Macro-finance in the long-run

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Princeton Initiative, 2024

Business Cycle versus the Long Run

- Macro-finance is the study of connecting the *real* economy in the *aggregate* to *financial markets*

- Most traditional work in this area has focused on the business cycle frequency, e.g. "boom-bust" cycles, highlighting amplification mechanisms, the necessity of macro-prudential approach due to externalities and lack of adequate risk-sharing etc.

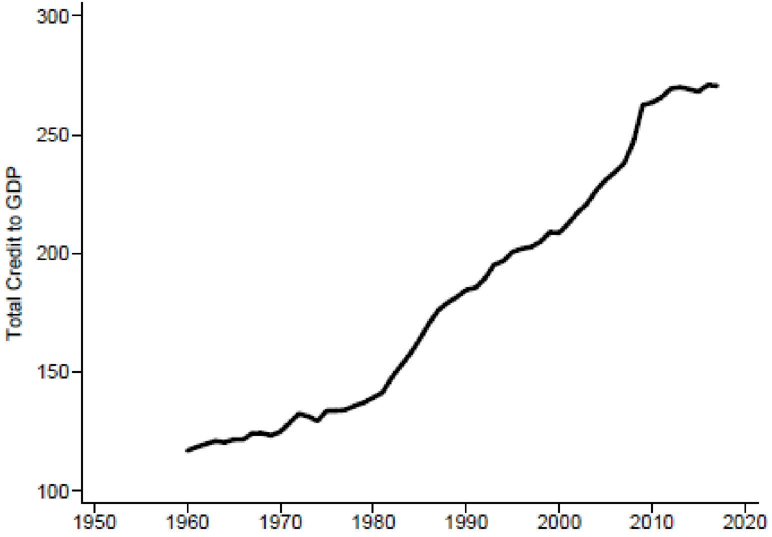
- For one summary of this literature, see "Finance and business cycles", Mian and Sufi, *Journal of Economic Perspectives*.

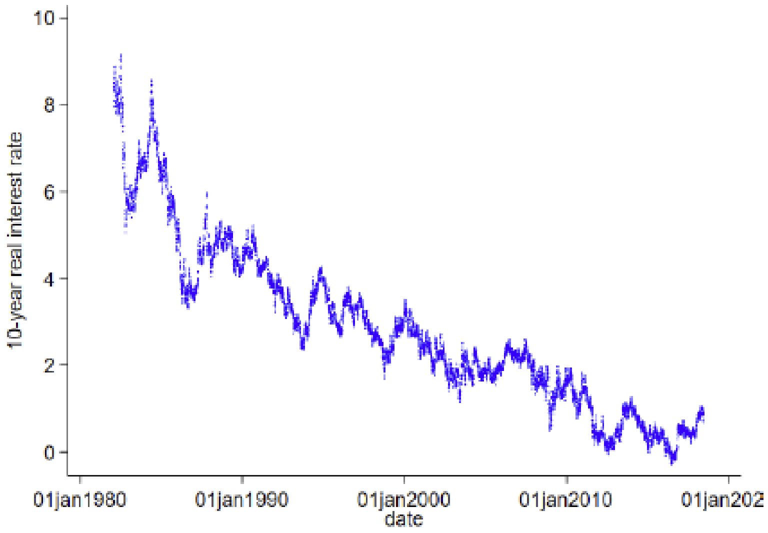
- However, a lot less has been done on the question of **long-run** connection between the real economy and financial markets – open area of research!

- All papers mentioned in these slides are available on my website

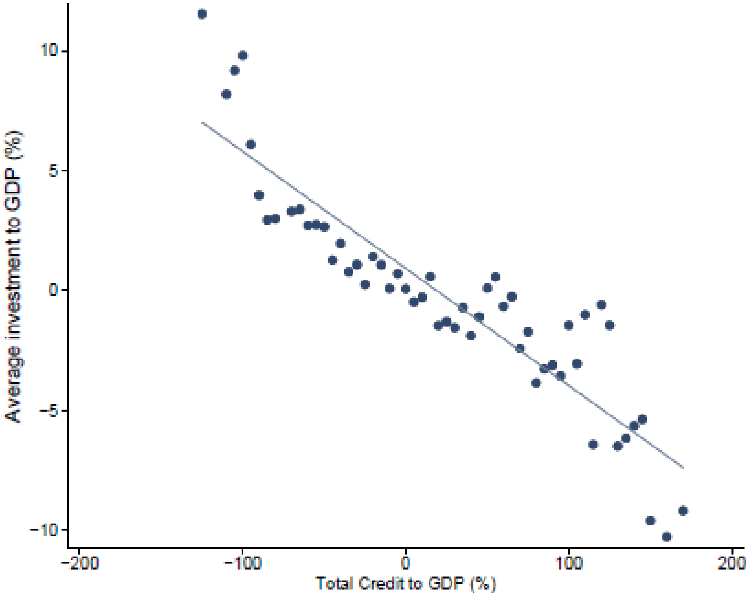
Macro-Finance and the long-run

- Huge rise in quantity and large fall in price of credit since about 1980. Why did this happen? What are its consequences?





- Is credit financing the supply-side of the economy?



