

# Macroeconomics and Inequality

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Princeton and CEBI, IFS, IZA, CEPR, NBER

Vilfredo Pareto Lecture

Collegio Carlo Alberto, June 17th, 2021

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Based on joint work with Greg Kaplan and Ben Moll

# Main Takeaway and Plan for the Talk

- Relation between macroeconomics and inequality is a **two-way street**

macroeconomics  $\iff$  inequality

- Macroeconomic shocks affect inequality
- Inequality affects the evolution of macroeconomic aggregates
- Only last generation of macro models features  $\iff$

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- Inequality affects the evolution of macroeconomic aggregates
- Only last generation of macro models features  $\iff$
- **Plan:**
  1. Brief history of macro
  2. 3rd gen theories: **distributional macroeconomics**
  3. Three examples of 3rd gen macro theory at work

# Macroeconomics: A Definition

- Theory and empirical measurement of growth and business cycles
- **Growth:** long-run determinants of the economic prosperity of nations
- **Business cycles:** short-run fluctuations in aggregate economic activity

# Macroeconomics: A Definition

- Theory and empirical measurement of growth and business cycles
- **Growth**: long-run determinants of the economic prosperity of nations
- **Business cycles**: short-run fluctuations in aggregate economic activity
- NBER: Economic Fluctuations and Growth
- CEPR: (i) Growth & (ii) Monetary Economics and Fluctuations
- No *explicit* mention of the **income distribution**: heritage of the past
- Today: vibrant research program on inequality in macro
- Long journey to get to this point

# Inequality in Macro: A Brief History of Thought

- Four stages:
  - Pre-modern macro: before 1970
  - 1st generation modern macro: 1970-1990
  - 2nd generation modern macro: 1990-2010
  - 3rd generation modern macro: post 2010
- Subjective and, necessarily, partial narrative
- Focused on business cycles + household heterogeneity

# Pre-Modern Macro and the Transition

- Macroeconomics was born as a distinct field in the 1940's, as a part of the intellectual response to the Great Depression
- Keynes, Hicks and Tobin wanted to understand crises and offer a cure
- Tobin's definition of macroeconomics: *A subject that attains workable approximations by ignoring the effects on aggregates of distributions of income and wealth*

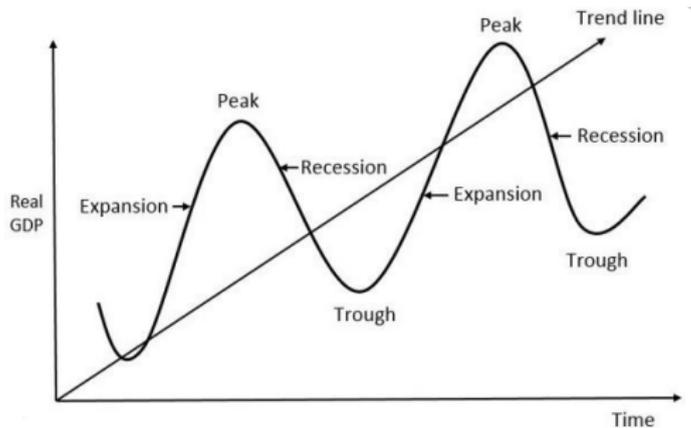
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- Tobin's definition of macroeconomics: *A subject that attains workable approximations by **ignoring** the effects on aggregates of distributions of income and wealth*
- In 1970s Lucas, Prescott, Sargent and Wallace **reoriented the discipline**:
  1. **Dynamic, stochastic, and general equilibrium** (Sargent-Wallace 1974)
  2. **Microfounded** (Lucas 1976)
  3. **Quantitative** (Kydland-Prescott 1982)
- But they did not criticize the **absence of distributional considerations**

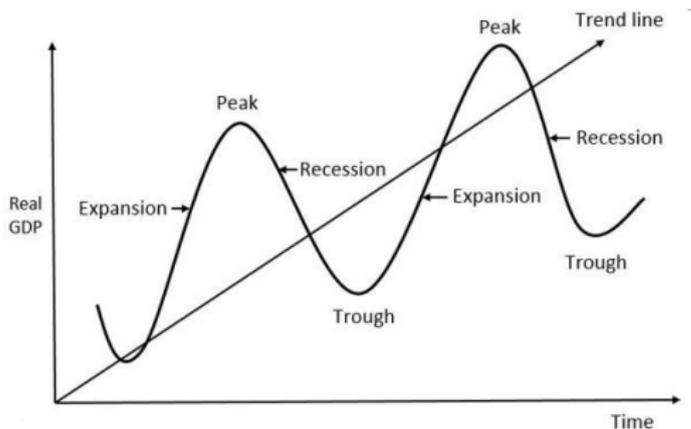
# First generation of modern macro: 1970-1990

- **Representative agent** models (RBC vs New Keynesian)
- Key ingredient: aggregation through **complete markets**
- Aggregate macroeconomic dynamics are independent of the distribution
- Trivial heterogeneity: **no mobility** within distribution
  - **OLG** as the framework with non-trivial heterogeneity and deviations from complete markets
- Stochastic equilibrium is a vector of **time series** ( $Y_t, C_t, I_t, \dots$ )

