

# Long-run Macro-Finance

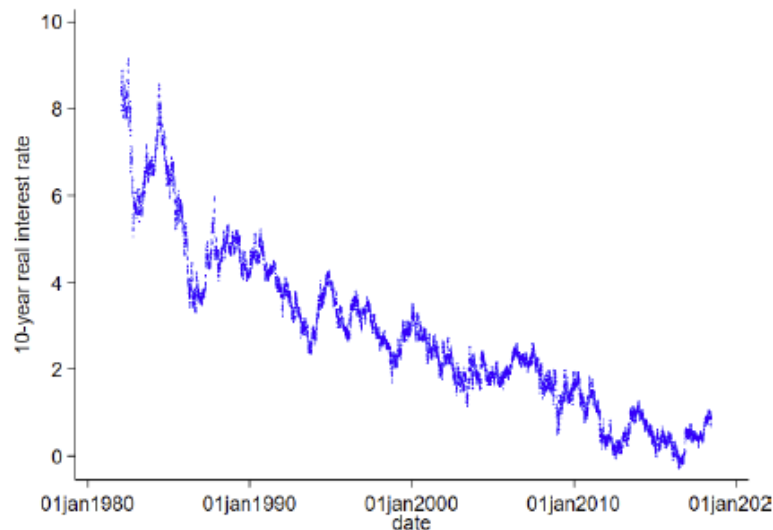
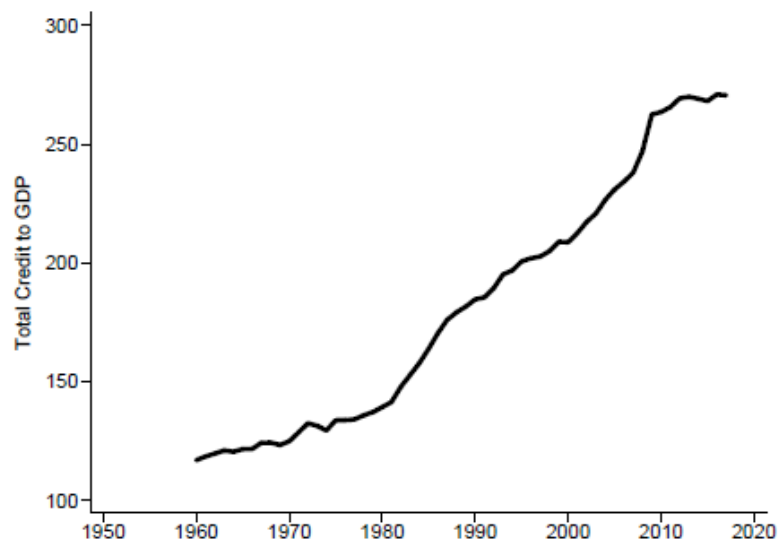
Atif Mian (Princeton University)