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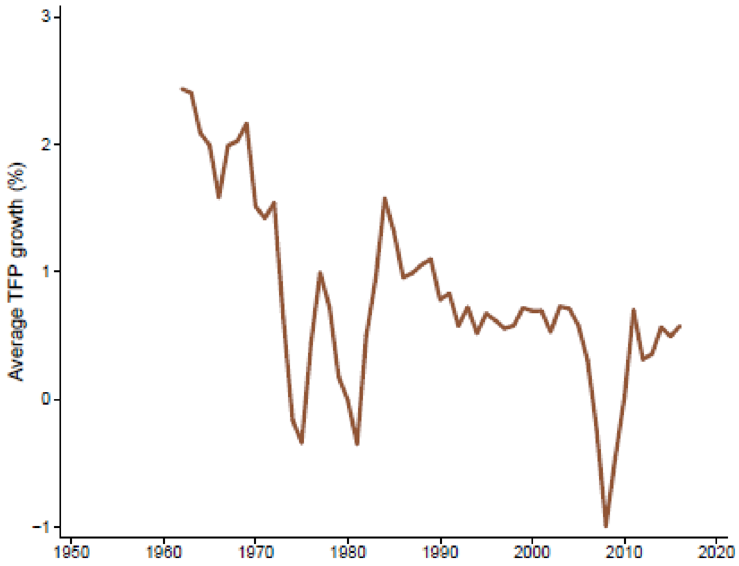
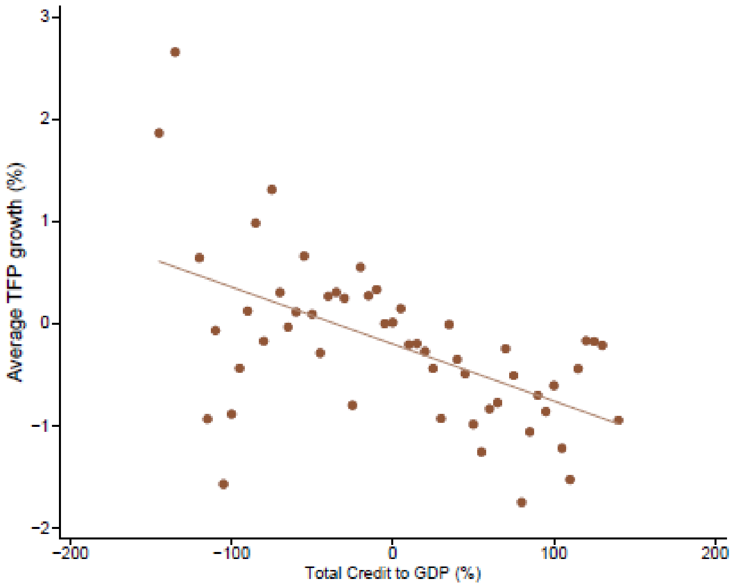
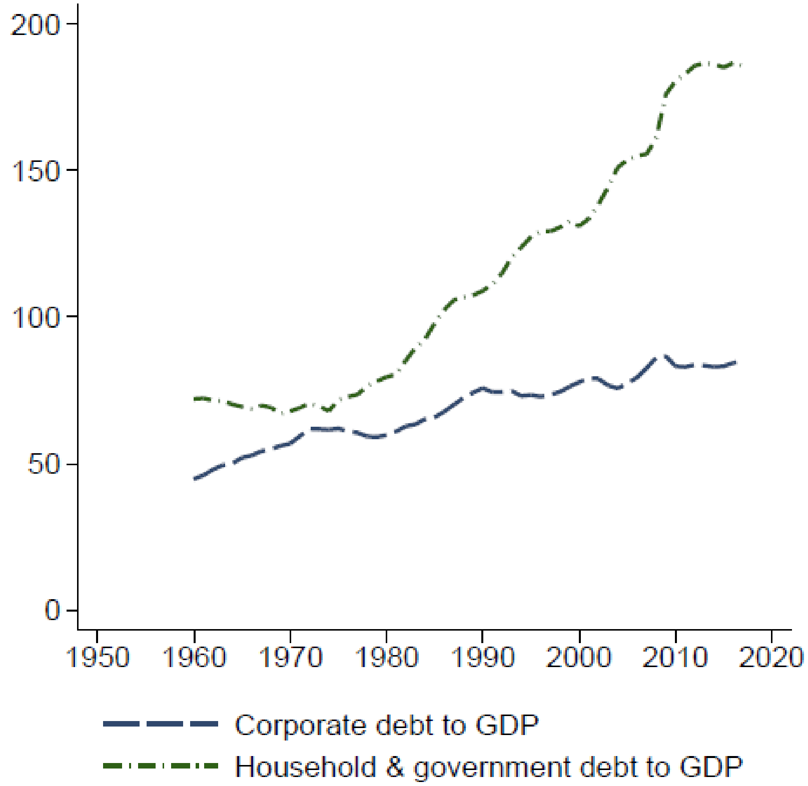
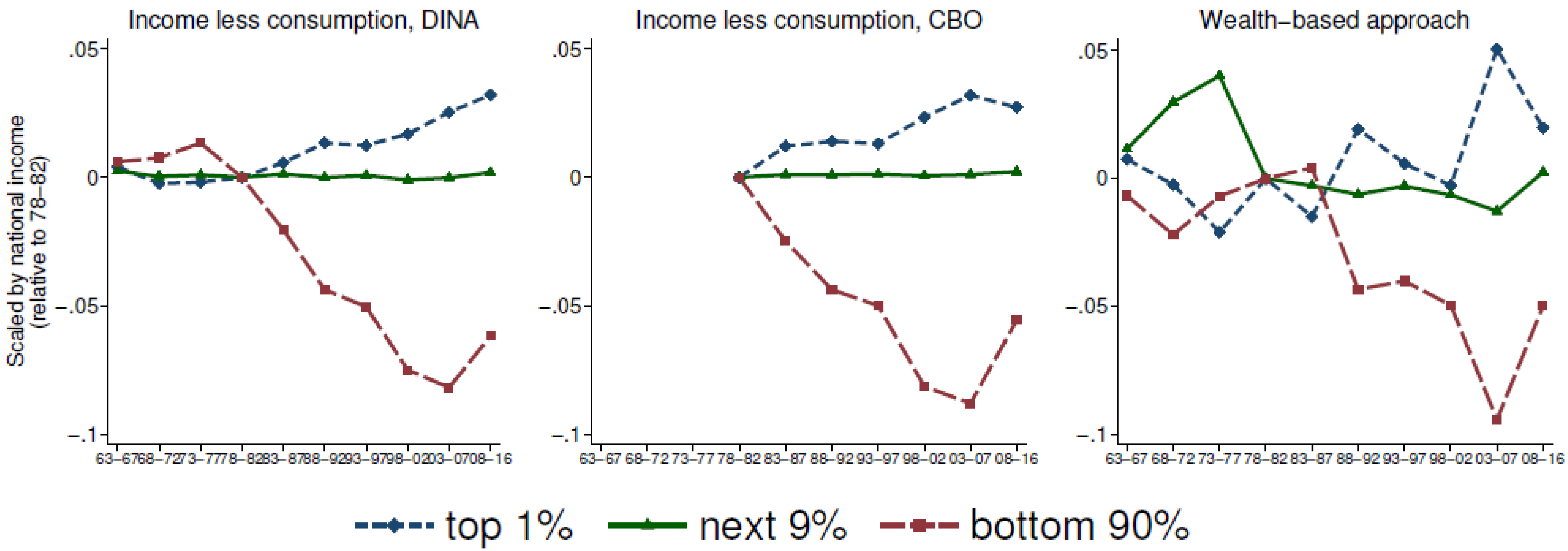




- Is credit financing the demand-side of the economy?

