Inequality

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Growth and inequality

- $$Y = AK^{\alpha}N^{1-\alpha}$$

  more of A, K, and N give more Y. But who gets the increased Y?
- Main question: if the size of the national cake Y increases (growth), does *everyone* get a bigger slice? bigger than they had before? bigger relative to others? does growth trickle down?

mean and median: US

Region and year	Number (thous.)	Median income: Current dollars	Median income: 2006 dollars	Mean income: Current dollars	Mean income: 2006 dollars
UNITED STATES					
2006	116,011	$48,201	$48,201	$66,570	$66,570
2005	114,384	46,326	47,845	63,344	65,421
2004 35/	113,343	44,334	47,323	60,466	64,542
2003	112,000	43,318	47,488	59,067	64,753
2002	111,278	42,409	47,530	57,852	64,837
2001	109,297	42,228	48,091	58,208	66,290
2000 30/	108,209	41,990	49,163	57,135	66,895
1999 29/	106,434	40,696	49,244	54,737	66,235
1998	103,874	38,885	48,034	51,855	64,056
1997	102,528	37,005	46,350	49,692	62,241

US facts: limits of quintiles

Year	Number (thous.)	Upper limit of each fifth (dollars)				Lower limit of top 5 percent (dollars)
		Lowest	Second	Third	Fourth	
Current Dollars						
2007	116,783	$20,291	$39,100	$62,000	$100,000	$177,000
2006	116,011	20,035	37,774	60,000	97,032	174,012
2005	114,384	19,178	36,000	57,660	91,705	166,000
2004 35/	113,343	18,486	34,675	55,230	88,002	157,152
2003	112,000	17,984	34,000	54,453	86,867	154,120
2002	111,278	17,916	33,377	53,162	84,016	150,002

US facts: share of national income

Household Shares of Aggregate Income by Fifths of the Income Distribution: 1967-1998

Year	Lowest	Second	Middle	Fourth	Highest	Top 5 percent
1998	3.6	9.0	15.0	23.2	49.2	21.4
1997	3.6	8.9	15.0	23.2	49.4	21.7
1996	3.7	9.0	15.1	23.3	49.0	21.4
1995	3.7	9.1	15.2	23.3	48.7	21.0
1994	3.6	8.9	15.0	23.4	49.1	21.2
1993	3.6	9.0	15.1	23.5	48.9	21.0
1992	3.8	9.4	15.8	24.2	46.9	18.6
1991	3.8	9.6	15.9	24.2	46.5	18.1
1990	3.9	9.6	15.9	24.0	46.6	18.6
1989	3.8	9.5	15.8	24.0	46.8	18.9
1988	3.8	9.6	16.0	24.3	46.3	18.3
1987	3.8	9.6	16.1	24.3	46.2	18.2
1986	3.9	9.7	16.2	24.5	45.7	17.5
1985	4.0	9.7	16.3	24.6	45.3	17.0
1984	4.1	9.9	16.4	24.7	44.9	16.5
1983	4.1	10.0	16.5	24.7	44.7	16.4
1982	4.1	10.1	16.6	24.7	44.5	16.2
1981	4.2	10.2	16.8	25.0	43.8	15.6
1980	4.3	10.3	16.9	24.9	43.7	15.8
1979	4.2	10.3	16.9	24.7	44.0	16.4
1978	4.3	10.3	16.9	24.8	43.7	16.2
1977	4.4	10.3	17.0	24.8	43.6	16.1
1976	4.4	10.4	17.1	24.8	43.3	16.0
1975	4.4	10.5	17.1	24.8	43.2	15.9
1974	4.4	10.6	17.1	24.7	43.1	15.9