Princeton Initiative, 2023

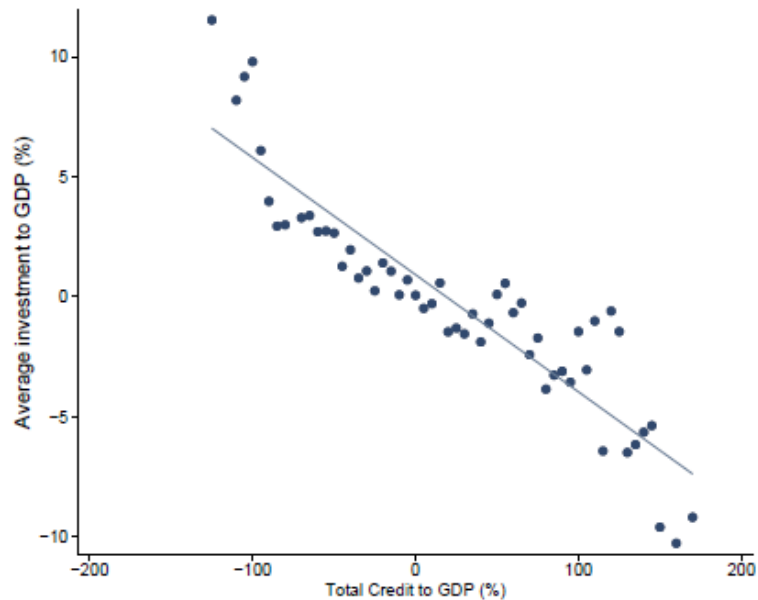


## Macro-Finance and the long-run

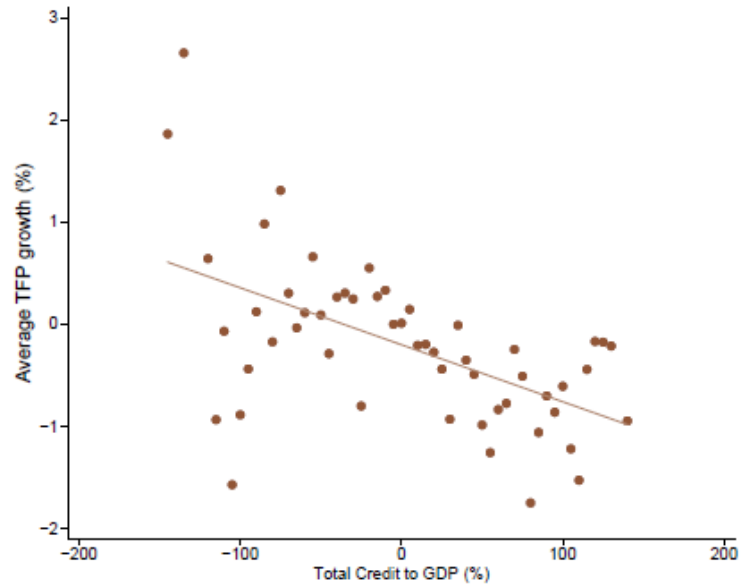
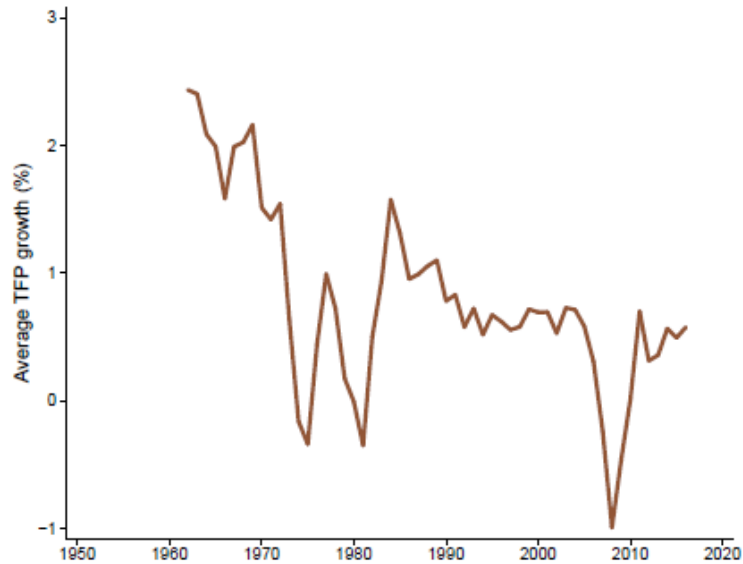
- Huge rise in quantity and large fall in price of credit since about 1980. Why did this happen? What are its consequences?



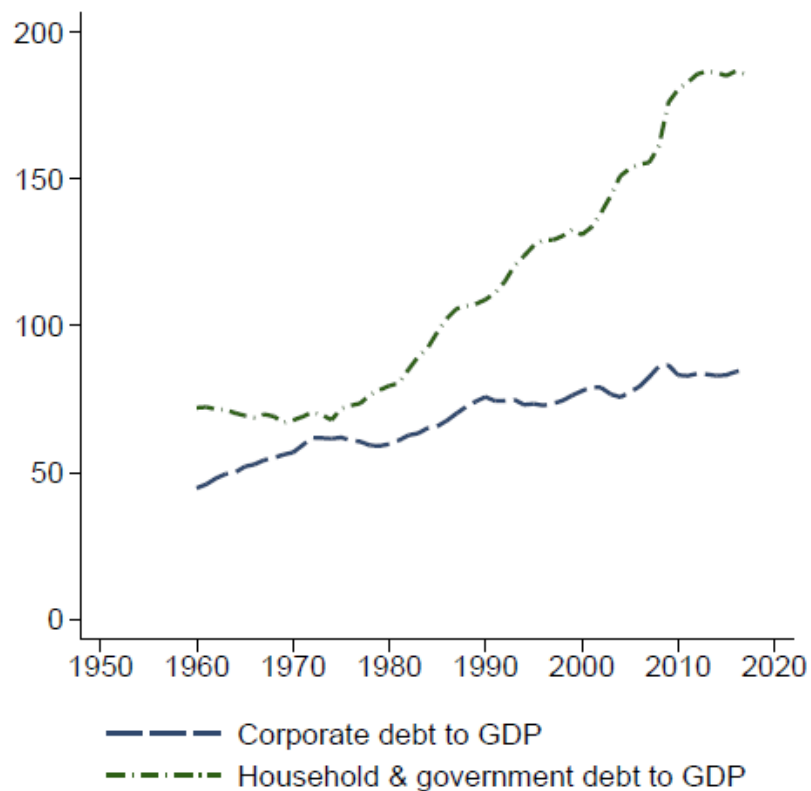
- Is credit financing the supply-side of the economy?



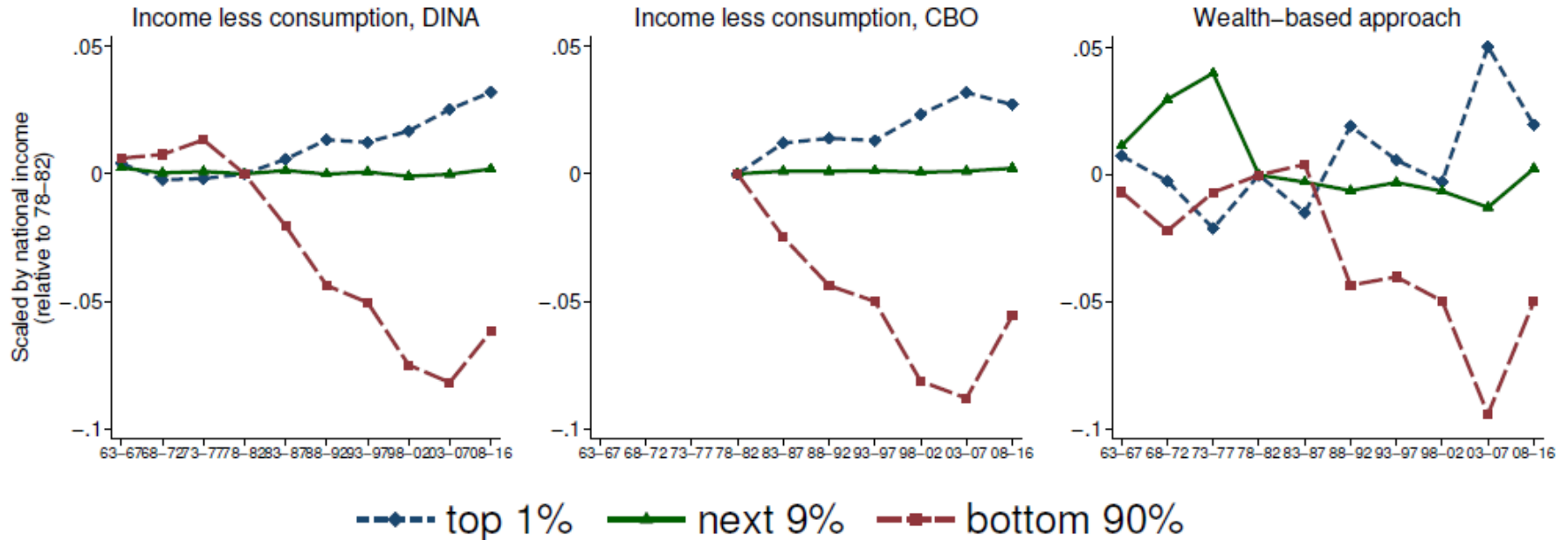
- Is credit financing the supply-side of the economy?