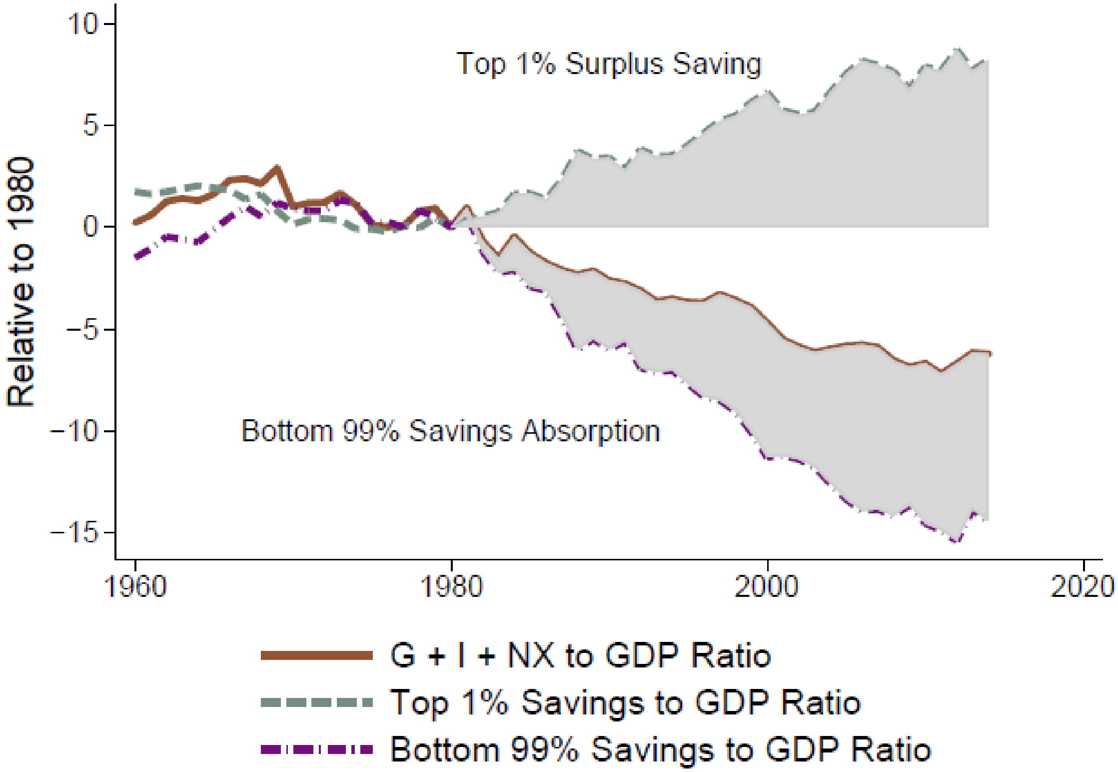


Where does the saving glut of the rich go?

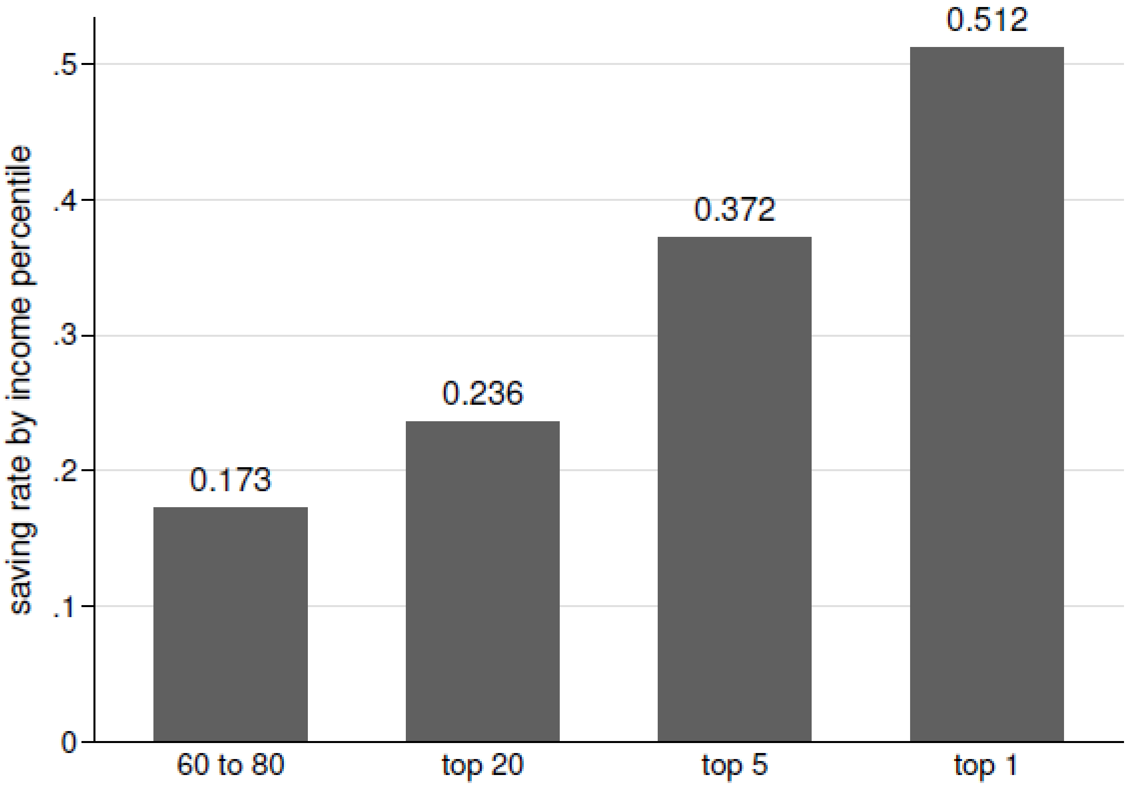


See Mian, Sufi and Straub ("Saving Glut of the Rich") for formal details

- Where is long-run credit expansion coming from?



Fact: The rich save more out of *lifetime* income



From Dynan, et al, Table 3, column 2

Indebted Demand

- When rich save more out of lifetime income, and extreme inequality rises

  … need to stimulate demand today through debt creation: rich save/lend, non-rich borrow

  … but that reduces demand in the future when borrowers have to repay the debt

  … only solution is for interest rate to fall, so non-rich could borrow even more!

