Inequality in Finance and Macroeconomics

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- "Indebted Demand," Quarterly Journal of Economics, 2021

- "The Saving Glut of the Rich," Working Paper, 2021

- "What Explains the Decline in r*? Rising Income Inequality versus Demographic Shifts," Jackson Hole Economic Symposium Proceedings, 2021

Inequality Matters

- In most macroeconomic models, shifts in the distribution of permanent income are neutral for key macroeconomic aggregates (Straub 2019)

- This ignores the fact that saving rates out of permanent income are higher for the rich

- This agenda explores empirically and theoretically the implications of rising permanent income inequality for the economy

- Key insight: inequality is more than an issue of fairness; inequality matters for key macroeconomic aggregates, financial system, and policy
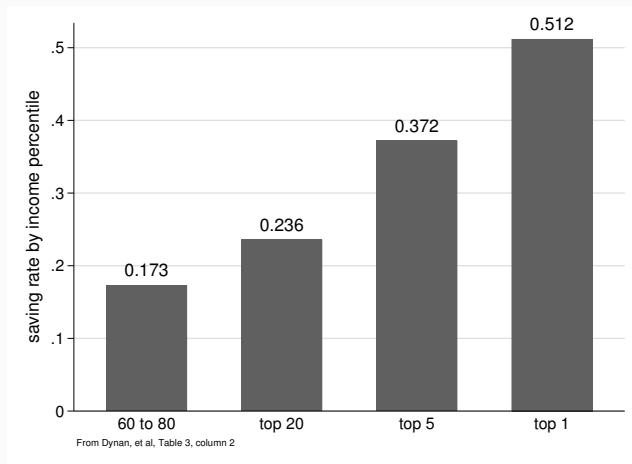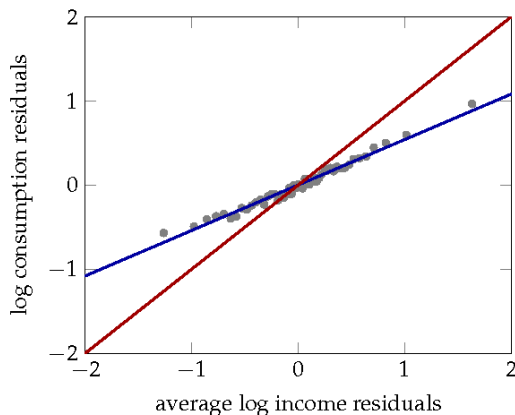
The Global Rise in Top 1% Income Share

Top 1% pre-tax income share across 23 advanced economies, GDP-weighted; Source: WID
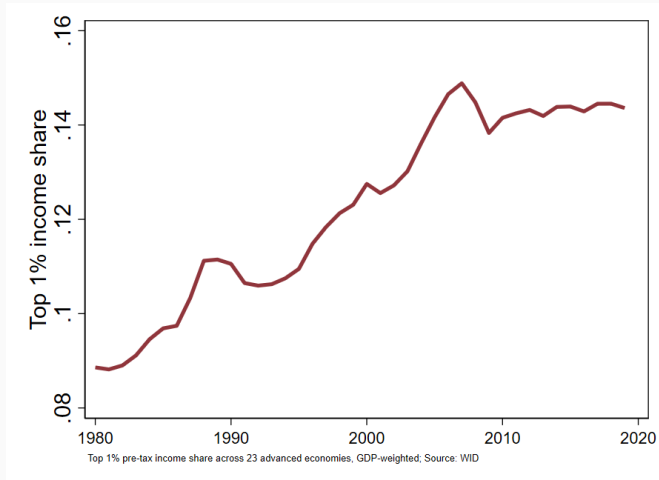
Saving by the Rich

- **Dynan Skinner Zeldes (2004)**: saving rates increase in current income
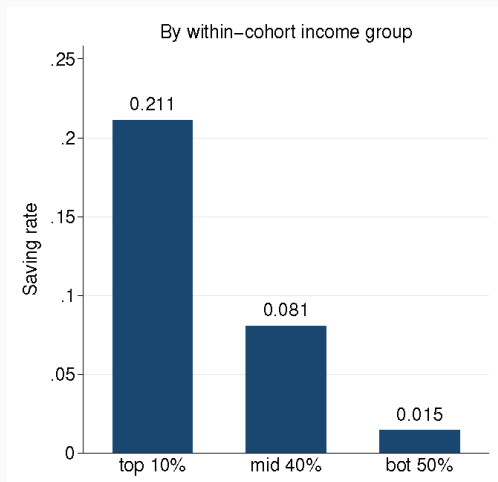