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

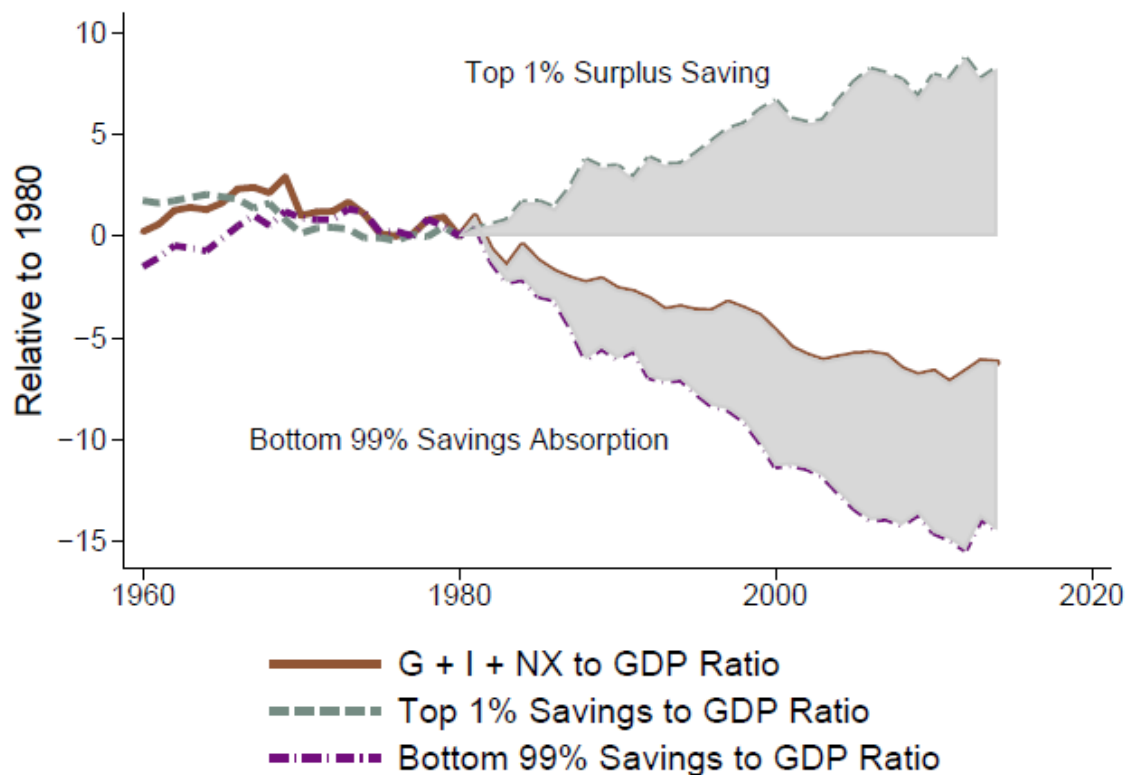


# Where does the saving glut of the rich go?

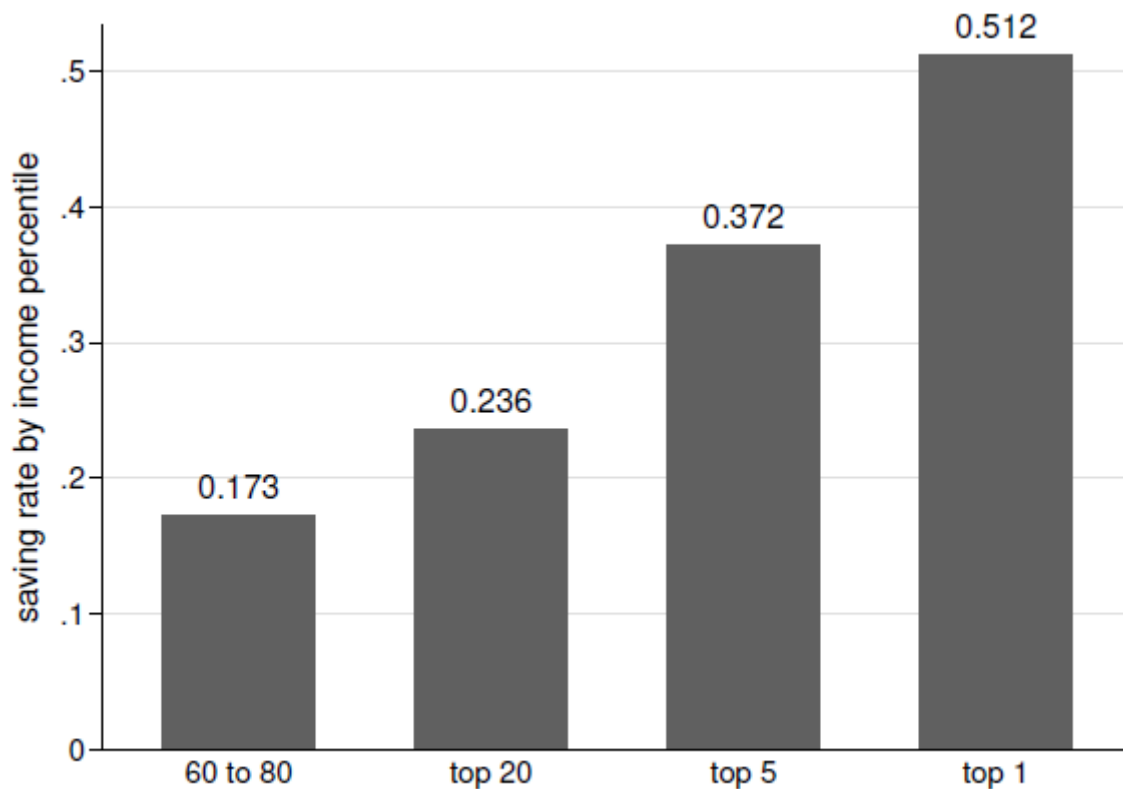


See Mian, Sufi and Straub (“Saving Glut of the Rich”) for formal details

