Income and Wealth Inequality

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A. Introduction: Inequality Across Space and Time

- Two types of income inequality:
  - between group (education, gender, race, industry, occupation, location)
  - within group (residual inequality)
- Fact: large cross-country and within-country differences in per capita income
- Potential causes of such disparities:
  - differences in *human capital*
  - differences in technological know-how
  - differences in production efficiency due to various institutions and organizations

B. A First Look: Acemoglu-Dell (2009)

- Measure of inequality (municipal m in country j) by the Theil index:

$$T = \sum_{j=1}^{J} \frac{L_j}{L}\frac{y_j}{y}\left(\ln \frac{y_j}{y}\right) + \sum_{j=1}^{J} \frac{L_j}{L}\frac{y_j}{y}\left[\sum_{m=1}^{M_j} \frac{L_{jm}}{L_j}\frac{y_{jm}}{y_j} T_{jm} + \sum_{m=1}^{M_j} \frac{L_{jm}}{L_j}\frac{y_{jm}}{y_j} \ln\left(\frac{y_{jm}}{y_j}\right)\right]$$

  where $T_{jm} = \sum_{i=1}^{L_{jm}} \frac{y_{jmi}}{L_{jm} y_{jm}} \ln\left(\frac{y_{jmi}}{y_{jm}}\right)$ is the within-municipal m Theil index in country j

- Alternative measures: mean log deviation, variance/coefficient of variation, gini coefficient, 80/20 or 90/10 ratios

- **Wage inequality**

	90/10	Theil index	
		Between Country	Within Country
Municipals			
actual pop weights	34.2	0.25	*0.544*
equal pop weights	28.6	0.285	*0.622*
Regions			
actual pop weights	36.7	0.203	0.529
equal pop weights	32.7	0.139	0.615

  - more *within* than between country inequalities
  - more inequality using *municipal* than region data

- **Decomposition of wage inequality measured by Theil index**

	Overall Inequality			Residual Inequality		
	Between Country	Between Munic.	Within Munic.	Between Country	Between Munic.	Within Munic.
Municipals						
actual pop weights	*0.265*	0.067	0.424	0.033	0.04	*0.389*
equal pop weights	*0.301*	0.105	0.474	0.041	0.053	*0.404*
U.S.		0.05	0.365		0.02	*0.291*

  - "residual" *within-the-skilled-group* inequalities account for a large portion of overall inequalities
  - *within-municipal* disparities are most important for wage inequalities
  - between-country disparities are important only for "non-residual" *between-skilled-and-unskilled-group* inequalities
  - between-municipal disparities are never important
  - hard to explain this large within group inequality:
    - most assume luck as the driver
    - micro matching: Jovanovic (2014), Tang-Tang-Wang (2022)

C. Inequality with municipals: Human Capital Stratification

- **In reality, households are stratified in various degrees by race, income, education and other socioeconomic indicators**
- **The Dissimilarity index (Duncan-Duncan 1955): using the 2000 Census data, most of the 30 largest Metropolitan Statistical Areas were highly stratified:**

Metropolitan Statistical Area (MSA)	Dissimilarity Index
DC-Baltimore, Detroit	0.70 or higher
Milwaukee, Cleveland, St. Louis, New York	0.60 - 0.69
Philadelphia, Cincinnati, Chicago, Indianapolis	
Pittsburgh, Atlanta, Kansas City	0.50 - 0.59
Houston, Boston, Los Angeles	
Tampa, San Antonio, Phoenix, Minneapolis	0.40 - 0.49
San Diego, Norfolk, San Francisco	
Miami, Denver, Sacramento, Orlando	
Dallas, Seattle, Portland	0.39 or lower

- **It has been shown that since 1980, racial segregation in the U.S. has declined while economic segregation has risen.**
- **Human capital and housing are believed the two primary sources of economic segregation (Peng-Wang 2005; Chen-Peng-Wang 2008).**