From Dynan, et al, Table 3, column 2

- **Straub (2019):** consumption has elasticity < 1 w.r.t. average income

Figure 3: Consumption and average income.
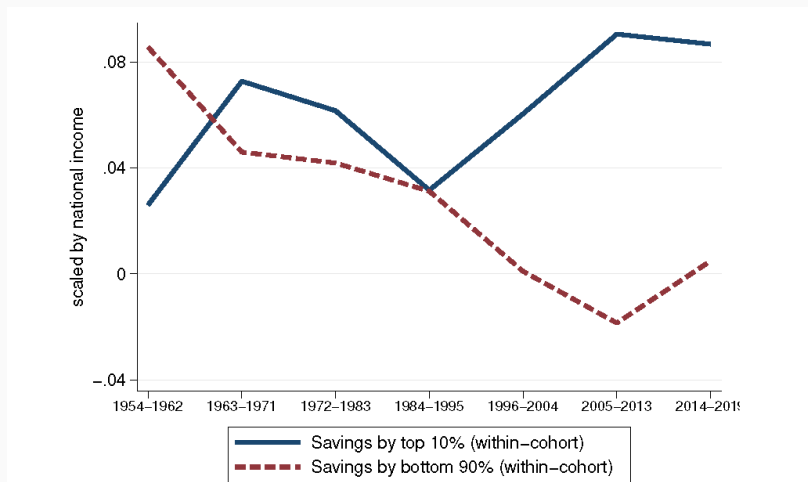
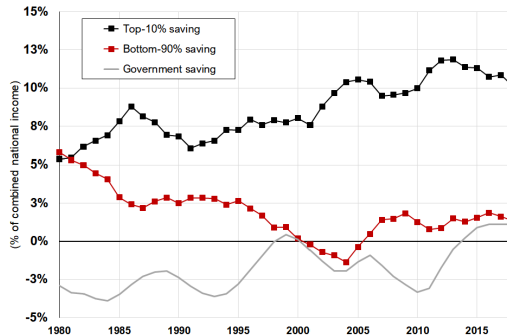- **Mian, Straub, Sufi (2021), Jackson Hole paper**: within-birth cohort saving rate across income distribution

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- **Mian, Straub, Sufi (2021), Jackson Hole paper**: saving coming from top of income distribution

- **Bauluz, Novokmet, Schularick (2022)**: Saving for China, Europe, and USA

Figure 11: **G3 net national saving decomposition, 1980-2018**

Notes: This figure shows the development of the G3 top 10%, bottom 90% and government saving. G3 saving is the combination of top 10%, bottom 90% and government saving in the U.S., China and Europe. G3 saving is scaled by G3 national income. Cross-country combinations use market exchange rates to convert local currencies into US dollars. Series are 5-year moving averages.

- **Mian, Straub, Sufi (2021), The Saving Glut of the Rich**

Figure 7: Net Household Debt across Wealth Distribution Relative to 1982
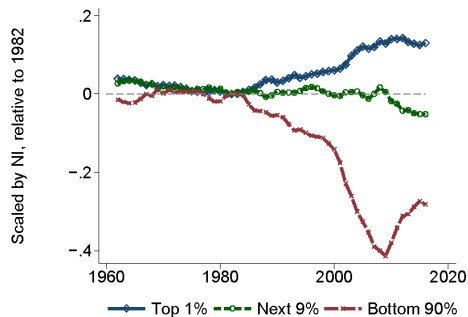
This figure shows net household debt outstanding by the U.S. household sector across the wealth distribution. Net household debt is defined household debt held as a financial asset minus household debt owed as a liability. All series are scaled by national income, and the 1982 level is subtracted.