- 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

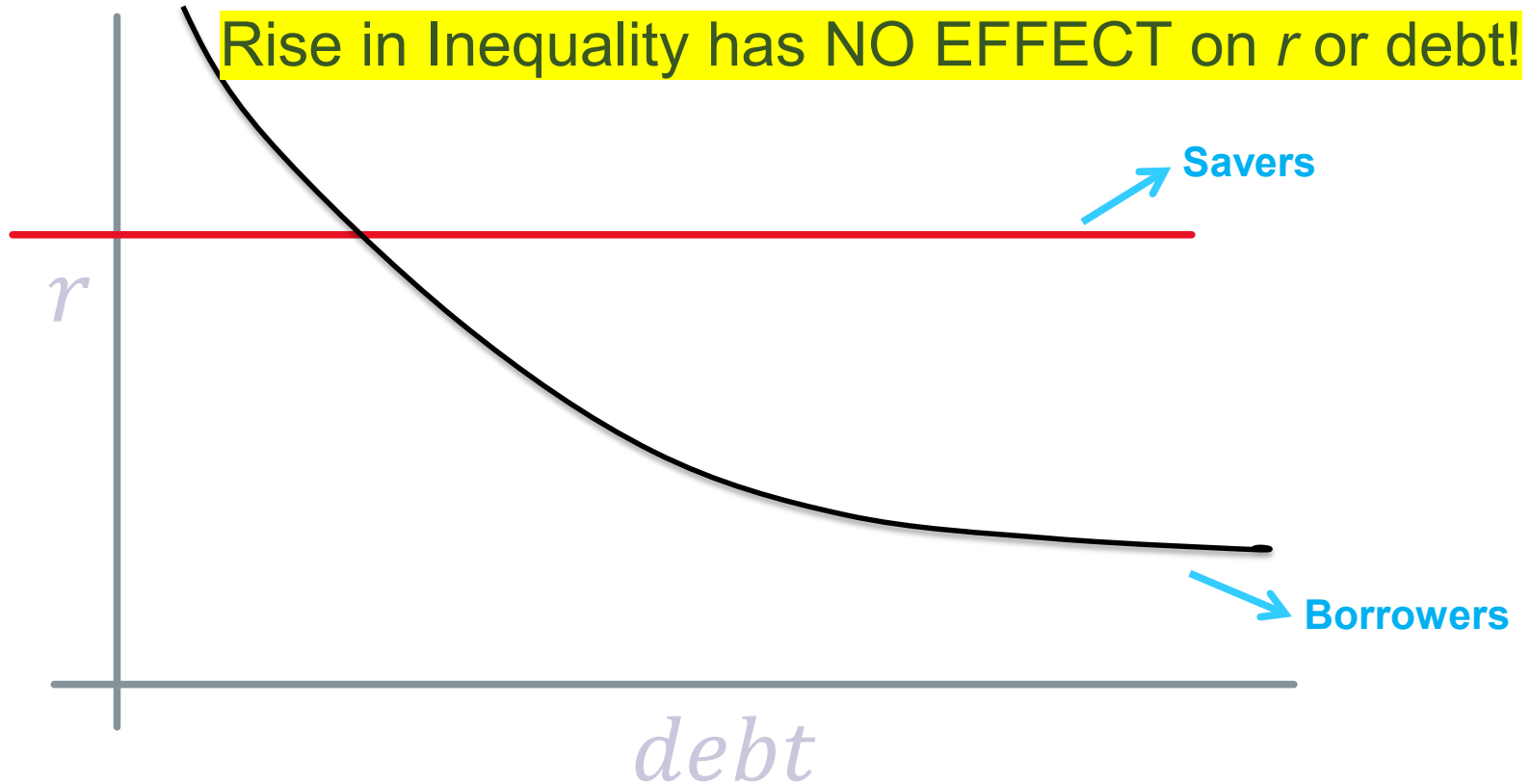
$$\int_0^{\infty} e^{-(\rho+\delta)t} \left\{ \log c_t^i + \frac{\delta}{\rho} \cdot v(a_t^i) \right\} dt$$