# Welfare Costs of Business Cycles in 1st Gen Models



# Welfare Costs of Business Cycles in 1st Gen Models



- Welfare cost of business cycles is *one-half of one tenth of a percent*

$$\omega \simeq \frac{1}{2} \gamma \sigma^2 = \frac{1}{2} \cdot 1 \cdot (0.032)^2 = 0.0005,$$

- Representative agent would be **willing to pay \$25 to avoid a recession**

## Quick Detour: Empirical Micro in the Meantime

- **Heterogeneity** was at the heart of the research program in empirical micro:
  1. McFadden (1974): discrete choice under preference heterogeneity
  2. Heckman (1979): selection on unobservables in a cross-section
  3. Abowd-Card (1989): longitudinal individual income dynamics
  4. Attanasio-Davis (1996): empirical rejection of complete markets

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  4. Attanasio-Davis (1996): empirical rejection of complete markets
- Browning-Hansen-Heckman (Micro data and general equilibrium models, Handbook of Macroeconomics, 1999): *This chapter explores challenges for closing the gap between empirical microeconomics and dynamic macroeconomic theory*
- Macro's microfoundation had **weak underpinnings** to micro data
- Representative agent assumption **separated** macro from micro research

## Second generation of macro theories: 1990-2010

- Imrohoroğlu, Huggett, Aiyagari, Rios-Rull, Krusell-Smith, ...
- Key ingredient: **market incompleteness**
  1. Idiosyncratic income shocks
  2. Risk-free asset + borrowing constraints
- Partial pass-through of individual shocks to consumption
- Equilibrium **distribution of income and wealth + social mobility**
- Stochastic equilibrium is a **law of motion for the distribution**

$$\mu' = G(\mu; Z, \tau)$$

# Which Theory of the Wealth Distribution?

- A theory of the wealth distribution that Pareto would have liked



- V. Pareto, *La Courbe des Revenues* (1896):

## **957. Répartition de la richesse.**

La répartition de la richesse peut dépendre de la nature des hommes dont se compose la société, de l'organisation de celle-ci, et aussi, en partie, du *hasard*

- Endowments, institutions and luck all feature prominently in these models

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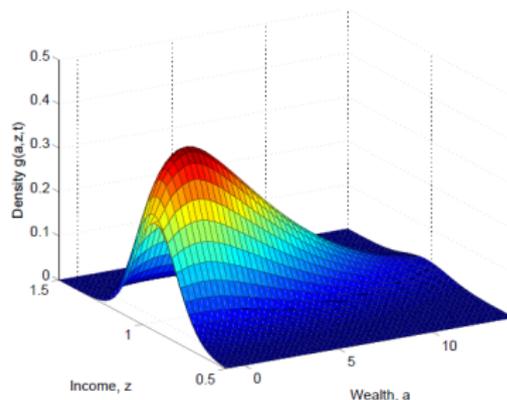
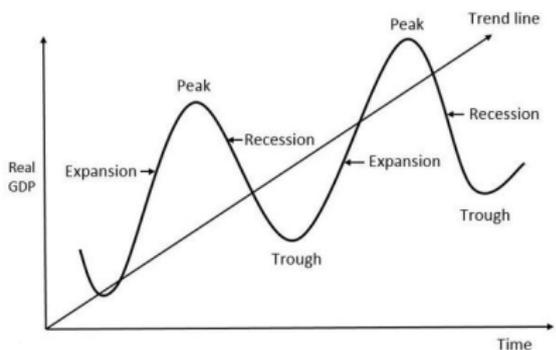
- Endowments, institutions and luck all feature prominently in these models
- Large literature on how to generate a [Pareto tail](#) in wealth distribution

# Welfare Cost of Business Cycles in 2nd Gen Models

- Deaton (Nobel lecture 2016): *While we often must focus on aggregates for macroeconomic policy, it is impossible to think coherently about national well-being while ignoring inequality and poverty, neither of which is visible in aggregate data*
- Welfare costs of recessions revisited:
  1. Amplification: countercyclical uninsurable earnings risk
  2. Connect to empirical micro literature on earnings losses of displaced workers (Jacobson, LaLonde, and Sullivan, 1993)
- Costs of recessions can be 1,000 times bigger for some workers
- Stabilization policy has differential effects across workers

# Scope of Second Generation Macro Theories

- **Quantitative analysis** of distributional effects of aggregate shocks, policy reforms, demographic changes, etc...
- **Strong microfoundation**: micro data used to parameterize individual income dynamics, labor supply elasticities, tax/transfer systems, ...