Model

Model of indebted demand

- Deterministic ∞-horizon endowment economy with real assets ("trees")

- Populated by **two separate dynasties**

- Same preferences, but **different endowments** of trees
  - mass 1 of **borrowers** $i = b$: endowment ω^b
  - mass 1 of **savers** $i = s$: endowment $\omega^s > \omega^b$
  - total endowment $\omega^b + \omega^s = 1$

- Trees are nontradable, **dynasties trade debt contracts**

- Agents within a dynasty die at rate $\delta > 0$, wealth inherited by offspring

Preferences

- Dynasty i consumes c_t^i, owns wealth a_t^i. Preferences:

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

- Budget constraint

$$c_t^i + \dot{a}_t^i \leq r_t a_t^i$$

- $v(a)$ = utility from bequest [future consumption, "status" benefits from wealth, artwork, gifts (to relatives or charities), adjustment frictions in illiquid accounts]

- Key object: $\eta(a) \equiv a v'(a)$ — marginal utility of $v(a)$ **relative to log**

  - **homothetic model:** $\eta(a) = const \Rightarrow v(a) \propto \log a$

  - **non-homothetic model:** $\eta(a)$ increases in a

Borrowing constraint & asset market

- Total wealth = **real asset wealth** net of **debt**

$$a_t^i = \omega^i p_t - d_t^i$$

  where p_t = price of a Lucas tree: $r_t p_t = 1 + \dot{p}_t$

- Agents can pledge ℓ trees each to borrow d_t^i

$$d_t^i \leq p_t \ell$$

  - steady state: $d^i \leq p\ell$ [paper: generalize to $\ell = \ell(\{r_s\}_{s \geq t})$]

- Market clearing $d_t^s + d_t^b = 0$ pins down interest rate r_t

- Focus on **debt of borrowers:** $d_t \equiv d_t^b$ (**state variable**)

Equilibria & indebted demand

- Savers' Euler equation

$$\frac{\dot{c}_t^s}{c_t^s} = r_t - \rho - \delta + \delta \frac{c_t^s}{\rho a_t^s} \cdot \eta(a_t^s)$$

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- Setting $\dot{c} = 0$ in Euler and use $c^s = ra^s \Rightarrow$

$$r = \rho \cdot \frac{1 + \rho/\delta}{1 + \rho/\delta \cdot \eta(a^s)}$$
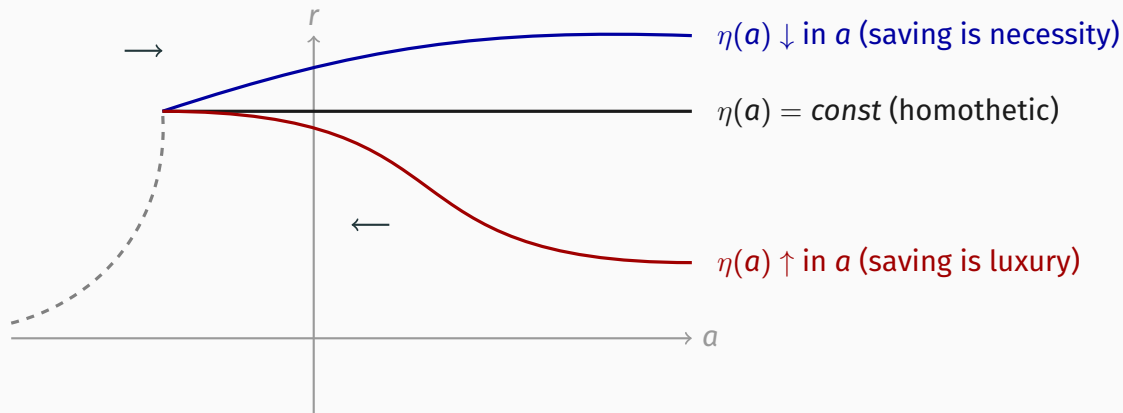
Saving supply curves

- Savers' Euler equation

$$\frac{\dot{c}_t^s}{c_t^s} = r_t - \rho - \delta + \delta \frac{c_t^s}{\rho a_t^s} \cdot \eta(a_t^s)$$

- Setting $\dot{c} = 0$ in Euler and use $c^s = ra^s \Rightarrow$

$$r = \rho \cdot \frac{1 + \rho/\delta}{1 + \rho/\delta \cdot \eta(a^s)}$$

- This is a **long-run saving supply curve:**
    - r necessary for which saver keeps wealth constant at a^s

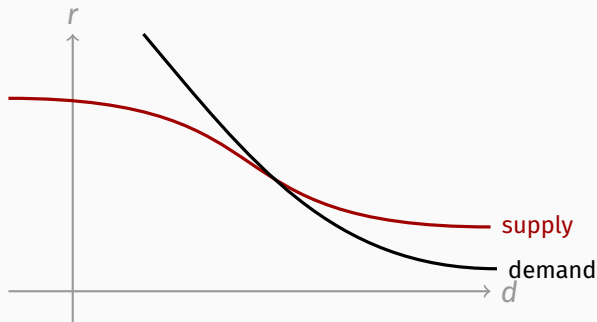- $\eta(a^s)$ determines the shape of the saving supply curve

- If $\eta(a^s)$ increasing: **larger wealth** a^s requires **lower return on wealth** r for saver to be indifferent about saving!