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

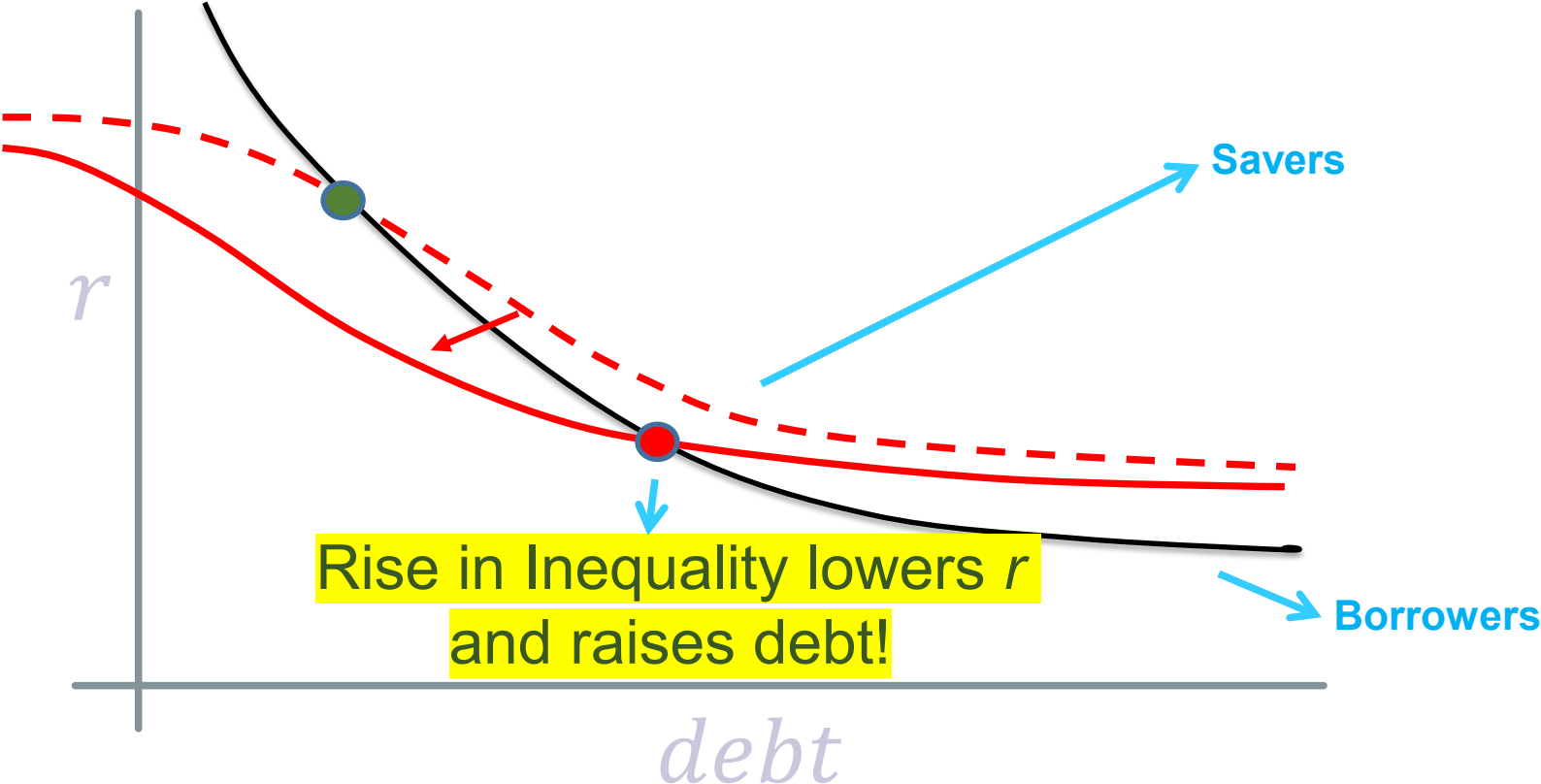
$$r = \rho \cdot \frac{1 + \rho/\delta}{1 + \frac{\rho}{\delta} \cdot av'(a)}$$