macroeconomy  $\implies$  distribution of outcomes

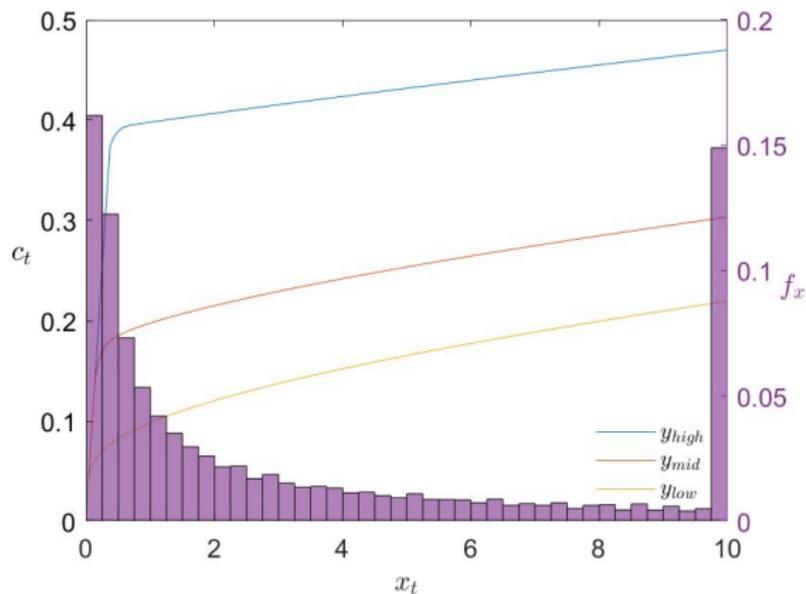
# Second Generation of Macro Theories

- How about: inequality  $\implies$  macroeconomy?

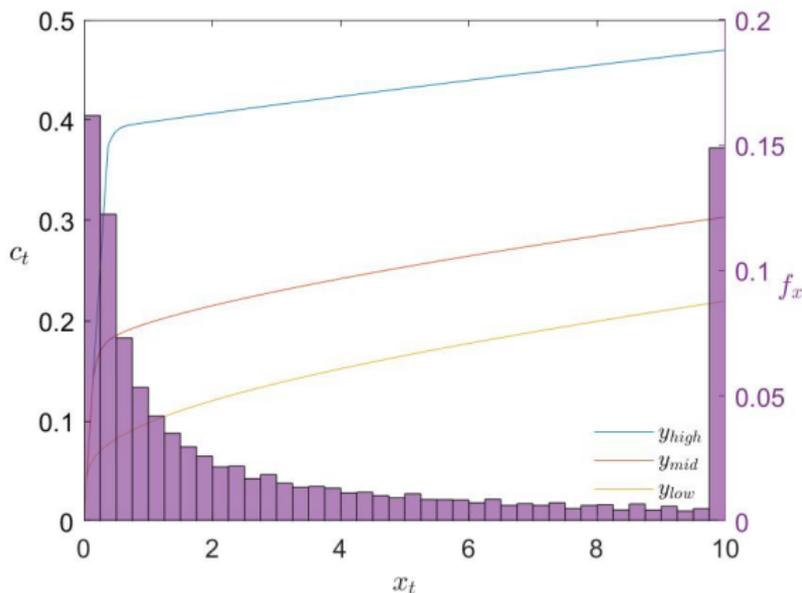
# Second Generation of Macro Theories

- How about: inequality  $\implies$  macroeconomy?
- No impact of the distribution for macroeconomic dynamics
- **Approximate aggregation** (Krusell-Smith 1998): *Our main finding is that, in the stationary stochastic equilibrium, the behavior of the macroeconomic aggregates can be almost perfectly described using only the **mean of the wealth distribution**.*
- Summary by Lucas (2003): *For individual behavior and welfare, of course, heterogeneity is everything. [But] for determining the behavior of aggregates, realistically modeled household heterogeneity just does not matter very much.*
- This result injected new blood into RA approach to business cycles

# Why Approximate Aggregation?



# Why Approximate Aggregation?



- Nonlinearity only for constrained: few and poor
- All that matters is the **mean**

# Third Generation of Macro Theories: 2010-

- Why 2nd gen models fail in generating: inequality  $\Rightarrow$  macro?
  1. Rich are a **scaled-up** version of the poor (homotheticity)
  2. Consumption behavior **at odds with the data** (MPC way too small)
  3. Only **ex-post heterogeneity** across individuals (from history of shocks)
- Third gen models address these shortcoming
- Coming up: three examples

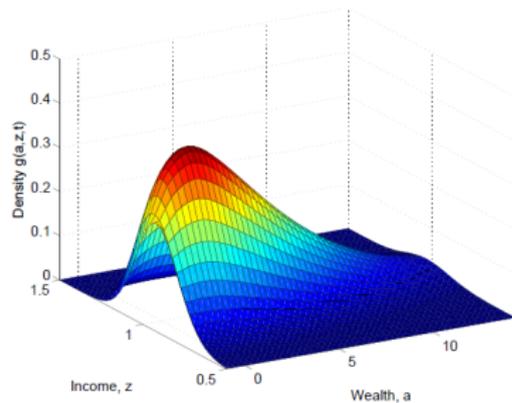
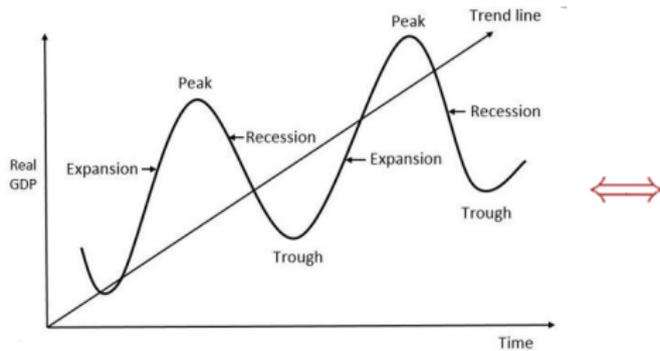
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- Mechanisms through which inequality  $\Rightarrow$  macroeconomy
  1. **Demand**:  $corr(\Delta y_i, MPC_i)$  determines amplification of shocks
  2. **Supply**: tighter credit in recession implies more misallocation of  $K$
  3. **Political economy**: extreme inequality can lead to a crisis