  … this **indebted demand** cycle continues, until interest rate hits zero lower bound (ZLB)

  … if extreme inequality persists, remain stuck in perpetual **debt trap**

Indebted Demand model

- Non-homothetic preferences
  … people derive greater utility from accumulating wealth (*a*) as they get richer

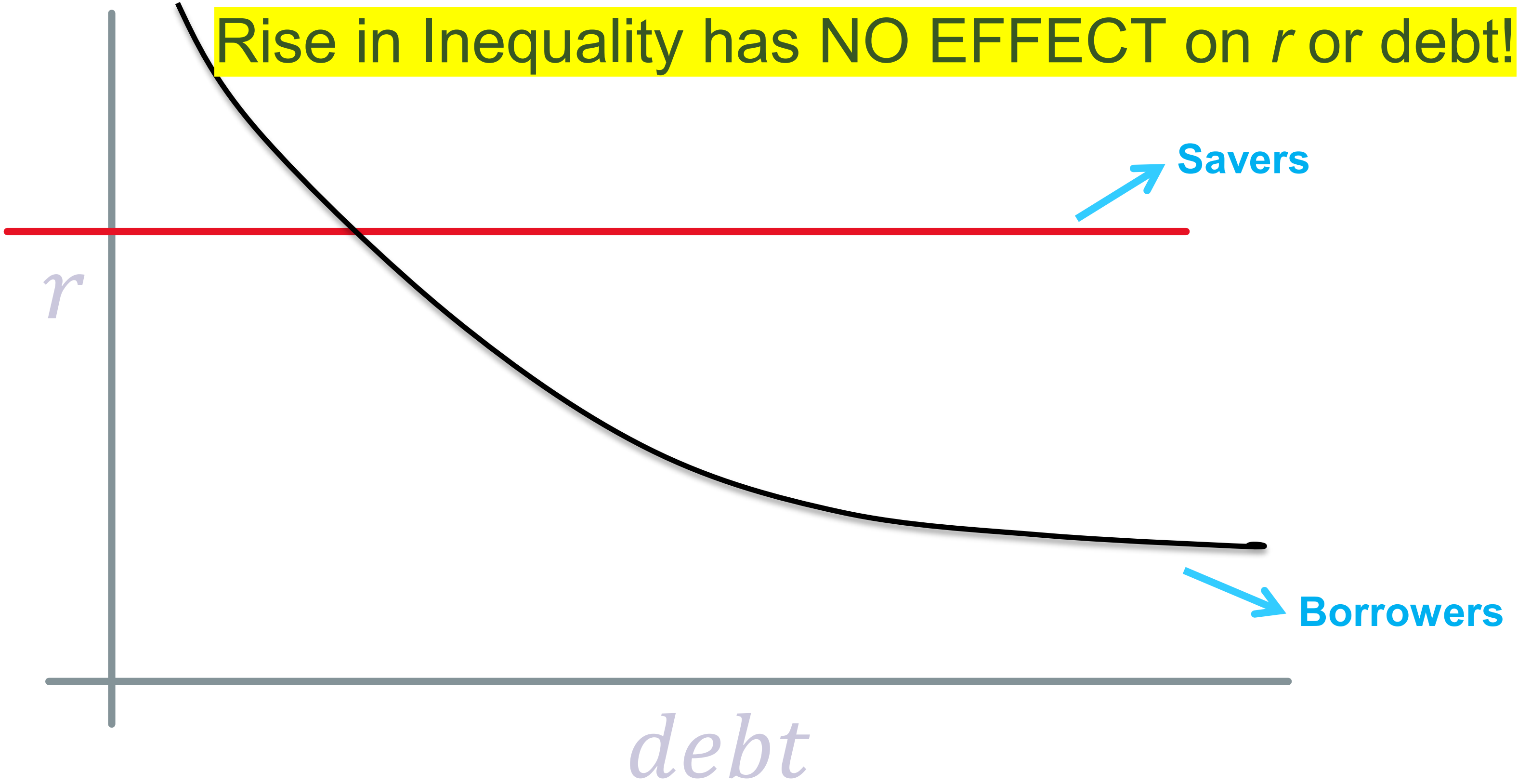
$$\int_0^\infty e^{-(\rho+\delta)t} \left\{ \log c_t^i + \frac{\delta}{\rho} . v(a_t^i) \right\} dt$$

- Euler equation in steady-state for the rich
  … determines the long-run saving supply schedule

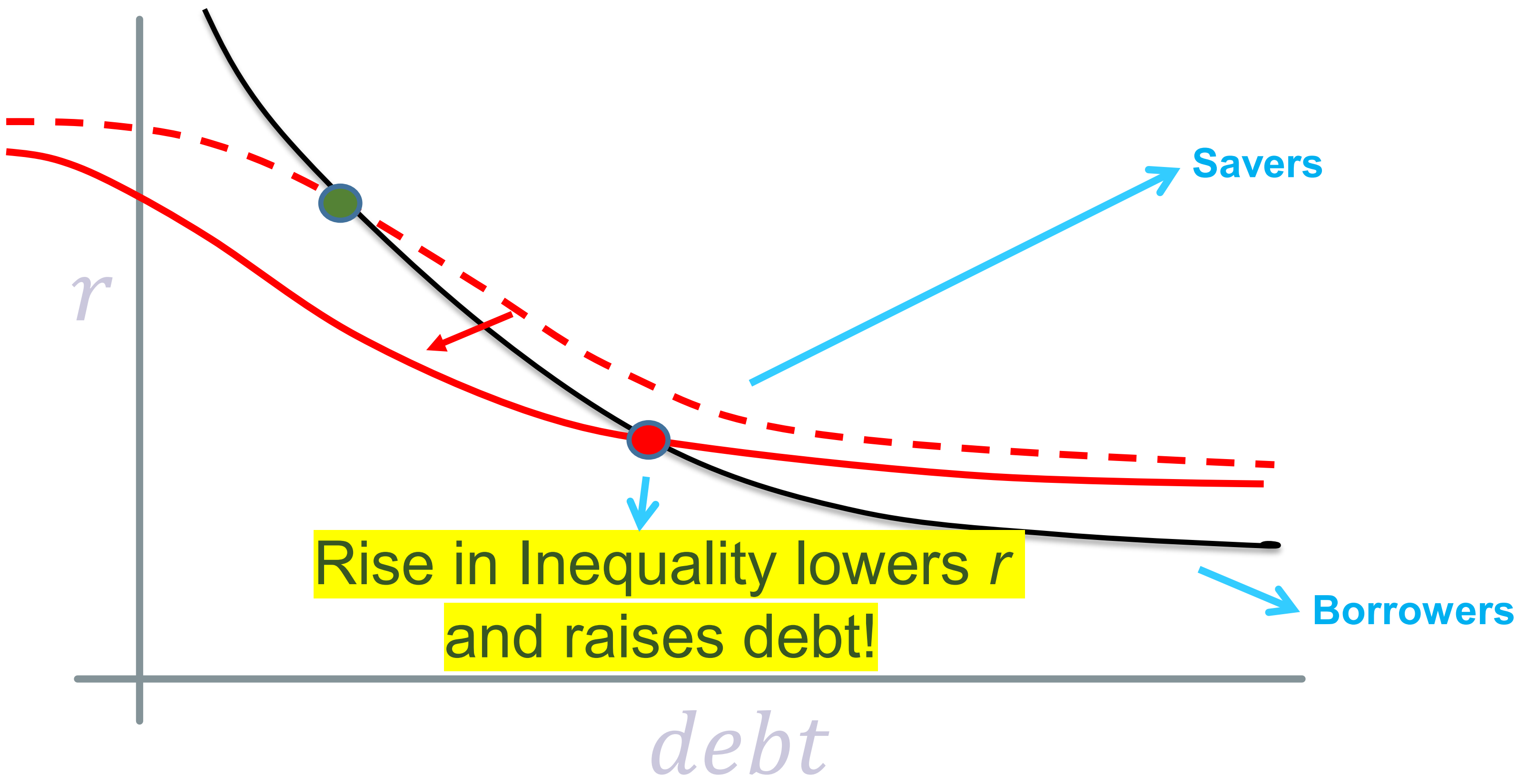
$$r = \rho . \frac{1 + \rho/\delta}{1 + \frac{\rho}{\delta} . av'(a)}$$