1. The Model: Benobou (1996)

- **Interactions**
  - **Local positive spillovers - in human capital evolution**
  - **Global positive spillovers - in goods production (as in Lucas 1988)**
- **Human Capital and Education**
  - **human capital evolution:** $h_{t+1}^i = \phi^i((1-u_t^i)h_t^i)^\delta (E_t^i)^{1-\delta}$
  - **public education:** $E_t^i = \tau_t^i \int y_t^i dG_t^i(y_t^i)$
- **Output:** $y_{t+1}^i = \mathrm{A}(H_t)^\alpha (h_t^i)^{1-\alpha}$
- **Combining the above relationships** $\Rightarrow h_{t+1}^i = \mathrm{B}^i (h_t^i)^\delta (H_t)^{\alpha(1-\delta)} (L_t^i)^{(1-\alpha)(1-\delta)}$, **where** L^i **is a "local" human capital aggregator that summarizes local education and local tax factors**

2. Segregated vs. Integrated Equilibrium

- Segregated equilibrium features locational clustering by human capital/income
- Integrated equilibrium features mixture of groups with different human capital/income
- Two fundamental forces:
  - complementarity between L^i and h^i => segregation (assortative matching)
  - complementarity between H and h^i => integration (homogenizing)

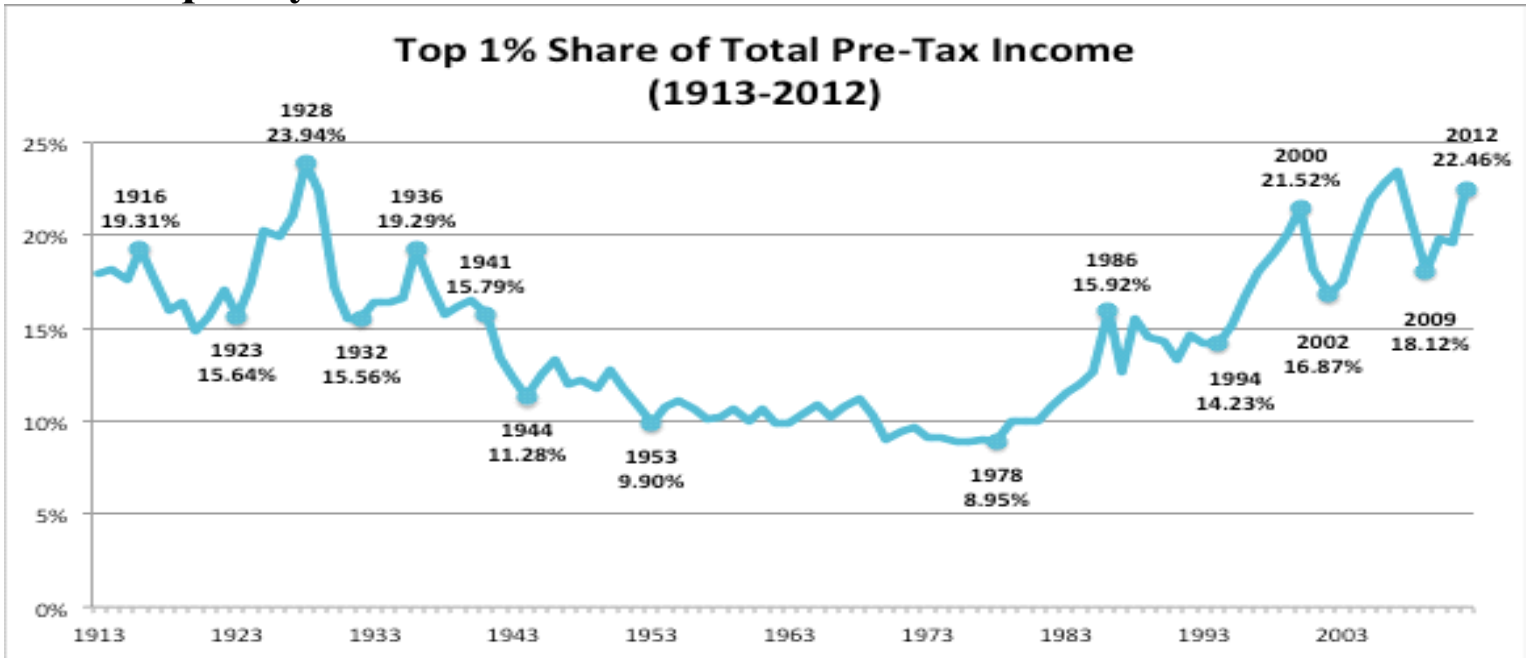
3. Results

- Co-existence of segregated and integrated equilibria
- Integration lowers inequality as compared to segregation
- Integration lowers growth in SR but raises it in LR, because H has a larger scale effect in the long run
- Example: broad base entrance exams serve as a device to break down segregation and promote intergenerational mobility

D. The Battle between the Top 1% and the Remaining 99%

1. Stylized Facts

- **Income inequality**



- **Wealth inequality**
  - **U.S. Wealth Inequality:** https://www.youtube.com/watch?v=QPKKQnijnsM
- **Capital In The 21st Century:**
  - **BBC:** **https://www.youtube.com/watch?v=HL-YUTFqtuI**

E. Wealth Inequality: De Nardi (2015)

- Cagetti-De Nardi (2006): over the past 3 decades in the U.S., top 1% own 1/3 of national wealth, top 5% more than 1/2 (see also an older literature led by Wolff 1992, 1998)