# Even Tighter Connection with Micro Data

- **Credibility revolution** in econometrics:
  - Only RCT can identify causal effects and structural parameters
  - **Criticism**: identification in structural models is too dependent on functional form and other assumptions
- **Solution**: use results from RCTs to validate model parameterization
- Reproduce the RCT in a partial equilibrium version of the model
- Best of both worlds:
  1. Plausible identification of parameters or PE effects
  2. Structural model to study counterfactuals, scaling-up, GE effects, ...
- **Micro Data Macro Models**: take data seriously and build from grounds up

# Third generation of macro theories



macroeconomy  $\iff$  distribution of income and wealth

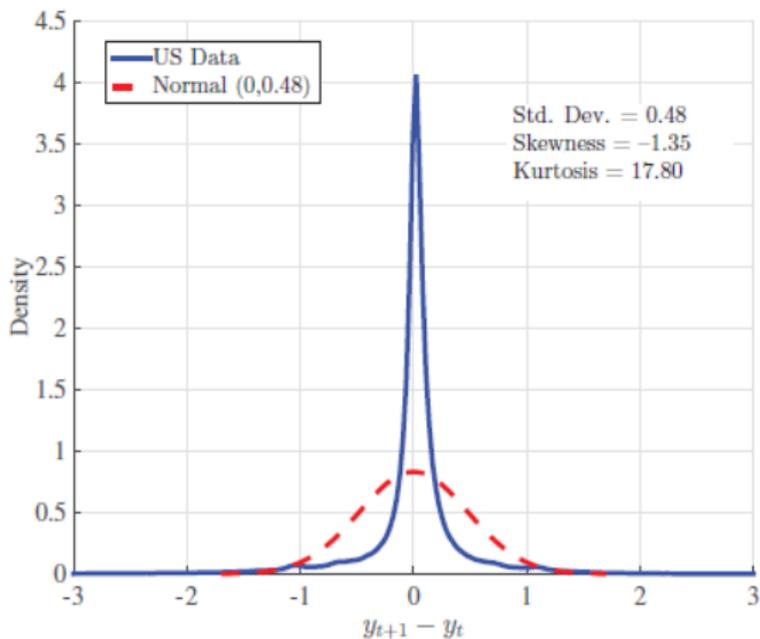
# Summary of This Transformation of Macro

- Pre-Modern Macro
  - No role for inequality **by design**
- 1st Generation Modern Macro
  - No role for inequality **by necessity**
- 2nd Generation Modern Macro
  - macro  $\Rightarrow$  inequality
  - inequality  $\nRightarrow$  macro **by assumption**
- 3rd Generation Modern Macro: **Distributional Macroeconomics**
  - Rich **two-way interaction** between inequality and macro

# What Explains This Transformation of Macro?

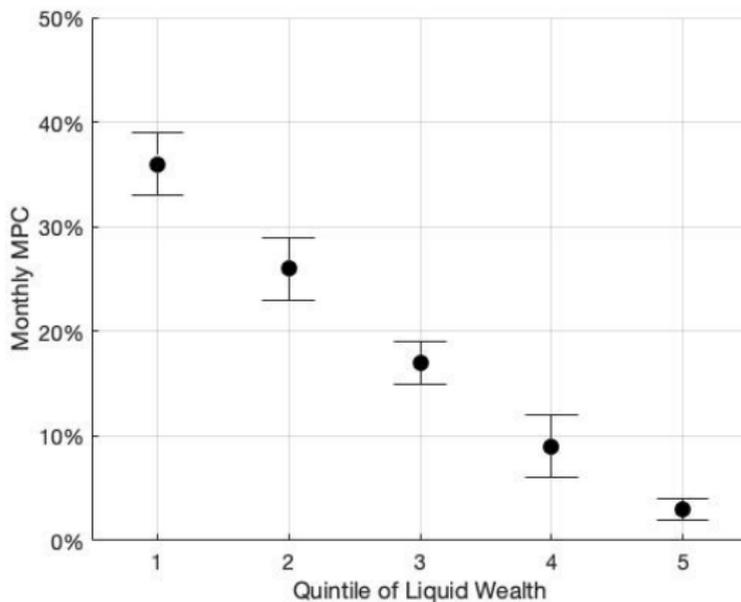
1. **Historical events**: Secular rise in inequality and Great Recession
  - Yellen's speech (2014): *Prior to the financial crisis, representative-agent models were the dominant paradigm for analyzing many macroeconomic questions. However, a disaggregated approach seems needed to understand [...] the Great Recession. While the economics profession has long been aware that these issues matter, their effects had been incorporated into macro models only to a very limited extent prior to the financial crisis. I am glad to now see a greater emphasis on the possible macroeconomic consequences of heterogeneity.*
2. **Faster computers and better algorithms**
  - From Dynare to TensorFlow
3. **Better data** (large-scale, granular administrative datasets)