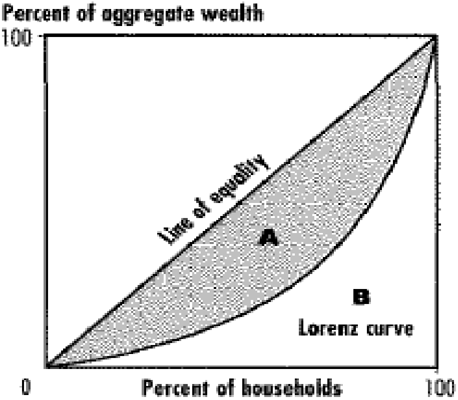
Demographic Composition of the Rich and Poor

- notion of wealth: income is a flow and wealth is a stock
- net worth: assets minus liabilities
- role of education
- other demographic issues

measurement: Lorenz curve

It depicts the total number of households on the horizontal axis and their total wealth holdings on the vertical axis. To construct the Lorenz curve, households are first arrayed in ascending order by wealth. Then the total cumulative total wealth is calculated, beginning with the poorest household and ending with the richest household. These values are plotted for each household on the diagram, and then connected to construct the Lorenz curve. Any point on the curve shows that the poorest $x\%$ of households own $y\%$ of all wealth in the society.

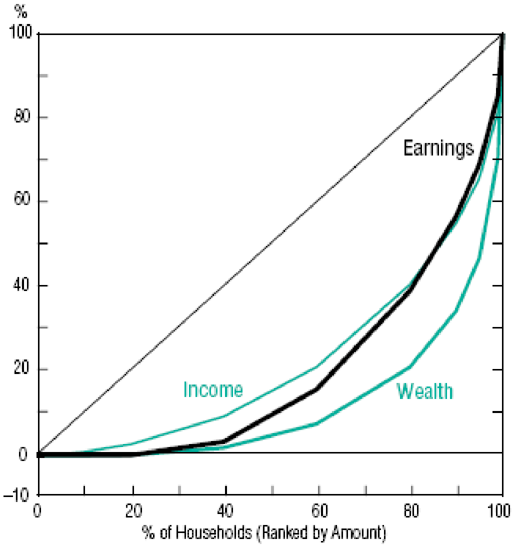
Lorenz Curve and Gini Coefficient



Gini Coefficient:

$$L = \frac{A}{A+B} = \frac{\text{area betw. curve and diagonal}}{\text{area under diagonal}}$$

- The 45^0 degree line represents perfect equality (the poorest x% of the households hold exactly x% of the wealth); if all wealth belongs to 1 household, then the Lorenz curve traces the lower and right-hand borders of the diagram (perfect inequality). Why must the Lorenz curve touch both ends of the 45^0 line?
- Inequality is greater the farther the Lorenz curve bends away from the 45^0 line of perfect equality (the larger the shaded area A)


%
100
80
60
40
20
0
–10
0
20
40
60
80
100
Earnings
Income
Wealth
% of Households (Ranked by Amount)

Gini coefficient

- $$\text{Gini} = \left(\frac{A}{A+B}\right) = \frac{\text{area btw curve and } 45^0\text{line}}{\text{area under } 45^0 \text{ line}}$$
- Gini is a number between 0 and 1.
- when is the Gini coefficient 0 or 1?
- The greater is the concentration of wealth, the closer is the Gini index to unity.
- The Gini index is a shorthand (summary) measure of inequality.