See Mian, Sufi and Straub (QJE 2021) for formal details

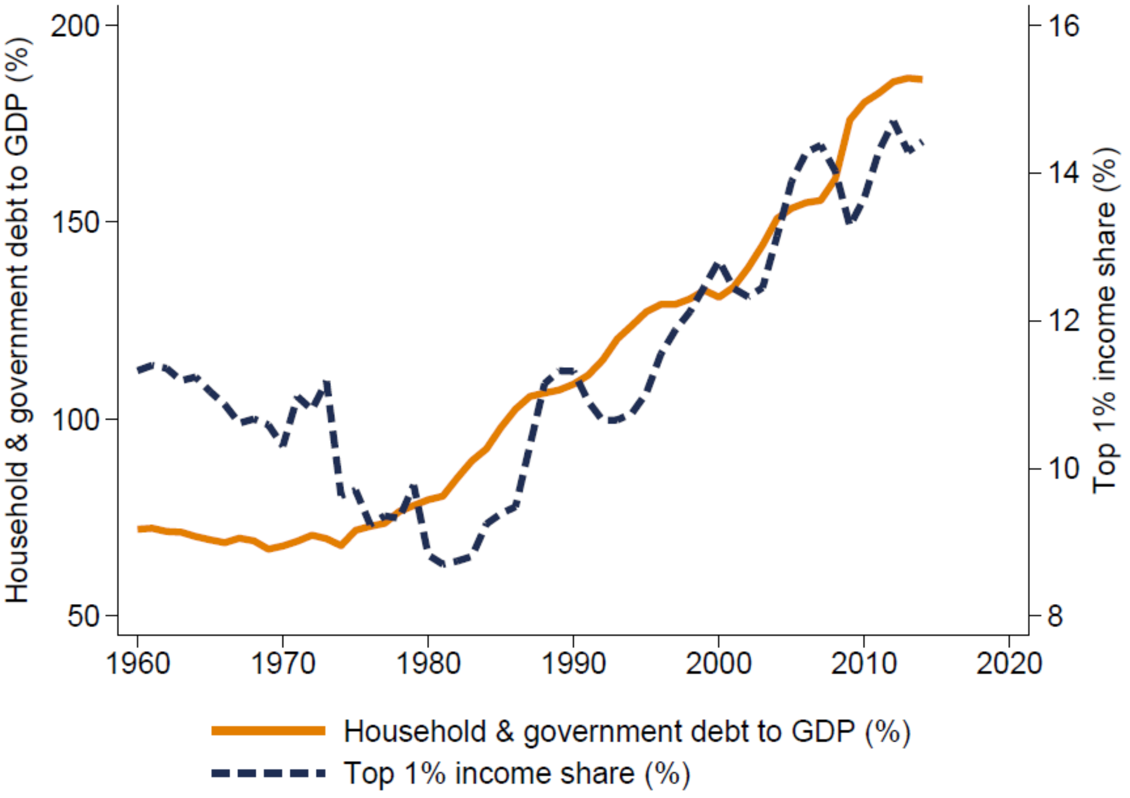
Standard homothetic models

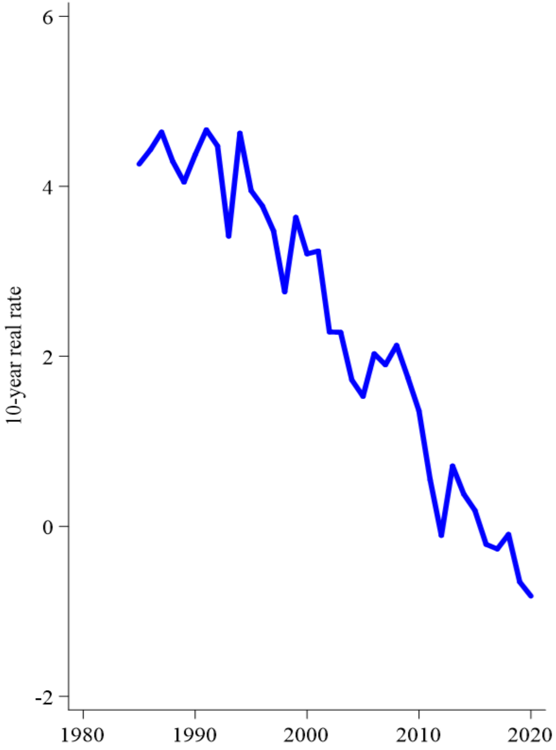


Indebted Demand model



Rising inequality is associated with rising debt …. and falling rates





Implications for monetary policy

- Rising inequality forces the hand of monetary policy by lowering r*

  … reduces space for monetary policy to operate

- Easy monetary policy often raises demand through debt creation

  … but that creates indebted demand, putting downward pressure on future rates: monetary policy has limited ammunition.