- Can typical models predict such a high concentration of wealth?

a. The Bewley (1977) Model of Permanent Income

- Infinitely lived agents with time-additive preferences: $E\left\{\sum_{t=1}^{\infty}\beta^t u(c_t)\right\}$
  - u takes a CRRA form
- Labor endowment subject to an idiosyncratic labor productivity shock z, taking finite number of values and following a first-order Markov process with transition matrix $\Gamma(z)$
- A single asset *a* that may be used to insure against labor income risk
- Production of a single good Y using K and L under a CRS technology

- **Household's problem:**

$$V(x) = \max_{(c,a')} \left\{ u(c) + \beta E\left[V(a', z') | x \right] \right\}$$

s.t.

$$c + a' = (1 + r)a + zw$$

$$c \geq 0, \quad a' \geq \underline{a},$$

  - $\underline{a}$ **= net borrowing limit**
  - **state x = (*a*, z)**
- **In a stationary equilibrium, the distribution of people with (*a*, z) is constant**
- **Quantitative analysis by Aiyagari (1994): log(labor earning) follows AR(1) with autocorrelation = 0.6 and std dev of the innovations = 0.2**

	% wealth in top		
Gini	1%	5%	20%
U.S. data, 1989 SCF			
.78	29	53	80
Aiyagari Baseline			
.38	3.2	12.2	41.0

  - **wealth inequality largely underestimated compared to the 1989 Survey of Consumer Finance (not much improved even doubling std dev)**

b. A Overlapping-Generations Bewley Model with Survival Risk: Huggett (1996)

- **Agents live for at most N periods, subject to survival probability s_t of surviving up to t conditional on surviving at t-1**
- **Lifetime utility:** $$E\left\{\sum_{t=1}^{N}\beta^t\left(\Pi_{j=1}^{t}s_t\right)u(c_t)\right\}$$
- **Labor endowment is now age-specific: e(z, t)**
  - **again, z is Markov with transition Γ(z)**
- **No annuity, so people self-insure against earning risk and long life**
- **Those die prematurely leave accidental bequests**
- **Same production technology as in Bewley**
- **Household's problem:**

$$V(a,z,t)=\max_{(c,a')}\left\{u(c)+\beta s_{t+1}E\left[v(a',z',t+1)|z\right]\right\}$$

s.t.