Figure 7.
Gini Coefficients for Pre-tax and Post-tax Household Income: 1993-1998

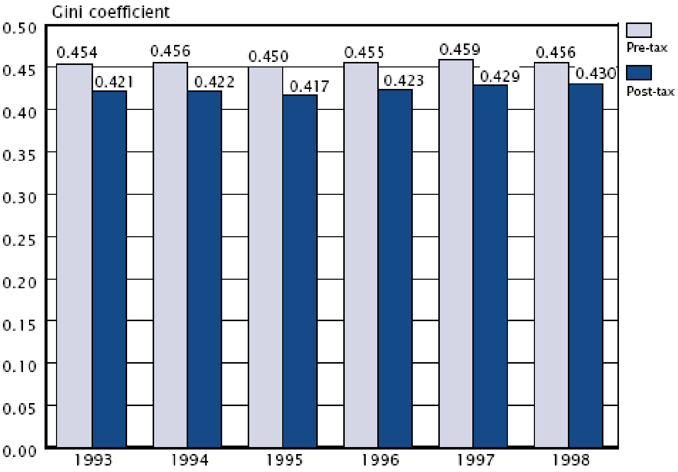
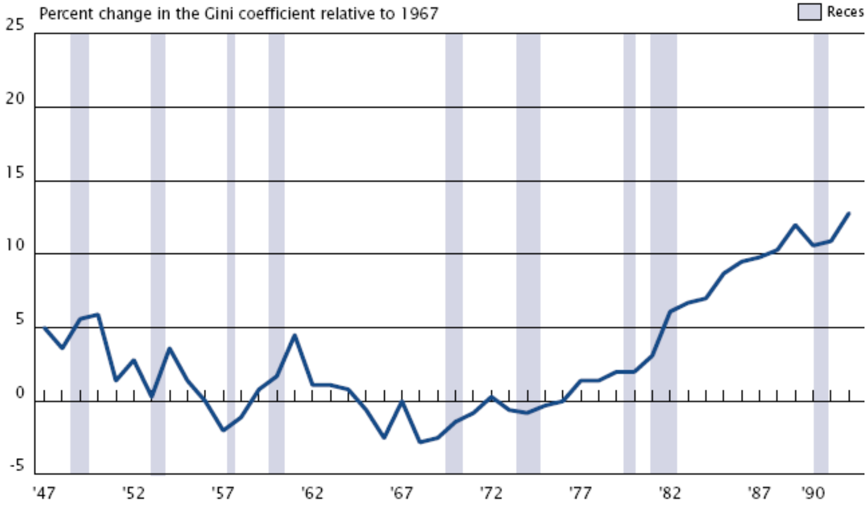


Figure 1.
Change in Income Inequality for Families: 1947-1998



Country	Gini, %	Year
Argentina	48.3	2006
Australia	35.2	1994
Belgium	33.0	2000
El Salvador	52.4	2002
European Union	31.6	2003
Finland	26.9	2000
France	26.7	2002
Germany	28.3	2000
India	36.8	2004
Japan	38.1	2002
Morocco	40.0	2005
Nigeria	43.7	2003
Russia	40.5	2005
United Kingdom	36.0	1999
United States	45.0	2004
Yemen	33.4	1998

- for highly unequal countries, Gini lies between 0.5 and 0.7, while for countries with relatively equitable distributions, the Gini is around 0.2-0.35; how has the US Gini changed over time?
- Socialist countries (e.g. Poland, Bulgaria, Hungary) tend to have lowest post-tax income Gini's.
- Recent 1996 data reveal that Latin America as a whole has the highest Gini (0.5), followed by sub-Saharan Africa, East Asia, high-income countries (U.S ~0.43), and former Eastern Europe (0.25).

Measure	1984 Quintile	1989 Quintile 1st	2nd	3rd	4th	5th
Earnings	1st	85.8	11.6	1.4	.6	.5
	2nd	18.6	40.9	30.0	7.1	3.4
	3rd	7.1	12.0	47.0	26.2	7.6
	4th	7.5	6.8	17.5	46.5	21.7
	5th	5.8	4.1	5.5	18.3	66.3
Income	1st	71.0	17.9	7.0	2.9	1.3
	2nd	19.5	43.8	22.9	10.1	3.7
	3rd	5.1	25.5	37.2	24.9	7.3
	4th	2.5	10.7	23.4	42.5	20.8
	5th	1.9	2.1	9.5	20.3	66.3
Wealth	1st	66.7	23.4	6.6	2.9	.4
	2nd	25.4	46.6	20.4	5.4	2.3
	3rd	5.8	24.4	44.9	20.5	4.6
	4th	1.8	4.6	22.4	49.6	21.6
	5th	.7	.8	5.7	21.6	71.2