  “the sustainability of debt burdens depends on interest rates remaining low” – Mark Carney

- Persistent extreme inequality pushes monetary policy against ZLB, and economy stagnates inside a debt trap

Implications for fiscal policy

- With “specialness”, such as “convenience yield”, of government debt, $R < G$ for government borrowing when aggregate demand is weak … fiscal policy is like a wealth tax!
- Rising inequality expands fiscal space
- There is an MMTesque “free lunch” when $R < G - \psi$, i.e. government can increase primary deficit permanently without ever having to raise taxes
- The design of tax policy is really important for moving and staying away from the ZLB

See Mian, Sufi and Straub “A Goldilocks Theory of Fiscal Policy”

Household problem

- Fraction $1-\mu$ savers solve (de-trended) problem

$$\max_{\{c_t, b_t\}} \int_0^\infty e^{-\rho t} \{\log c_t + v(b_t)\} \, dt$$

$$c_t + \dot{b}_t \leq (R_t - G_t) b_t + (1-\mu) y_t - \tau_t$$

- $b_t =$ government debt to potential GDP
- $v(b_t)$ captures convenience benefits of government bonds

  [Krishnamurthy Vissing-Jorgensen 2012, Greenwood Hansen Stein 2015]

  - increasing and concave
- Spenders consume constant share of income μy_t
- $y_t =$ labor endowment, sold to repr. firm. If rationed, $y_t < 1$

Government

- Fiscal policy consists of $\{x, b_t, \tau_t\}$ that satisfy

$$x + (R_t - G_t)\, b_t \leq \dot{b}_t + \tau_t$$

$$\text{primary deficit:} \qquad z_t \equiv x - \tau_t$$

- Monetary dominance, natural rate implemented whenever possible

$$R_t = \max\{R_t^*, 0\}$$

- Simple downward nominal wage rigidity [easily generalized]

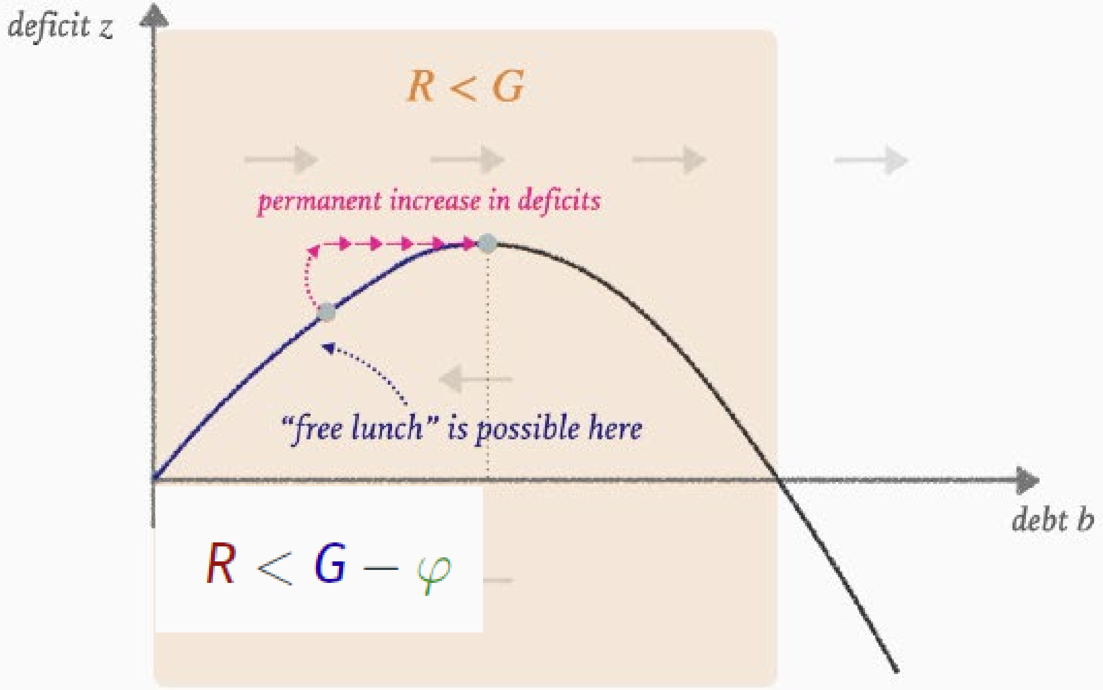
$$\pi_t = \dot{W}_t / W_t \geq \pi^* - \kappa(1 - y_t)$$

When demand is low, $y_t < 1$ and $\pi_t < \pi^*$

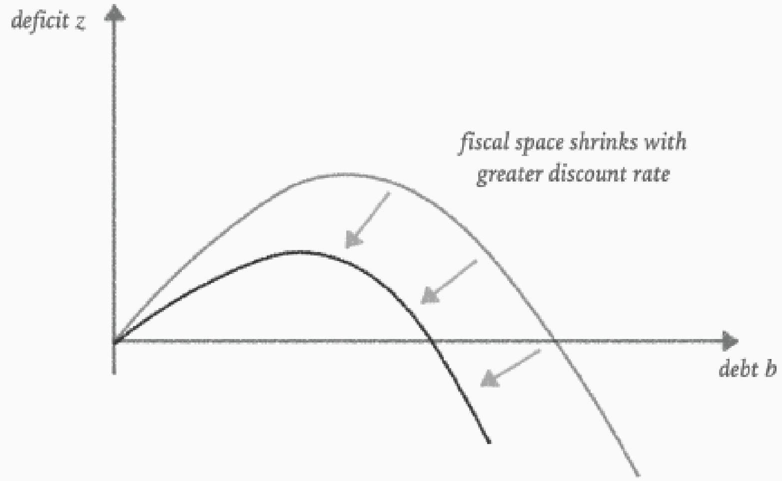
[$\kappa < v'(0)$ avoids Benhabib Schmitt-Grohe Uribe (2001) issues, as in Michaillat Saez (2019)]

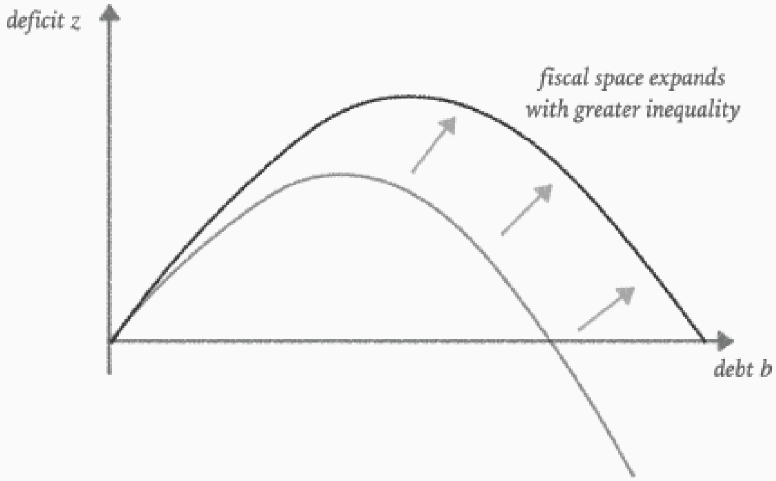
Fiscal space without ZLB

Free lunch in the deficit debt diagram



What determines fiscal space?