# Three New Facts Relevant For 3rd Gen Models



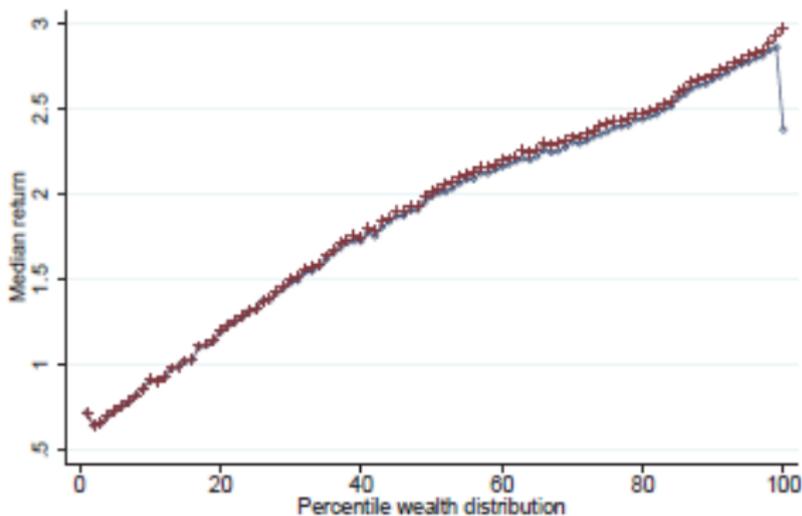
- Labor income shocks are not Gaussian

# Three New Facts Relevant For 3rd Gen Models



- MPC out of windfalls are large and decreasing in liquid wealth

# Three New Facts Relevant For 3rd Gen Models



- Rates of return on saving are increasing in wealth level

# Aggregate $C$ Response to Fiscal Stimulus Payments

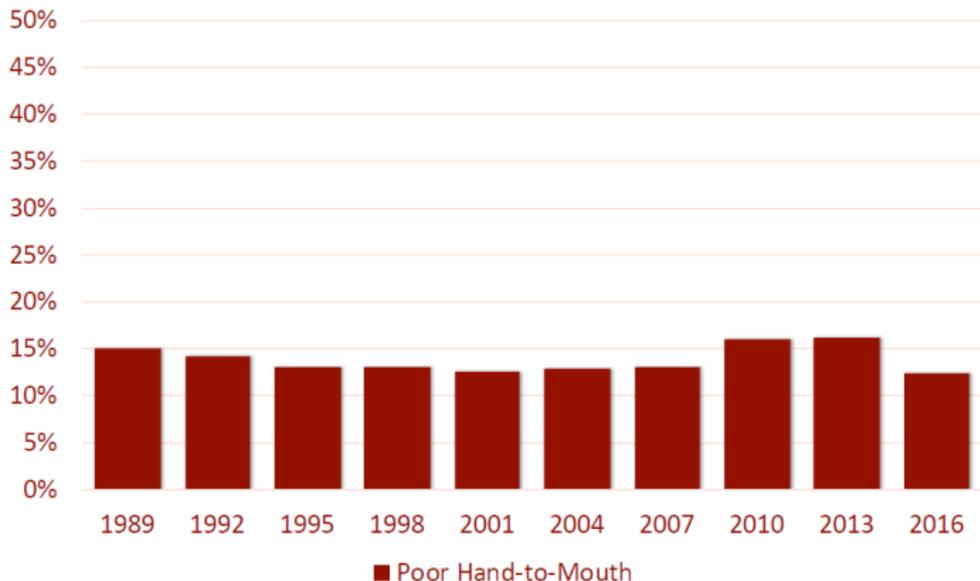
# Aggregate $C$ Response to Fiscal Stimulus Payments

- Ricardian experiment in a RA model: **neutral on  $C$**
- 2nd gen macro models has **similar implications**
  - Aggregate MPC is nearly the same as for the RA (2% quarterly)
  - Why? Hand-to-mouth (HtM) households are few and poor

# Aggregate $C$ Response to Fiscal Stimulus Payments

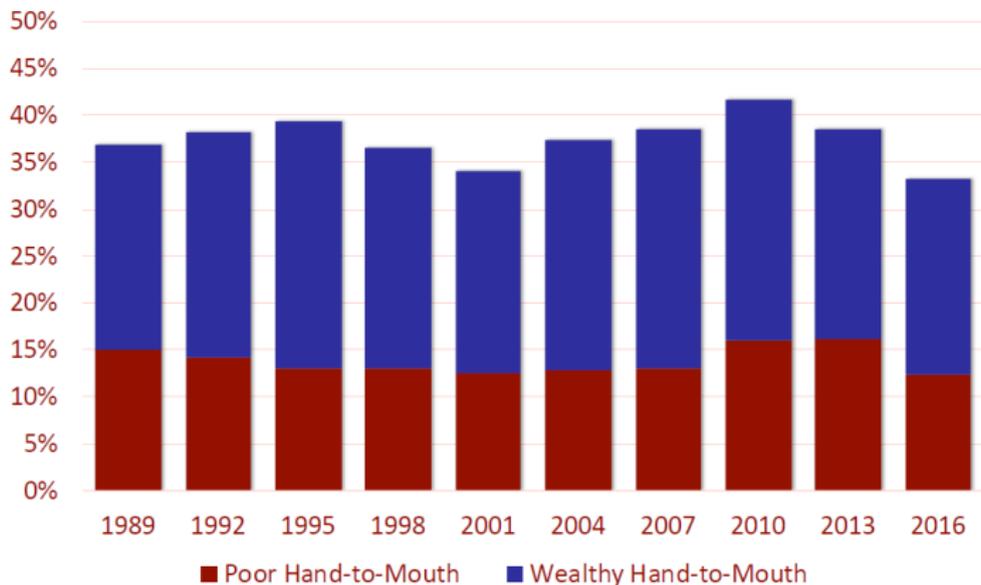
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  - Why? Hand-to-mouth (HtM) households are few and poor
- 3rd gen macro models have instead **large transfer multipliers**
  - Aggregate MPC can be as large as 15%
  - HtM households are many more and of a different type
- Based on Kaplan-Violante (ECMA, 2014)