Characteristic	Average Level (1992 $)			Concentration (Gini Index)			Source of Income (%)				
	Earnings	Income	Wealth	Earnings	Income	Wealth	Labor	Capital	Business	Transfers	Othe
Age											
25 and Under	16,210	18,908	26,207	.528	.471	.808	84.0	1.7	2.0	6.4	5.8
26–30	29,937	34,009	35,732	.410	.418	.734	86.4	1.7	1.9	2.6	7.3
31–35	39,164	47,701	76,060	.466	.494	.755	75.0	3.2	8.2	3.1	10.5
36–40	47,123	54,618	102,234	.542	.555	.719	66.4	3.3	23.0	2.4	4.9
41–45	48,367	58,616	187,820	.506	.513	.753	71.4	8.3	12.8	4.0	3.4
46–50	52,301	62,914	254,922	.473	.499	.753	74.9	9.1	9.5	3.0	3.5
51–55	49,207	63,884	299,256	.509	.550	.755	71.3	10.0	6.6	2.7	9.3
56–60	43,352	57,411	357,254	.613	.609	.751	67.0	14.3	9.9	4.7	4.1
61–65	29,722	53,119	300,240	.793	.679	.744	45.4	14.8	12.2	15.8	11.8
Over 65	4,927	28,442	251,850	1.032	.611	.725	12.5	26.8	5.5	43.4	11.7

Preliminaries of the Galor and Zeira model

- simple OG economy; one good produced in two sectors
- agents live for 2 periods; second period they may leave bequest to their children
- in the first period, person receives a bequest and then decides whether to acquire human capital (skills) or work as an unskilled worker

Preliminaries

- if he chooses to acquire skills when young, he becomes a skilled worker; gets wage w_s; otherwise, he is an unskilled worker in both pds. (earns $w_n << w_s$)
- agents endowed with 1 unit of labor in each pd; no leisure
- minimum amount h needs to be invested to get any returns from human capital

Warm glow preferences

- no popn growth; popn size is L
- agents only consume in the 2nd period of life

$$u = c^{\alpha} b^{1-\alpha}$$

- all agents are identical when born; what will create a difference will be the inheritances they get from their parents.

Credit market imperfection

- exogenous difference between borrowing and lending rate; agents pay higher interest rate when they borrow and get less when they lend; credit market imperfection

$$i > r$$

Agent's problem

- old agent's problem: an old agent with wealth y

$$\max_{c,b} u = c^{\alpha} b^{1-\alpha}$$

s.t

$$c + b = y$$

- $$\max_{b} u = (y - b)^{\alpha} b^{1-\alpha}$$

- $$b^{*} = (1 - \alpha) y$$

Indirect utility

- indirect utility:

$$U = (y - b^*)^\alpha \, b^{*1-\alpha} = \alpha^\alpha \, (1-\alpha)^{1-\alpha} \, y \equiv \varepsilon y$$

- utility is linear in wealth

Choices – no education

- if a person inherits x and chooses not to acquire skills, then as an adult, he gets

$$\left[\left(x+w_n\right)\left(1+r\right)+w_n\right] \tag{1}$$

- his utility will be:

$$U_n(x)=\varepsilon\left[\left(x+w_n\right)\left(1+r\right)+w_n\right]$$

- his bequest will be:

$$b_n(x)=\left(1-\alpha\right)\left[\left(x+w_n\right)\left(1+r\right)+w_n\right]$$

Choices – education with lending

- if a person inherits x, where $x \geq h$, and chooses to acquires skills using h part of his x; remainder he lends; then as an adult his wealth is

$$[(x - h)(1 + r) + w_s]$$

- his utility is:

$$U_s^l(x) = \varepsilon \left[(x - h)(1 + r) + w_s\right]$$

and his bequest is

$$b_s^l(x) = (1 - \alpha)\left[(x - h)(1 + r) + w_s\right]$$

Choices – education with borrowing

- if a person inherits x where $x < h$, and chooses to invest in education, he borrows $(h - x)$; his adult wealth is

$$[(x - h)(1 + i) + w_s]$$

- his utility is

$$U_s^b(x) = \varepsilon \left[(x - h)(1 + i) + w_s \right]$$

and his bequest is

$$b_s^b(x) = (1 - \alpha) \left[(x - h)(1 + i) + w_s \right]$$

- when will all individuals prefer to work as unskilled?