- **Steady state:** intersect long-run **supply curve** with **debt demand curve**

$$r = \rho \cdot \frac{1 + \rho/\delta}{1 + \rho/\delta \cdot \eta(\omega^s/r + d)} \qquad\qquad d = \frac{\ell}{r}$$

Indebted demand

- Start from a steady state & **raise debt service costs** by some dx

- What is **response of aggregate spending**? (partial equilibrium, r fixed)

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- What is **response of aggregate spending**? (partial equilibrium, *r* fixed)
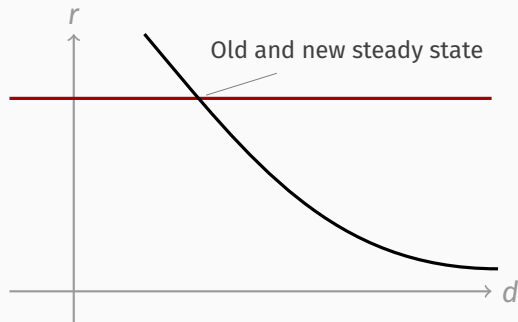
$$dC = dc^s + dc^b = -\frac{\rho + \delta}{r}\frac{1}{2}\left(1 - \sqrt{1 - 4\left(1 - \frac{r}{\rho + \delta}\right)\frac{\eta'(a)a}{\eta(a)}}\right) dx$$
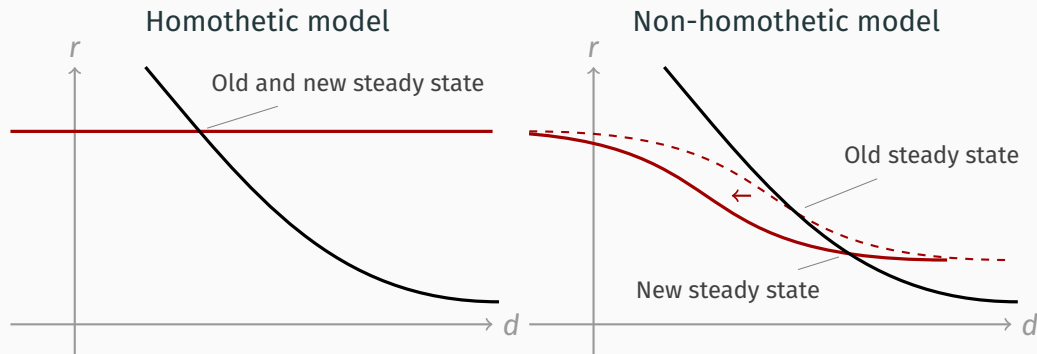
$\Rightarrow$ Thus increase in debt service costs weighs on aggregate demand

- *dC* < 0 if $\eta' > 0$

- Call this phenomenon **"indebted demand"**

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Inequality & financial liberalization

Homothetic model

Old and new steady state
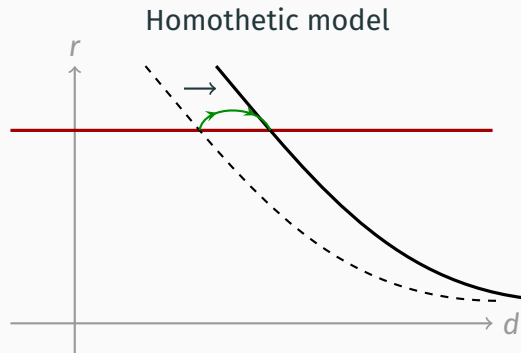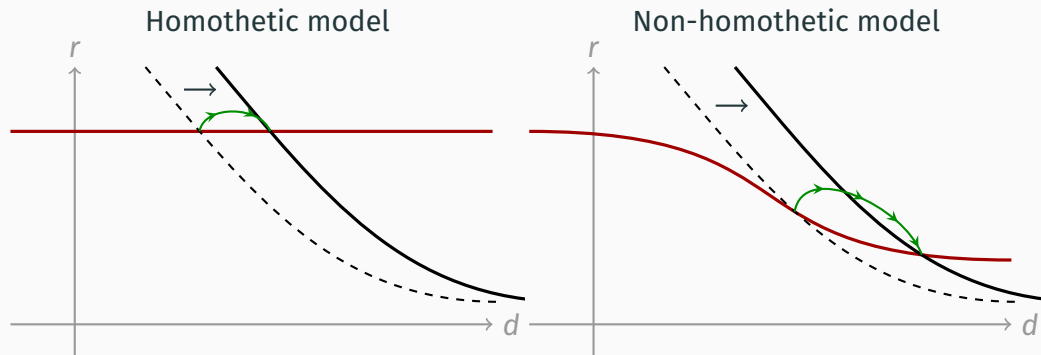
Homothetic model — Non-homothetic model

