MPC distributions — and hence different policy transmission. No consensus yet (Ozkan et al. 2023).

Welfare Comparisons in Heterogeneous-Agent Models

Transitions matter: comparing steady states is not enough. A capital subsidy raises steady-state capital and welfare, but starting from an efficient steady state, time-0 welfare must **fall** (lower consumption during the build-up outweighs the long-run gain).

With heterogeneity: solve the **full transition** and compare present-value utility for **all agents** at time 0; some gain, others lose. Aggregating requires a social welfare function — the equally-weighted utilitarian SWF is **normative** (implicitly pro-equality); it is justified "behind the veil of ignorance" (Rawls) only if agents are ex-ante identical.

The Nature of Contracts

The canonical model assumes away insurance, yet life/property/health insurance, social security, and personal **bankruptcy** protection exist. Important extensions incorporate bankruptcy (Chatterjee-Corbae-Ríos-Rull 2008; Livshits-MacGee-Tertilt 2007) and credit scores as determinants of borrowing contracts (Chatterjee et al. 2023).

Policy analysis faces a **Lucas critique**: the nature of contracts would respond to any policy change that the model does not endogenize.

The Nature of Contracts (cont.)

Concretely, full earnings insurance would raise ex-ante welfare *in the model* but be “socialism pure” in reality — destroying effort and human-capital incentives. Missing insurance markets likely reflect **private information** (moral hazard, adverse selection; Mirrlees 1971) and limited commitment.

Lucas-proof mechanism-design models (deriving optimal contracts under explicit frictions) exist but rarely resemble observed contracts: a persistent tension between descriptive accuracy and robustness to the Lucas critique.

Why Inequality Matters for Aggregates

Long-Run Channels

Incentives: inequality can be "good" — it reflects rewards to effort, innovation, accumulation. Proportional taxes with lump-sum rebates compress disposable income and consumption but lower steady-state capital and hours. Yet with **missing insurance markets**, distortionary redistribution *can* raise welfare; deeper frictions (private information, limited commitment) may make any improvement infeasible. Unicorn wealth accumulation appears even in Scandinavia; the more extreme US outcomes may reflect stronger incentives and freer markets.

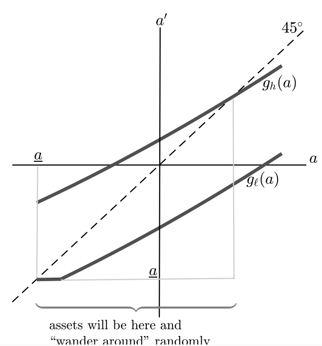
Long-Run Channels (cont.)

Credit constraints and education traps: education costs a fixed amount F upfront; lifetime incomes $w_s > w_u$. Even when $w_s - w_u > F$, only those with **wealth above** F (absent borrowing) can choose education $\Rightarrow$ the wealth distribution determines educational attainment. General equilibrium endogenizes w_u, w_s; **trapped dynasties** (poor parents $\to$ uneducated children $\to$ poor parents) and even economy-wide **low-GDP traps** are possible (Galor-Tsiddon 1997). Quantitative importance: still open.

Business Cycles: MPCs and Computation

Heterogeneous-agent models raise MPCs toward the data: representative-agent MPC $\approx r$; constrained agents have MPC $= 1$ $\Rightarrow$ **fiscal transfers are more powerful**.

Stylized saving decision rule — MPCs high at low assets, equal to 1 when the constraint binds



Business Cycles: MPCs and Computation (cont.)

Computational challenge: with aggregate shocks, the wealth **distribution** becomes a state variable. Two responses:

1. **TANK**: two agents — a hand-to-mouth worker (MPC $= 1$) and a rentier (MPC ≈ 0); pick population shares to hit an aggregate MPC of, say, 0.5. Widely used at policy institutions.
2. **Head-on** (Krusell-Smith 1998, and successors): now standard graduate material. A particularly accessible modern method: compute the **deterministic transition to a one-time unexpected shock**, then exploit **linearity** (certainty equivalence) to scale and add responses for arbitrary shock sequences (Boppart et al. 2018; Auclert et al. 2021).

Insights: MPCs, Demand, and Policy Targeting

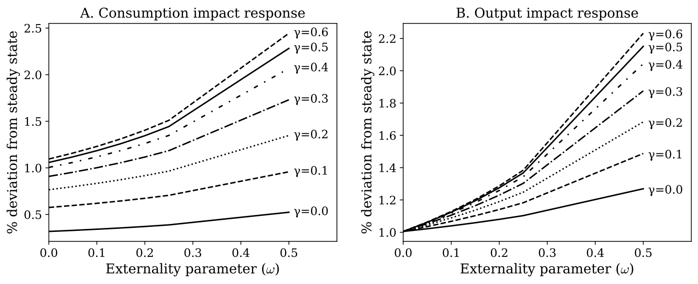
Wealthy hand-to-mouth (Kaplan-Violante): wealthy but illiquid agents have high MPCs. Simple device: with i.i.d. probability γ, the agent cannot decumulate ($a' \geq a$) — raising average MPCs further. Higher MPCs raise the consumption-output correlation and explain **excess sensitivity** (Chapter 11).