$$c+a'=(1+r)a+e(z,t)w+T+b_t$$

$$c\geq 0,\quad a'\geq \underline{a}\quad and\quad a'\geq 0\quad if\quad t=N$$

  - **T = lump-sum redistributed accidental bequests**
  - **b = social security payments to the retired**

- **Stationary equilibrium: similar to Bewley, with periodically balanced bequest transfers and government budget**
- **Quantitative results:**

Transfer wealth ratio	Wealth Gini	Percentage wealth in the top 1%	5%	20%	40%	60%	Percentage with negative or zero wealth
1989 U.S. data							
.60	.78	29	53	80	93	98	5.8–15.0
A basic overlapping-generations Bewley model							
.67	.67	7	27	69	90	98	17

  - **improved, but still far off for the top 1 or 5% wealth distribution**

c. Wealth Distribution in Variations of the Bewley Model

- **Benhabib-Bisin (2015): with intergenerational transmission and redistributive fiscal policy, the stationary wealth distribution is Pareto, driven critically by capital income and estate taxes**
- **Benhabib-Bisin-Zhu (2016): capital income shocks more important than labor income shocks**

d. Human Capital Transmission and Voluntary Bequests: De Nardi (2004)

- **Household's value:**

$$V(a,t) = \max_{c,a'} \left\{ u(c) + s_t \beta E_t V(a', t+1) + (1 - s_t)\phi(b(a')) \right\}$$

  - **value from leaving bequest by providing a worm glow (enjoyment of giving a la Andreoni (1989):**

$$\phi(b(a')) = \phi_1 \left(1 + \frac{b(a')}{\phi_2}\right)^{1-\sigma}$$

  - **overall bequest motive: φ_1**
  - **bequest luxuriousness φ_2**
- **Two intergenerational linages:**
  - **human capital: inheritance in labor productivity**
  - **bequests**

- **Quantitative results**

Transfer wealth ratio	Wealth Gini	Percentage wealth in the top 1%	5%	20%	40%	60%	Percentage with negative or zero wealth
1989 U.S. data							
.60	.78	29	53	80	93	98	5.8–15.0
No intergenerational links, equal bequests to all							
.67	.67	7	27	69	90	98	17
No intergenerational links, unequal bequests to children							
.38	.68	7	27	69	91	99	17
One link: parent's bequest motive							
.55	.74	14	37	76	95	100	19
Both links: parent's bequest motive and productivity inheritance							
.60	.76	18	42	79	95	100	19

  - **unequal bequests do not matter**
  - **both intergenerational links matter to top group wealth distribution**
  - **Example: estate tax can be crucial for breaking down bequest induced inequality (Taiwan's policy reducing estate tax from 50% to 10% is harmful)**
  - **Example: Henry George (land tax); capital gain tax**

e. Entrepreneurship: Cagetti-De Nardi (2004)

- **Agents are altruistic and face uncertainty about death time**
- **Occupational choice: workers vs. entrepreneurs**
  - **entrepreneurial production with working capital k and ability θ:** $f(k) = \theta k^{\nu} + (1-\delta)k$
  - **working capital subject to borrowing constraints, so** $k = a + b(a)$**, with borrowing b depending on asset collateral *a***
- **Quantitative findings:**

Wealth Gini	Fraction of entrepreneurs	Percentage wealth in the top 1%	5%	20%	40%
Data					
0.78	**10%**	**29**	**53**	**80**	**93**
Baseline model with entrepreneurs					
0.8	7.50%	31	60	83	94

  - **top CEOs or super-star companies can lead to large inequality**
  - **problem: over-estimation in top 5% wealth share especially under a smaller share of entrepreneurs**

F. Open Issues

- **To match top inequality requires unrealistic two-level extreme distributions**
- **Typical channels on nonhuman capital earnings do not work well, even with differential asset returns, financial knowledge, entrepreneurship, capital taxes**
- **At the end of the day, distributional extremism and luck seem to be the main drivers, which appear to be shallow**