# HtM from the Viewpoint of a 1-Asset Model



- HtM: 'zero' net worth

# HtM from the Viewpoint of a 2-Asset Model



- **Poor HtM:** 'zero' liquid and illiquid wealth
- **Wealthy HtM:** 'zero' liquid wealth, but positive illiquid wealth

# Rationale for Wealthy HtM behavior

Why holding zero liquidity and some illiquid wealth **at the same time?**

- Holding little liquidity entails **costs**:
  - Welfare cost of not being able to smooth income shocks
  - Transaction cost if withdrawing from illiquid asset
- And it entails **gains**:
  - Higher return earned from investing in illiquid asset
- If **gains exceeds costs**  $\Rightarrow$  **Wealthy HtM**

Higher lifetime consumption (long-run)

VS

Better consumption smoothing (short-run)

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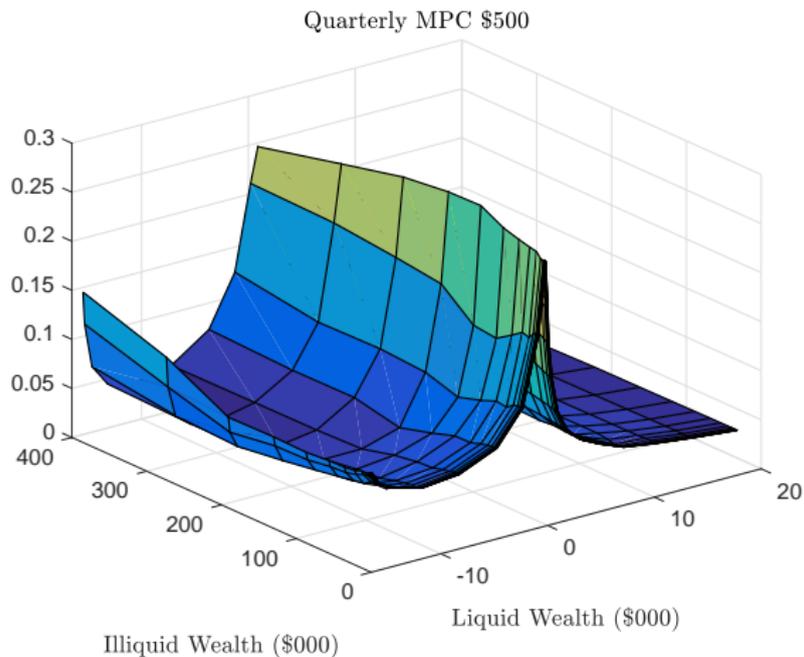
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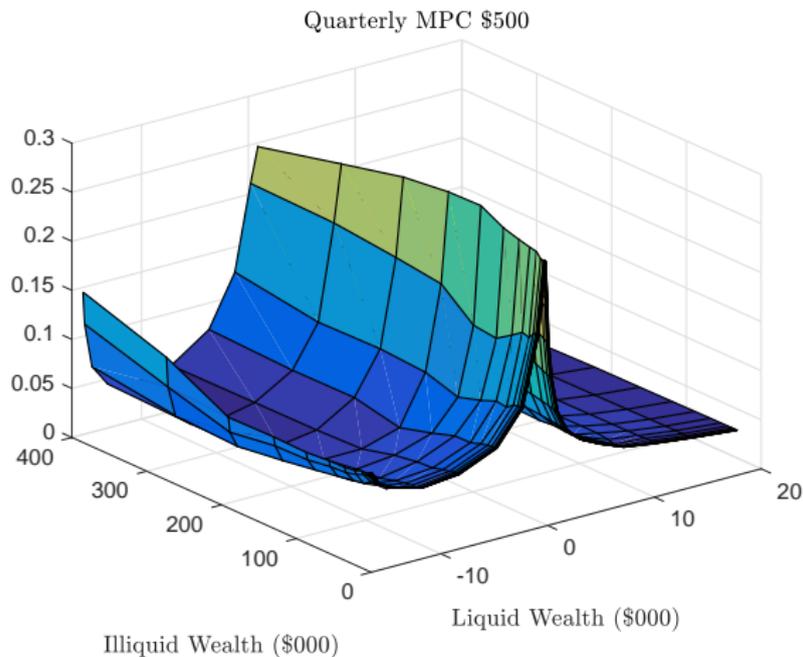
Better consumption smoothing (short-run)

- Heterogeneous returns, nature of income risk, risk aversion all matter

# MPC as a Function of Liquid and Illiquid Wealth



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- MPC heterogeneity  $\Rightarrow$  large macro impact of fiscal stimulus payments

# Revisiting Transmission Mechanism of Monetary Policy

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- Monetary transmission in RA + NK model:
  - Direct intertemporal substitution: ( $\Delta r \rightarrow \Delta C$ )
  - Indirect GE effects ( $\Delta Y \rightarrow \Delta C$ )
- It's all intertemporal substitution: NK model is very neoclassical!