$$\left[\left(x+w_n\right)\left(1+r\right)+w_n\right] > \left[(x-h)(1+r)+w_s\right]$$

or,

$$\left(2+r\right)w_n > w_s - h(1+r)$$

- **Assumption**

$$\left(2+r\right)w_n \leq w_s - h(1+r)$$

Cutoff

- when will a borrower (a person with inheritance less than h) invest in education? when

$$U_s^b(x) = \varepsilon\left[(x-h)(1+i)+w_s\right] \geq U_n(x) = \varepsilon\left[\left(x+w_n\right)\left(1+r\right)+w_n\right]$$

or,

$$x \geq \frac{w_n(2+r) - w_s + h(1+i)}{i-r} \equiv f$$

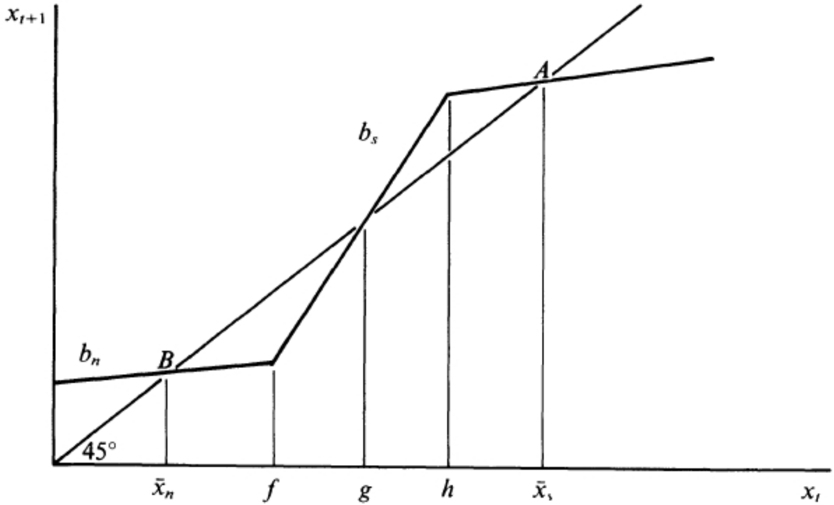
- Intuition: for example, when $w_s \uparrow$, you will choose to get education even when you get low inheritance.

Distribution

- individuals with "sufficiently high" inheritance will choose to be skilled; others will stay unskilled.
- Suppose you come into a period with inheritance x_t. How much will you leave for your children?

$$x_{t+1} = \begin{cases} b_n(x_t) = (1-\alpha)\left[(x_t + w_n)(1+r) + w_n\right] & \text{if } x_t < f \\ b_s^b(x_t) = (1-\alpha)\left[(x_t - h)(1+i) + w_s\right] & \text{if } f \leq x_t < h \\ b_s^l(x_t) = (1-\alpha)\left[(x_t - h)(1+r) + w_s\right] & \text{if } x_t \geq h \end{cases}$$

Bequest distribution



Long run

- long-run agents converge to one of two steady state points
- rich families that get education generation after generation, and poor ones that remain unskilled forever. Complete polarization. People moving out of the middle class into either end.

