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

\[ \text{macroeconomics} \leftrightarrow \text{inequality} \]

• Macroeconomic shocks affect inequality

• Inequality affects the evolution of macroeconomic aggregates

• Only last generation of macro models features \[ \leftrightarrow \]
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  macroeconomics ↔ inequality

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• Inequality affects the evolution of macroeconomic aggregates

• Only last generation of macro models features ↔

• 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
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- 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
Pre-Modern Macro and the Transition

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• 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** \((Y_t, C_t, I_t, \ldots)\)
Welfare Costs of Business Cycles in 1st Gen Models

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

\[
\frac{1}{2} \times \frac{1}{10} = \frac{1}{20} \approx 0.05
\]

Representative agent would be willing to pay $25 to avoid a recession.
Welfare Costs of Business Cycles in 1st Gen Models

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

\[ \omega \approx \frac{1}{2} \gamma \sigma^2 = \frac{1}{2} \cdot 1 \cdot (0.032)^2 = 0.0005, \]

- 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:
  2. Heckman (1979): selection on unobservables in a cross-section
  4. Attanasio-Davis (1996): empirical rejection of complete markets
Quick Detour: Empirical Micro in the Meantime

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- 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

- Imrohoroglu, 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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- 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 $\rightarrow$ distribution of outcomes
Second Generation of Macro Theories

• How about: inequality $\implies$ macroeconomy?
Second Generation of Macro Theories

• How about: inequality → 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?

Nonlinearity only for constrained: few and poor

All that matters is the mean
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 ⇒ 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 $\not\Rightarrow$ 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

Ricardian experiment in a RA model: neutral on

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

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)
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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 exceed costs ⇒ Wealthy HtM

  Higher lifetime consumption (long-run)
  vs
  Better consumption smoothing (short-run)
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• Heterogeneous returns, nature of income risk, risk aversion all matter
MPC as a Function of Liquid and Illiquid Wealth

Quarterly MPC $500

MPC heterogeneity and large macro impact of fiscal stimulus payments.
MPC as a Function of Liquid and Illiquid Wealth

- MPC heterogeneity ⇒ large macro impact of fiscal stimulus payments
Revisiting Transmission Mechanism of Monetary Policy

Monetary transmission in RA + NK model:

Direct intertemporal substitution: $(r!C)$

Indirect GE effects: $(Y!C)$

It's all intertemporal substitution: NK model is very neoclassical!

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
Revisiting Transmission Mechanism of Monetary Policy

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Monetary Policy Transmission Mechanism

- Direct effects (PE)
- Intertemporal Substitution
- RANK model

Monetary transmission to individual consumption

- Woodford
- Gali
- Gertler
- Eichenbaum, Rebelo, Wong
- Berger, Milbradt, Tourre, Vavra
- Wong
- Beraja, Fuster, Hurst, Vavra
- McKay, Wieland
- Greenwald
- Auclert
- Sterk, Tenreyro
- Doepke, Schneider
- Gornemann, Kuester, Nakajima
- Alves, Kaplan, Moll, Violante
- Kekre, Lenel
- Kaplan, Moll, Violante
- McKay, Nakamura, Steinsson
- Auclert, Rognlie, Straub
- McKay, Reis
- Auclert
- Auclert, Rognlie, Straub
- Werning
- Bilbiie
- TANK model
- Gornemann, Kuester, Nakajima
- Acharya, Dogra
- Holm
- Ravn, Sterk
- Auclert
- Kaplan, Moll, Violante
- Luetticke
- Auclert
- Auclert, Rognlie, Straub
- Bilbiie
Monetary Policy Transmission Mechanism

Monetary transmission to individual consumption

Direct effects (PE)
- Intertemporal Substitution
- Income Effects
  - RANK model
  - Income Effects through Interest Rates
  - Valuation Effects from Inflation (Fisher Effects)
  - Income Effects through Mortgage Rates

Indirect effects (GE)
- Asset Prices
- Fiscal Policy
- Labor Income
  - Dividends/Profits
  - Capital Gains
  - Level
  - Risk

Mounting empirical evidence is consistent with what predicted by HANK
Fed's new framework emphasizes inclusive recovery

Heterogeneity changes the transmission mechanism of monetary policy

© Greg Kaplan (2019)
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
COVID-19 Recession

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)
COVID-19 Recession

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- Based on Kaplan-Moll-Violante-Fu (2021)
Financial Vulnerability Across Occupational Groups

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

- Low Flexibility to Work Remotely and High Social Interaction: $875
- Low Flexibility to Work Remotely and Low Social Interaction: $1,013
- Essential Worker: $1,312
- High Flexibility to Work Remotely and High Social Interaction: $8,916
- High Flexibility to Work Remotely and Low Social Interaction: $18,375

HtM Shares: .499, .465, .453, .272
Impact of Fiscal Relief (CARES Act)

**Bottom Quartile**

- **Baseline** (blue line)
- **CARES** (orange line)

**Top Quartile**

- **Baseline** (blue line)
- **CARES** (orange line)
Taking Stock

macroeconomics $\leftrightarrow$ inequality
Taking Stock

macroeconomics ↔ 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 models