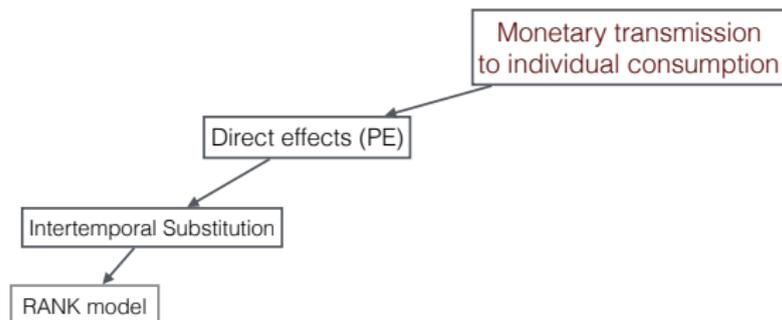
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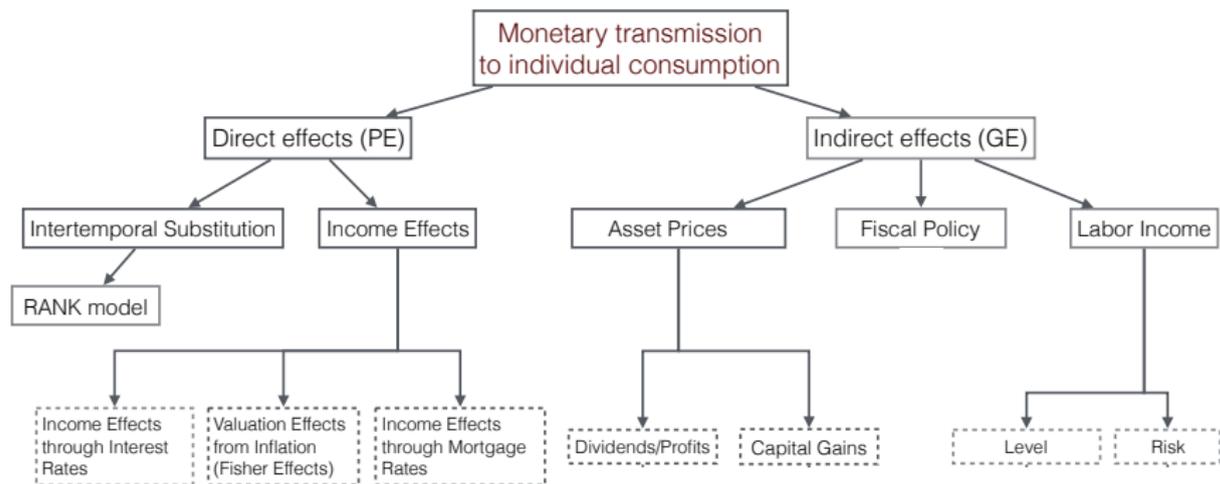
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- 2nd gen macro models has similar implications b/c of small MPC
- 3rd gen models with large MPC re-instate AD channel
  - Indirect GE effects account for majority of transmission
- Based on Kaplan-Moll-Violante (AER, 2018): HA + NK

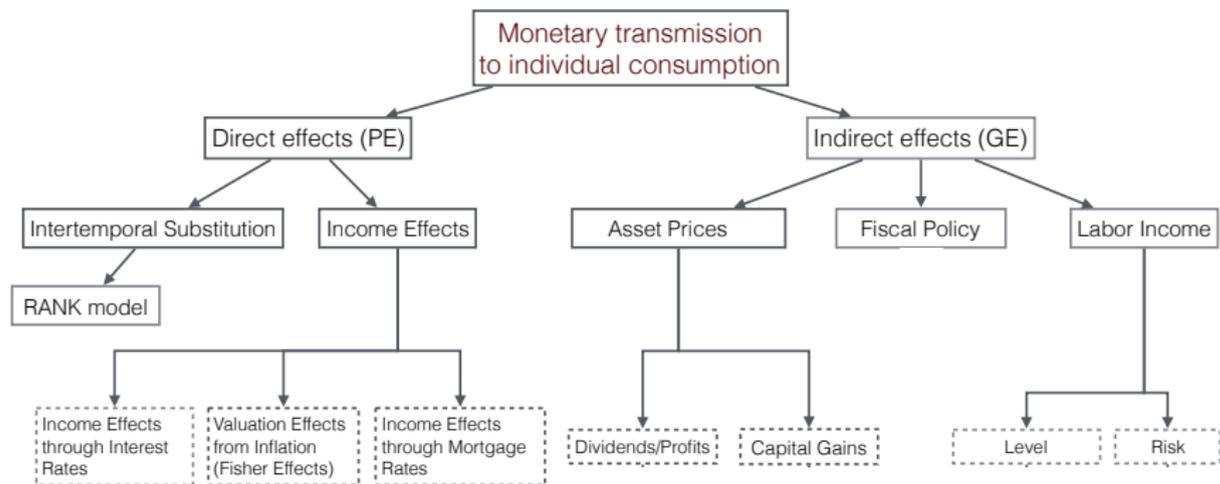
# Monetary Policy Transmission Mechanism