Insights: MPCs, Demand, and Policy Targeting (cont.)

But the supply side is rudimentary; demand must matter for output. Example: $Y_t = \hat{A}_t k_t^{\alpha}$ with $\hat{A}_t = A_t c_t^{\omega}$ (consumption externality, $\omega \geq 0$) — output partly **demand-determined**.

Impact Responses to a TFP Shock

Impact responses of consumption (A) and output (B) to a 1% TFP shock, by ω and γ



$\omega = \gamma = 0$: output $+1\%$, consumption $+0.3\%$. High γ (0.6): consumption $+1.1\%$ but output unchanged (investment falls). High γ *and* ω: the two mechanisms **reinforce**, generating strong propagation without any hours channel.

Policy Lessons

To boost demand, **target high-MPC consumers**; the full distribution of marginal propensities (consume, work, invest) matters; heterogeneous-agent models also reveal the **distributional welfare effects** of policy, beyond the employed/unemployed split.

From Micro to Macro: More Heterogeneity

Further dimensions of heterogeneity being incorporated:

From Micro to Macro: More Heterogeneity (cont.)

- **Age**: OLG structure matters for aggregate saving, social security, pensions; low fertility raises the future burden on workers and affects aggregate labor supply
- **Household structure**: marriage and cohabitation; second earners have elastic labor supply responses to transfers; cohabitation is countercyclical and trending down
- **Labor market dimensions**: education, occupation, experience, health, location — often combined with search and matching (Chapter 20), where the distribution of agents across matches becomes a state variable (sometimes summarized by tightness, sometimes not)

From Micro to Macro: More Heterogeneity (cont.)

Heterogeneous-agent macro is expanding rapidly: computational advances allow detailed micro foundations, connecting models to a much wider range of micro data and studies.

Summary

Key Takeaways (I)

1. **Facts**: income, earnings, and wealth are highly skewed with Pareto right tails; net-worth Gini 0.83 vs. labor income 0.675; top 1% hold 35.1% of wealth; consumption and hours far less dispersed; hours nearly uncorrelated with wages; portfolio risk and both the mean and dispersion of returns rise with wealth; wealth-to-income up $\sim$50% while capital/GDP is flat; growth concentrated at the top; skill premium up $\sim$50% since 1980.

Key Takeaways (II)

2. **Labor share**: CES with $\rho > 1$ plus investment-specific technical change lowers the labor share (Karabarbounis-Neiman); $k/y = s/(\delta + g)$ on the BGP.
3. **Wage inequality**: Katz-Murphy $\log(w_s/w_u) = -\frac{1}{\rho}\log(s/u) + \frac{\rho-1}{\rho}\log(A_s/A_u)$, $\rho \approx 1.4$, $\sim$10%/yr skill bias; Acemoglu directed technical change can make the premium rise in s/u if $\rho > 2$; capital-skill complementarity ties the premium to equipment growth; human capital (Mincer, Ben-Porath, Roy); task models formalize automation and hollowing out; search, amenities, monopsony, unions move wages off marginal products.

Key Takeaways (III)

4. **Wealth inequality theory**: frictionless dynastic model $\Rightarrow$ **indeterminate** distribution; OLG without bequests $\Rightarrow$ determinate (earnings timing); altruism restores indeterminacy; discount-factor heterogeneity $\Rightarrow$ extreme concentration; progressive capital taxes $\Rightarrow$ full equality; borrowing constraints *lower* asset inequality; permanent return differences $\Rightarrow$ one agent holds all.

Key Takeaways (IV)

2. **Uninsurable shocks**: Aiyagari/Huggett deliver determinacy but too little top wealth (top 1% hold 9% vs. ∼40%); fixes: superstar earnings (Castañeda, Gini 0.8, MPCs unchanged), random β (top 1% only 19%, average MPC 0.29), random returns (top 1% ≈ 30%); Kesten random growth $a' = sa + \epsilon$ gives Pareto tails when $\mathbb{E}[s^\zeta] = 1$. Random β = chosen inequality; random returns = luck.

Key Takeaways (V)

2. **Welfare analysis**: transitions matter; the utilitarian SWF is normative; contracts face the Lucas critique (full earnings insurance would destroy incentives — Mirrlees).
3. **Inequality matters for aggregates**: incentives vs. insurance trade-off; education fixed costs + credit constraints $\Rightarrow$ trapped dynasties and aggregate traps; high MPCs strengthen fiscal policy; TANK vs. Krusell-Smith methods; wealthy hand-to-mouth and demand externalities reinforce propagation; target high-MPC groups.