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

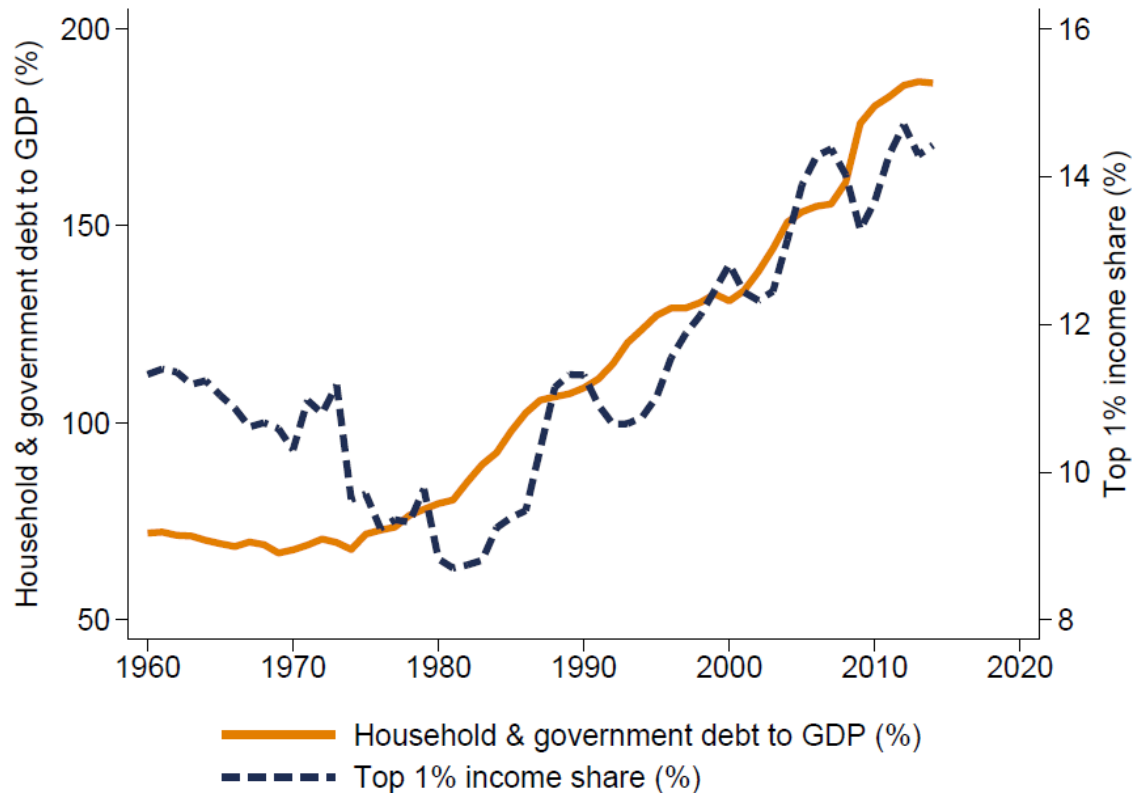
# Standard homothetic models



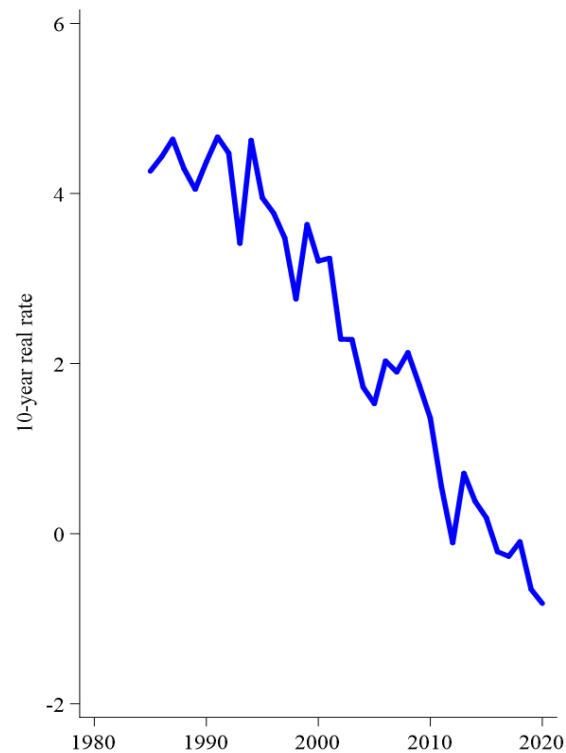
# Indebted Demand model



# 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  $\mu y_t$
- $y_t$  = labor endowment, sold to repr. firm. If rationed,  $y_t < 1$



## Government

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

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

primary deficit:  $z_t \equiv x - \tau_t$

- Monetary dominance, natural rate implemented whenever possible

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

- Simple downward nominal wage rigidity [easily generalized]

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

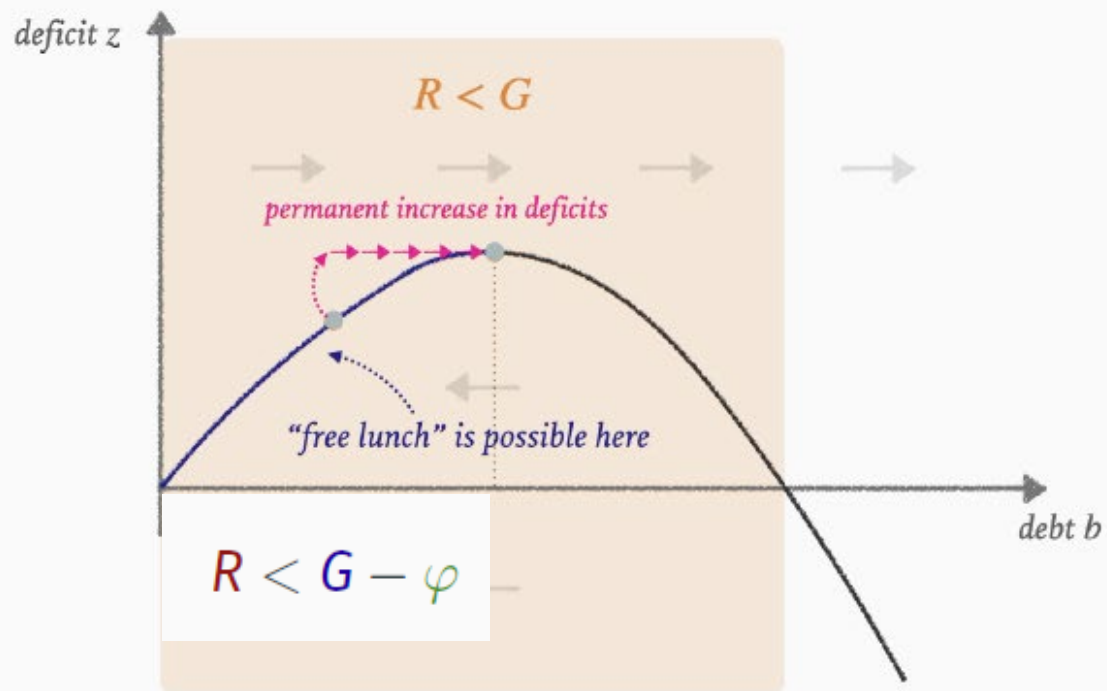
When demand is low,  $y_t < 1$  and  $\pi_t < \pi^*$