- Fiscal space shrinks with greater discount rate ρ
  - more "aggregate demand" shrinks fiscal space
- Fiscal space rises with greater inequality $1 - \mu$
  - conflict between large deficit-financed programs and reducing inequality?

What should policy makers do?

- Revise macroeconomic models to incorporate the key role that inequality plays in determining macroeconomic dynamics and fundamentals

  … possibly explains persistent over-forecasting of interest rates

- Monetary policy is ill-equipped to deal with weak aggregate demand resulting from extreme inequality. Emphasis should be on,

  … policies that deliver equitable and inclusive growth

  … progressive taxation, consider wealth taxes

  ... Increase public investment, especially in areas that promote equality of opportunity

  … promote competitive markets

Where is the natural rate heading?

- Wicksell: natural rate that clears market for saving and investment

- Natural rate of interest, r*, and LW and HLW estimates by New York Fed
… but estimates are very imprecise
… subject to serious misspecification concerns (e.g. broke down during pandemic)

- BHM estimate the long-term housing yield y*, using a natural experiment approach: lease extension experiments in UK
… precise, no structural assumption, real-time, public data – closely linked to r*

See Backer-Peral, Hazell and Mian "Dynamics of the Long Term Housing Yield: Evidence from Natural Experiments"

What is the natural rate of return on capital, r_K^*?

- Price P_t of capital with dividend R_t:

$$P_t = R_t \int_0^\infty e^{-\int_0^S r(u)+\zeta(u)-g(u)du} dS$$

where r is safe return, ζ is risk premium and g is dividend growth

- The natural rate of return on capital is the long-run expectation of the dividend-price ratio

$$\frac{R_{t+\infty}}{P_{t+\infty}} \equiv \lim_{u\to\infty} r(u) + \zeta(u) - g(u) \equiv r_K^* = r^* + \zeta^* - g^*$$

- Equivalently r_K^* is the Hall-Jorgensen user cost of capital, normalized by its price

Empirical Methodology

Price change after lease extension difference-in-difference:

$$\Delta_{it} = \log\left(1 - e^{-r^*_{Kt}(T_{it}+90)}\right) - \log\left(1 - e^{-r^*_{Kt}T_{it}}\right)$$

Control: non-extenders within $\{0.1, 0.5, 1, 5, 10, 20\}$ km and $\pm 10\%$ of extender duration T_{it}

- Robustness: residualize prices by hedonic characteristics

Validating control group + parallel trends:

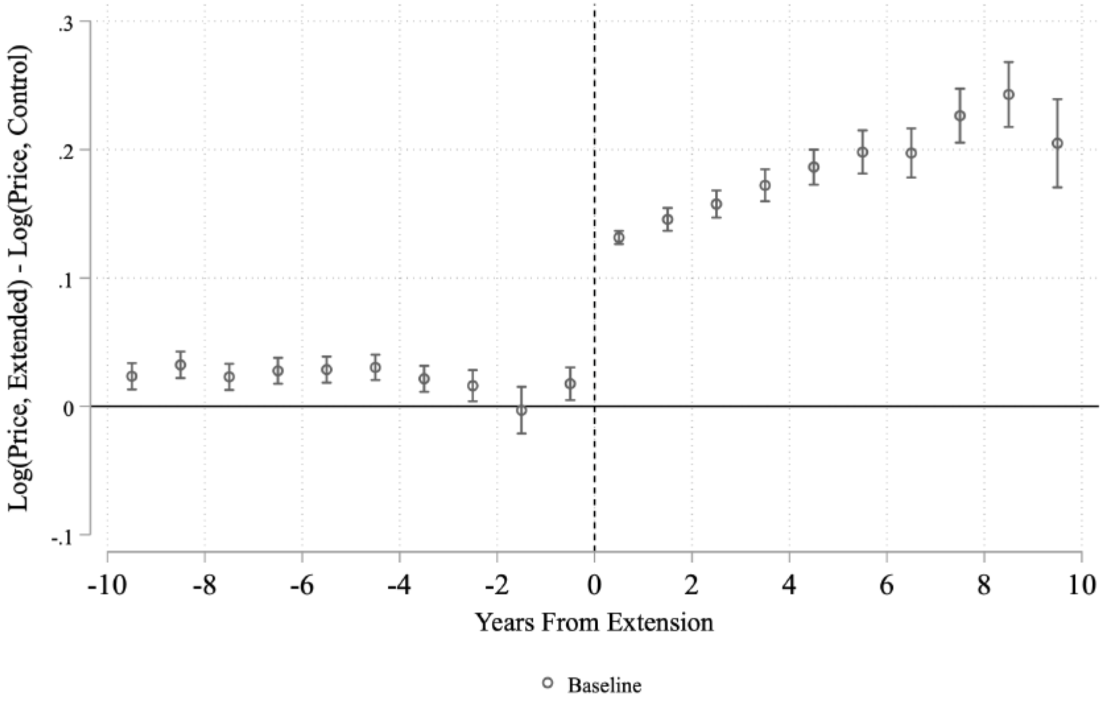
- ✓ Balance test: hedonics vs. treatment Balance Test
- ✓ Placebo: growth in (market) rents + hedonics vs. treatment Hedonics
- ✓ Lack of pre-trends: growth in prices before extension vs. treatment No-Pre Trends
- ✓ Stable coefficients w/ controls

Nonlinear least squares: estimate r^*_{Kt} given (Δ_{it}, T_{it}) from lease extensions