- **Effects** of rising inequality $\omega^s \uparrow$ in non-homothetic model:

  1. inequality $\uparrow \Rightarrow$ more saving by the rich $\Rightarrow r \downarrow \Rightarrow$ debt $\uparrow$
  2. debt $\uparrow$ first **raises** demand, pushing against decline in r
  3. high debt eventually **lowers** demand, aggravating decline in r

Homothetic model

Homothetic model   Non-homothetic model

- **Mechanism** in non-homothetic model:

    1. **raises debt & demand**, pushing r up (short-run saving supply slopes up)
    2. ultimately **high debt weighs on demand**, lowering r, **stimulating further debt**!
    $\rightarrow$ resolves puzzle in literature   [e.g. Justiniano Primiceri Tambalotti]

Monetary policy

Introducing monetary policy

- Introduce monetary policy as in Werning (2015)

- Assume both agents supply labor L^i, separable disutility

- Actual output $\hat{Y} \neq$ "potential" $Y = 1$

$$\hat{Y} = (L^b)^{\omega^b}(L^s)^{\omega^s}$$

- Nominal wage rigidity, flexible prices $\rightarrow$ income shares still ω^i

- Central bank sets real rate r_t directly

- Define $r_t^n \equiv$ natural interest rate path, achieving $\hat{Y}_t = Y$

Monetary policy has limited ammunition

- Begin in steady state with r. Consider following monetary stimulus:

$$r_t = \begin{cases} \hat{r} < r & t < T \\ r_t^n & t \geq T \end{cases}$$

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- **Result:**
  - stimulus generates demand partly by pulling forward spending, **raising debt**
  - indebted demand $\Rightarrow$ reduces **natural interest rates** r_t^n
  - effects are stronger if non-homotheticity $\frac{\eta'(a)a}{\eta(a)}$ is larger, T is longer

- **Natural rate** = **ammunition of monetary policy** (proximity to ZLB)
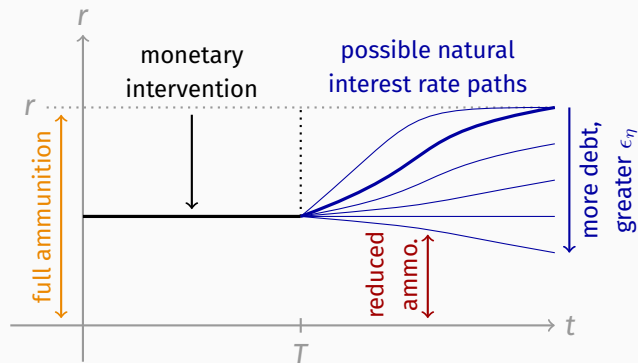
Expansionary monetary policy traps the policy-maker!

- **WSJ**: "borrowing helped pull countries out of recession but made it harder for policy makers to raise rates"

- **Mark Carney**: "the sustainability of debt burdens depends on interest rates remaining low"

- **Philip Lowe**: "if interest rates were to rise … many consumers might have to severely curtail their spending to keep up their repayments."
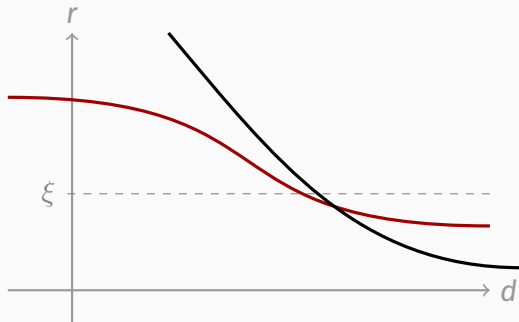
Debt trap

Introducing the lower bound

- Consider lower bound $\underline{r}$ on interest rate r
  - $\underline{r} > 0$ if r is return on wealth

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- What happens if the steady state natural rate falls below $\underline{r}$?