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

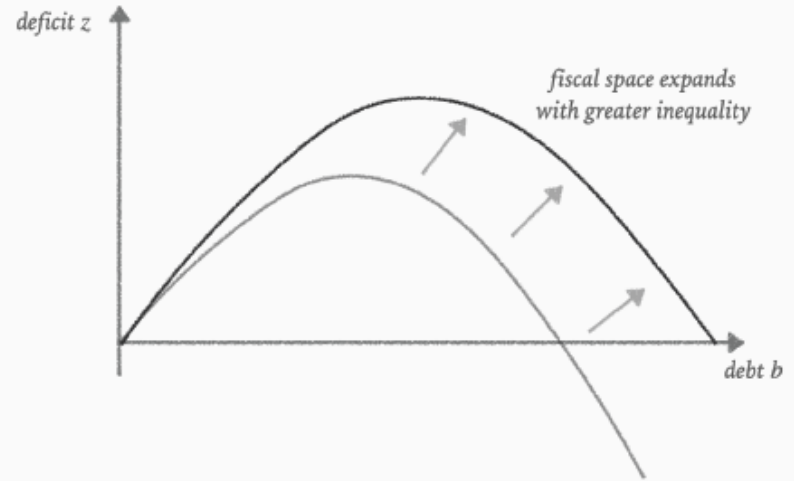
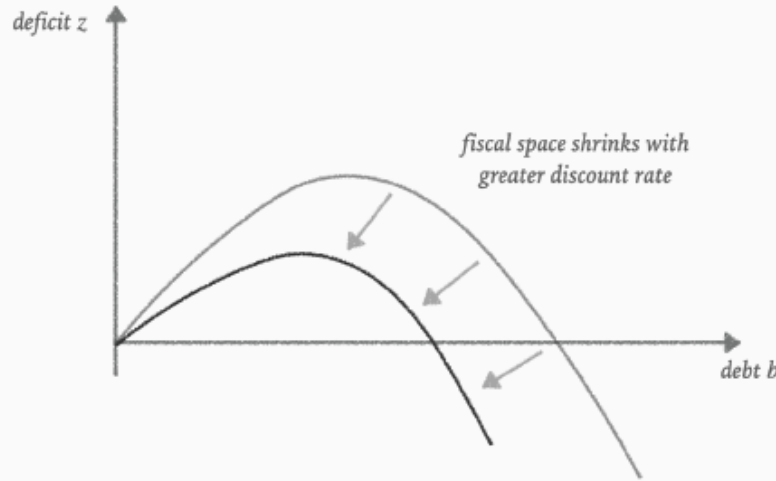
Fiscal space without ZLB

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# Free lunch in the deficit debt diagram



# What determines fiscal space?



- Fiscal space shrinks with greater discount rate  $\rho$ 
  - 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 natural rate of return on capital,  $r_k^*$ , using a natural experiment approach: lease extension experiments in UK  
... precise, no structural assumption, real-time, public data

See Backer-Peral, Hazell and Mian “Measuring The Natural Rate With 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,  $\zeta$  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

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

- ▶ 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  $(\Delta_{it}, T_{it})$  from lease extensions

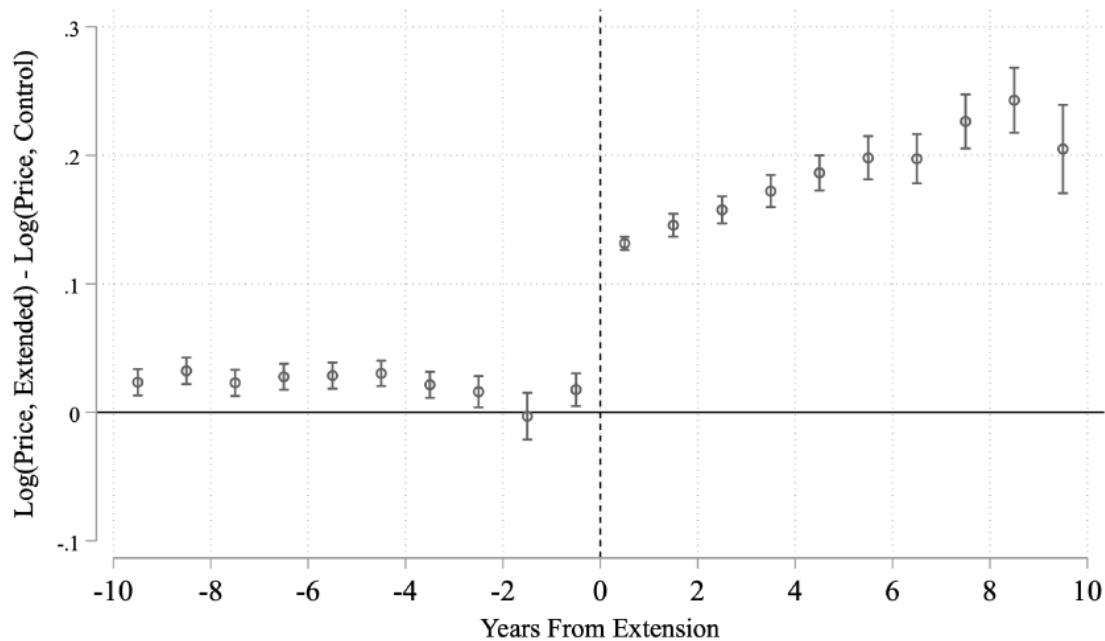
- ▶ Time varying estimator of  $r_{kt}^*$  is feasible