Long run

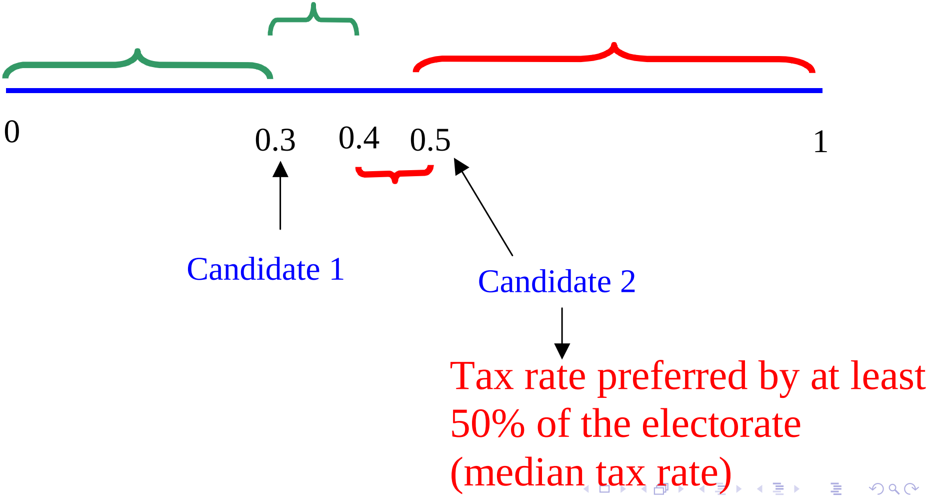
- all persons who inherit less than g and more than $\bar{x}_n$ will bequeath less than they inherit (below the 45^0 line, $x_{t+1} < x_t$) the process continues until they converge to $\bar{x}_n$.
- Agents with inheritances less than g but greater than f at t may invest in education but after some generations, their descendants will become unskilled. **Poverty trap.**
- Consider an economy in which initial average wealth *exceeds* g. If wealth is poorly distributed, so that few people have wealth exceeding g, then?
- Message: *"rich" countries with highly unequal income distributions can become poor in the long-run.*

1. A country with highly unequal incomes has large numbers of poor; poor cannot borrow to finance education; therefore, higher inequality leads to less education for the poor and hence prevents them from growing out of their poverty; overall growth suffers; also uneducated (unskilled) work force does not contribute to national output that much.
2. Political instability: more inequality leads to more crime, coups, assassinations, rapid changes of government etc.; investments become more risky; leads to reduced investment domestically.

The median voter

- Consider an electorate that is distributed uniformly along the idealogical spectrum $a \in [0, 1]$ from the left to the right. Two candidates, 1 and 2; candidate with the most votes wins.
- Each voter casts her vote for the candidate that is **closest to her idealogical position**. The candidates know this and care only about winning. Simple majority is needed to win. One man, one vote.
- Is it possible to make a prediction about the idealogical position the two candidates would choose to stand for?

The median voter



The median voter

- At every point on the line, there is a voter who most prefers that value of a; point A has a voter who most likes $a = 0.3$.
- Suppose candidate 1 were to consider announcing that she stands for $a = 0.3$ [if elected, she would implement a tax rate of 0.3]. Candidate 2 considers announcing $a = 0.5$.
- How many people have most preferred tax rates that are greater or equal to $a = 0.5$? 50%. Why?

The median voter

- For all these agents, $a = 0.3$ is further from their most preferred position than $a = 0.5$ is. $a = 0.3$, if elected, would hurt them more than if $a = 0.5$ were elected.
- Hence they all vote for $a = 0.5$; since this is at least 50% of the people, $a = 0.3$ cannot win! In fact, any candidate that positions herself between $a = 0.3$ and $a = 0.5$ will win.
- Equilibrium: both candidates will announce they stand for $a = 0.5$; political equilibrium; appeal to the median voter; in this example, the one exactly in the middle.

Politics of inequality

- how does politics affect macroeconomic policy making? a highly unequal democratic society has a poor median voter who all candidates attempt to win over
- Politics of inequality: highly unequal democratic societies are likely to vote for large income redistributions through the tax system; the rich get taxed heavily, enterprise suffers, welfare budgets will go up; such fiscal policies may harm future growth.