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# Monetary Policy Transmission Mechanism



- Heterogeneity **changes the transmission mechanism** of monetary policy
- Mounting empirical evidence is **consistent** with what predicted by HANK
- Fed's new framework emphasizes **inclusive recovery**

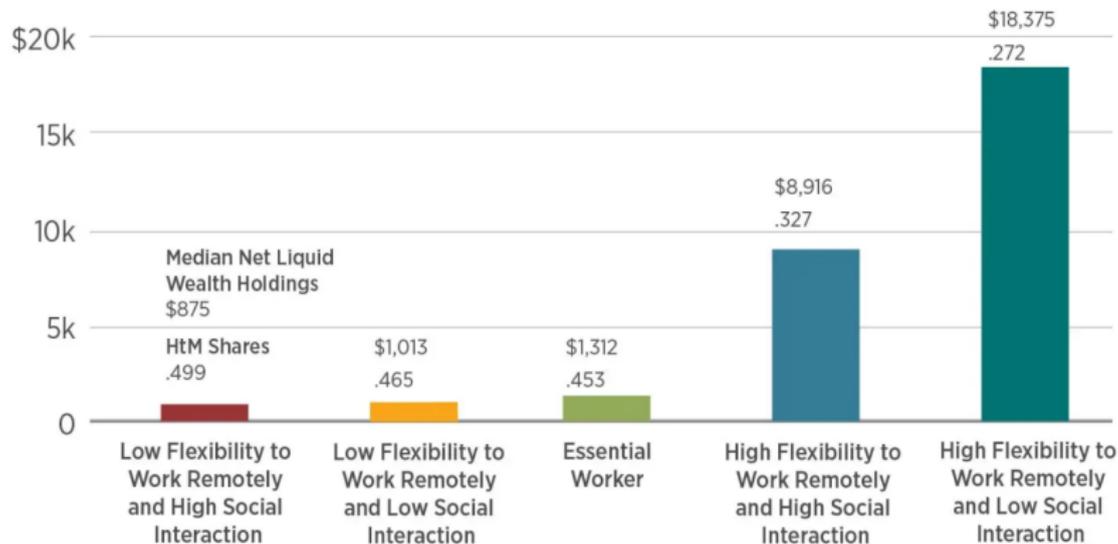
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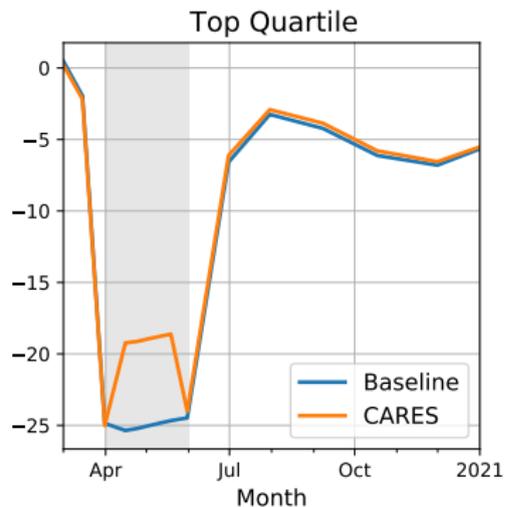
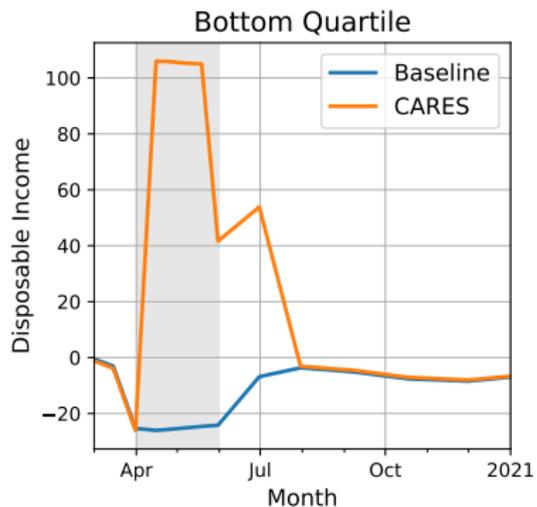
- 3rd gen models incorporate more **ex-ante heterogeneity**
- Impossible to analyze this downturn without considering:
  - **Industry**: contact-intensive vs not
  - **Occupation**: flexible (remote work) vs rigid (on-site work)
- Exposure to economic shock **correlated** with financial fragility
- Two implications:
  1. This correlation **amplifies** the aggregate demand shock
  2. Huge fiscal relief package **'over'-insured** households?
- Based on Kaplan-Moll-Violante-Fu (2021)

# Financial Vulnerability Across Occupational Groups

Median net liquid wealth holdings and hand-to-mouth (HtM) shares



# Impact of Fiscal Relief (CARES Act)



# Taking Stock

macroeconomics  $\iff$  inequality

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macroeconomics  $\iff$  inequality

- Long journey to arrive at this class of models
- Future is bright for **distributional macroeconomics**
- **Empirically**, unified approach to micro and macro data
- **Conceptually**, unified framework to study:
  - Short-run fluctuations and long-run dynamics of distribution
  - Stabilization and redistributive policies
- **Technically**, now easier and faster to solve these model