The debt trap ($\equiv$ a debt-driven liquidity trap)

- **Result:** if natural rate $< \underline{r}$, get **stable** liquidity trap steady state: **"debt trap"**

  $\rightarrow$ **Output persistently below potential**

  $$\hat{Y} = Y \frac{\underline{r}}{\omega^s + \ell} \cdot \left[\eta^{-1} \left(\frac{\rho}{\underline{r}} \left(1 + \rho/\delta \right) - \rho/\delta \right) \right] < Y$$

- Liquidity trap more likely if

  - income inequality ω^s is high

  - pledgability ℓ high

Policies to escape the debt trap

- Output in debt trap is

$$\hat{Y} = Y \frac{r}{\omega^s + \ell} \cdot \left[\eta^{-1} \left(\frac{\rho}{\underline{r}} \left(1 + \rho/\delta \right) - \rho/\delta \right) \right] < Y$$

- Debt jubilee? Government bailout of borrower? Only if combined with limits on future borrowing!
- **Redistributive income taxes** or **a wealth tax** on saver's wealth can by particularly effective
- Shown in paper: a wealth tax boosts output, increasing borrower welfare while leaving saver indifferent

Indebted demand post-Covid

Inflation, interest rates, and inequality

- Inflationary environment characterized by strong after-tax and transfer income growth of the non-rich

- Spending growth in response to stimulus also stronger for the non-rich

- A key question: are changes in income patterns temporary or permanent?

- Our framework: this is key question for long run interest rates

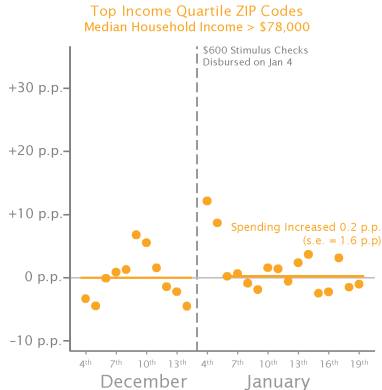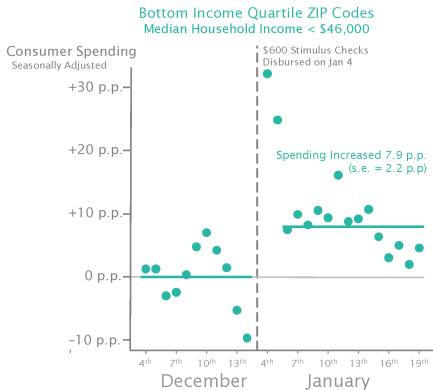# After-tax real income growth, by income group

- **From "Realtime Inequality", Blanchet, Saez, Zucman 2022**
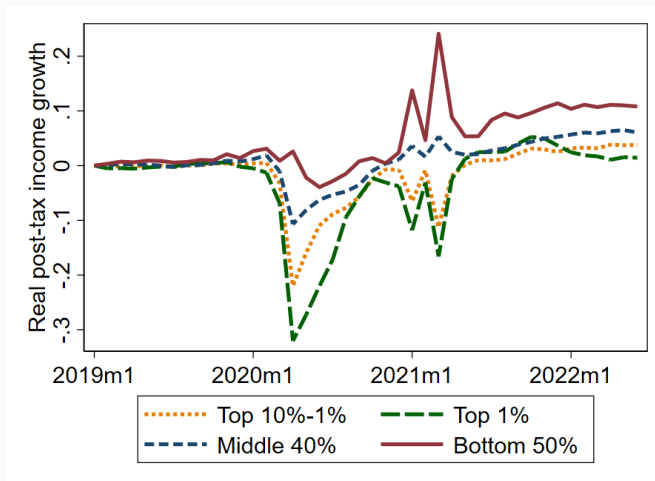
Spending response to stimulus

- **From OI Economic Tracker; Chetty, Friedman, Hendren, and Stepner 2022**

Effect of the **January 2021** Stimulus Checks on Daily Consumer Spending

Conclusion

- **Inequality matters**
  - For debt levels, interest rates, and output
  - Macroeconomic models and models of the financial systerm should recognize and incorporate importance of inequality
- **Looking forward**
  - Will we be back in a secular stagnation type equilbrium in medium to long run?
  - Focus on evolution of inequality in permanent income!