- Time varying estimator of r^*_{Kt} is feasible

Event Study

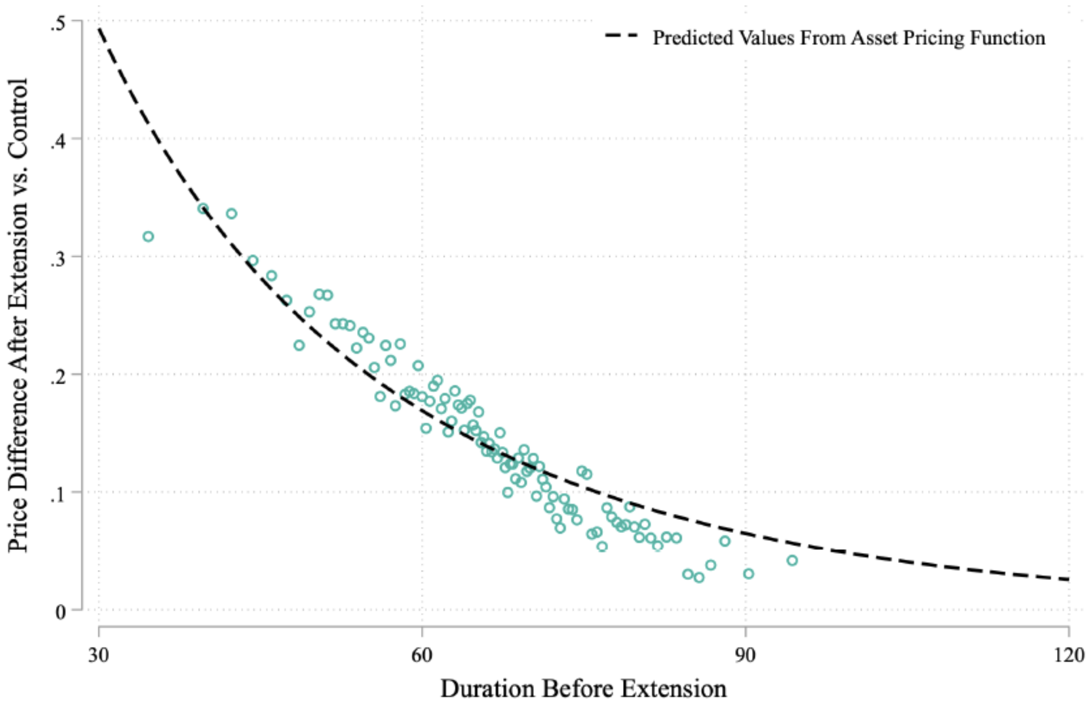
Event Study Plot Over Time & Duration | Lease Term Distribution



90 year extensions

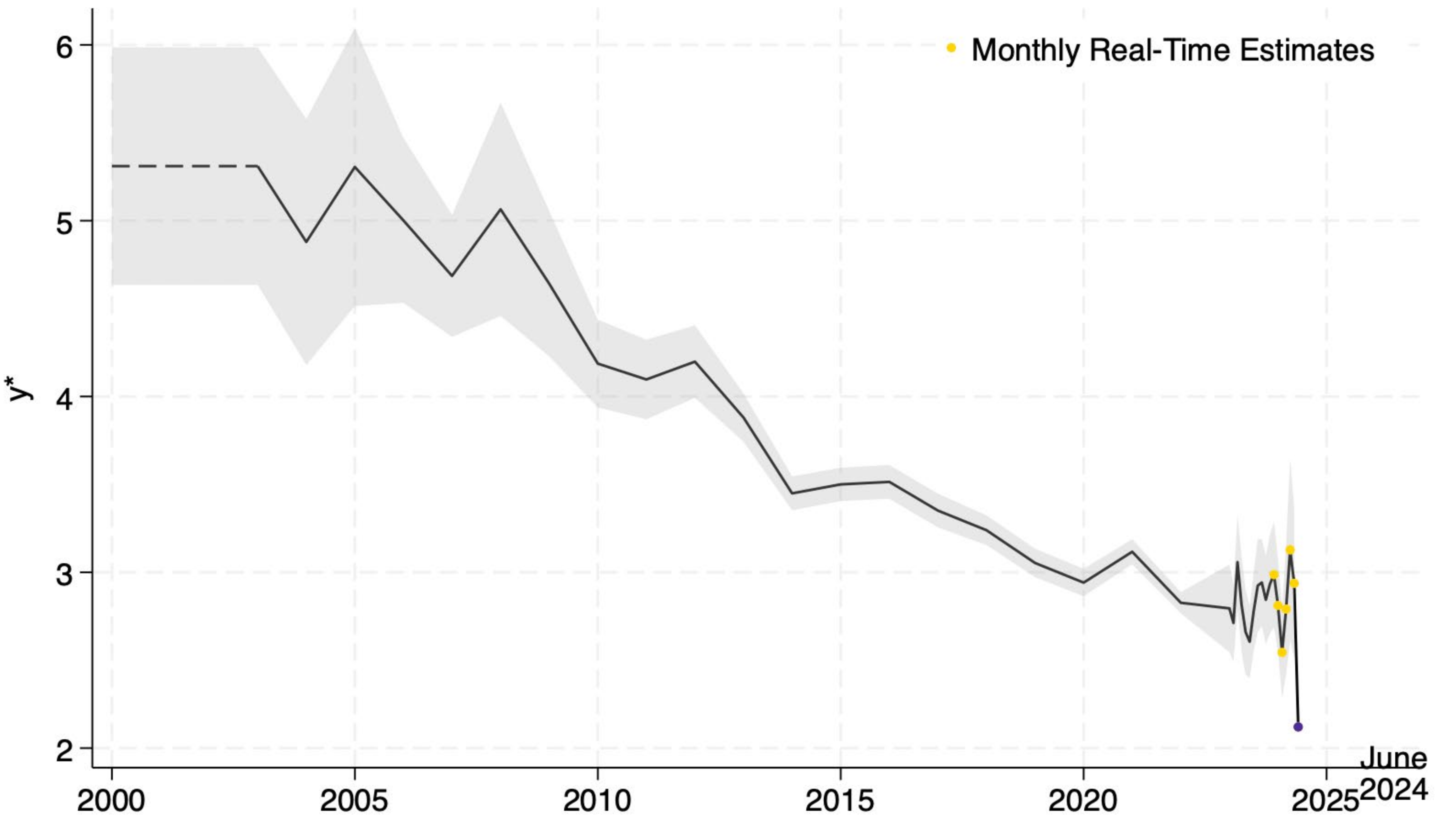
Price change from lease extension helps to identify r^*_{Kt}

Duration Before Extension Predicts Price Change After Extension



Binscatter with 100 bins, 90 year extensions

Model prediction: price gain from extension decreasing in duration before extension (helps to identify r_K^*)



The long-term housing yield declines from around 5% before 2008 to about 2.7% in recent years.

Long-run Macro-Finance

- Today we focused on the "demand side" – how inequality, via consumption-saving decisions, impacts determination of long-run interest rate and debt to GDP, shapes (and constrains) monetary and fiscal policies

- We took the "supply side" as given – but falling rates should be expansive, why has investment not exploded (e.g. see Liu, Mian and Sufi Ectma 2022)? What is the impact on asset prices, and the Q theory of investment?

- What about feedback effects of long-run debt and interest rate to inequality and mobility?

- What are the consequences of long-run credit expansion?