# Event Study

Event Study Plot Over Time & Duration

Lease Term Distribution

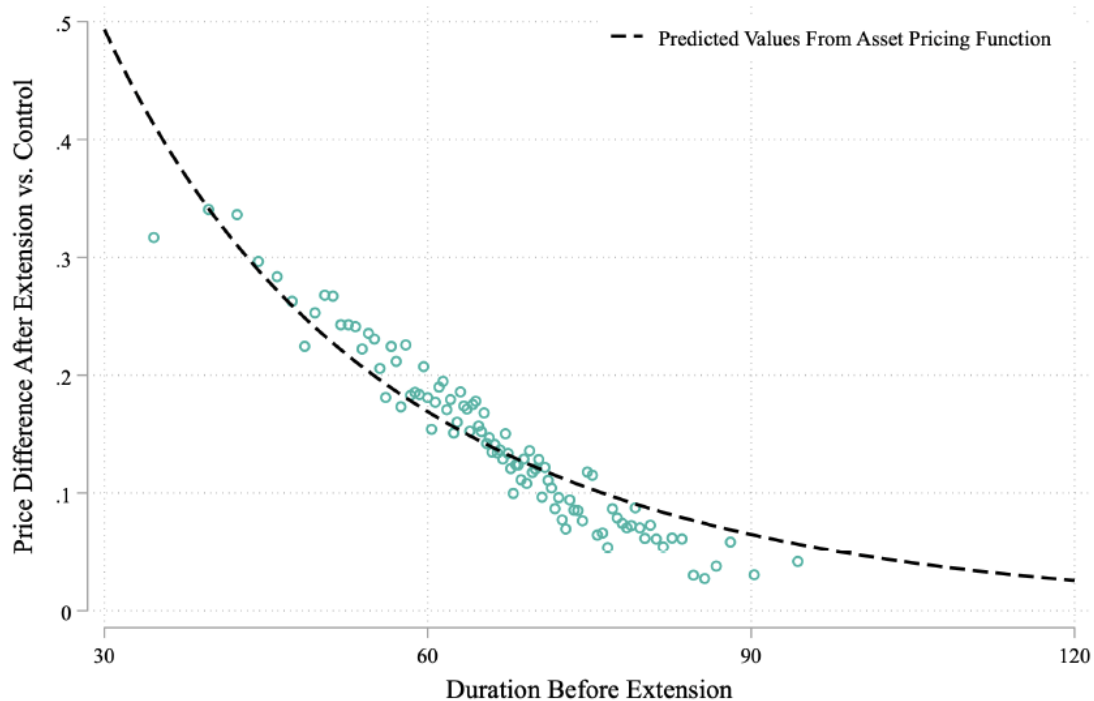


○ Baseline

90 year extensions

Price change from lease extension helps to identify  $r_{Kt}^*$

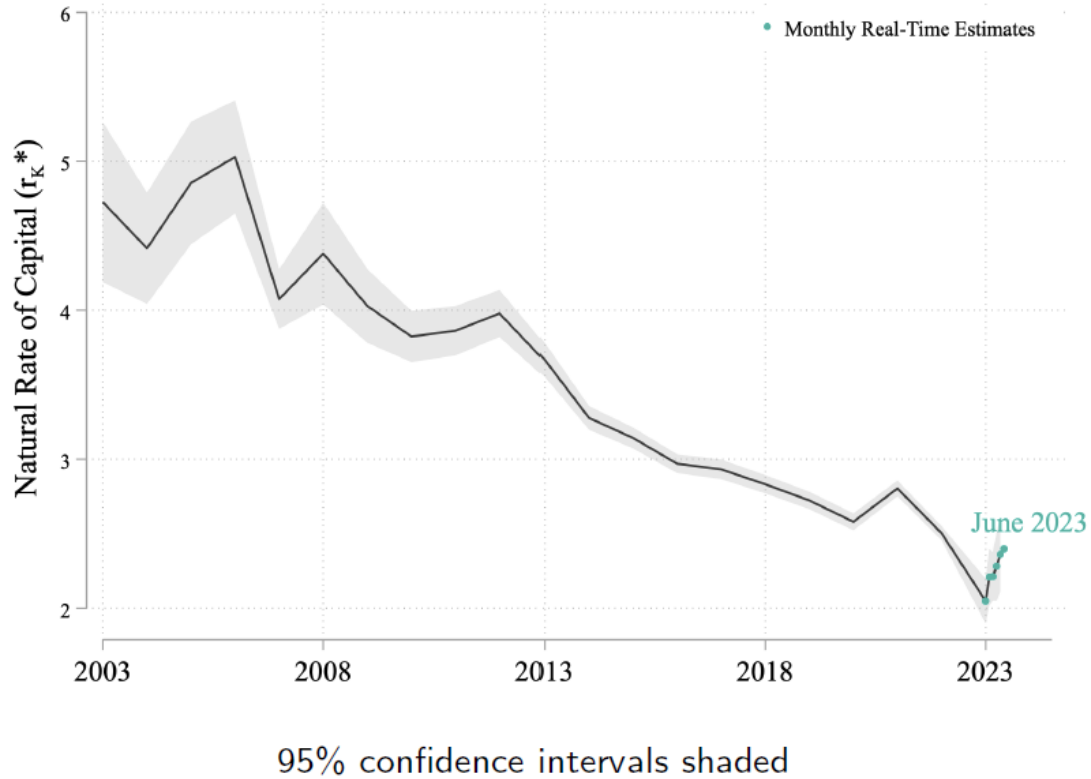
# Duration Before Extension Predicts Price Change After Extension



Binscatter with 100 bins, 90 year extensions

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

# Main Result



Fall of  $r_K^*$  from 4.8% to 2.3%, more than **doubling** of natural price-rent ratio

# 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?

