Econ 133 – Global Inequality and Growth

Inequality between individuals

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What we've learned so far:

Trends in the functional distribution of income

- The capital share is rising, the labour share falling

- What theories can account for this evolution

Now we move to the interpersonal distribution of income, starting with the tools

Roadmap

1. Data sources to study inequality between individuals

2. Metrics: Gini coefficient, Pareto-Lorenz coefficient, top shares

1 Data sources for interpersonal inequality

1.1 Survey data

- Surveys are a popular data source to study inequality:
  - Ask a sample of families about their income, wealth...
  - Lots of socio-demographic characteristics
  - Revolutionized empirical research in second half of 20th century

- Numerous household surveys now available:
  - Luxembourg income study (40 countries, 1968–)
  - Luxembourg wealth studies (12 countries, 1994–)
  - World Bank Living Standard Measurement Studies (39 countries, 1985–).
- Survey data are useful, but insufficient:
  - Large gap between surveys and macro totals
  - Practical pbs: non-response & under-reporting at the top

1.2 Tax data

- Tax administrations have published tabulations of income by size of income since beginning of income tax (usually early 20th century)
- In recent decades, availability of micro-samples of tax returns
- Kuznets (1953) first to use tax data to compute top income shares
- Recently extended and systematized to 30+ countries $\rightarrow$ World Wealth and Income Database

Limits of tax data:

- Miss tax evasion
- Miss legally tax-exempt income
- Ex: US tax data only capture 60% of US national income
- Silent on distribution within bottom 90%

1.3 Distributional national accounts (DINAs)

DINAs = decompositions of national account aggregates such that:

- Distributions of income, wealth, saving, taxes, transfers... are consistent with what survey/tax data show

- Totals match macro aggregates

- First attempt: King (1696)

Ranks, Degrees, Titles and Qualifications	Number of families	Heads per family	Number of persons	Income per family £	Income per head £	Expence per head £	Increase per head £	Total income £'000	Total expence* £'000	Total increase £'000
Temporall Lords	160	40	6 400	2 800	70	60	10	448	384	64
Spiritual Lords	26	20	520	1 300	65	55	10	33.8	28.6	5.2
Baronets	800	16	12 800	880	55	51	4	704	652.8	51.2
Knights	600	13	7 800	650	50	46	4	390	358.8	31.2
Esquires	3 000	10	30 000	400	40	37	3	1 200	1 110	90
Gentlemen	12 000	8	96 000	240	30	27.5	2.5	2 880	2 640	240
Persons in greater Offices and Places	5 000	8	40 000	240	30	27	3	1 200	1 080	120
Persons in lesser Offices and Places	5 000	6	30 000	120	20	18	2	600	540	60
Eminent Merchants & Traders by Sea	2 000	8	16 000	400	50	40	10	800	640	160
Lesser Merchants & Traders by Sea	8 000	6	48 000	200	33.3	28.3	5	1 600	1 360	240
Persons in the Law	10 000	7	70 000	140	20	17	3	1 400	1 190	210
Eminent Clergymen	2 000	6	12 000	60	10	9	1	120	108	12
Lesser Clergy-men	8 000	5	40 000	45	9	8	1	360	320	40
Freeholders of the better sort	40 000	7	280 000	84	12	11	1	3 360	3 080	280
Freeholders of the lesser sort	140 000	5	700 000	50	10	9.5	0.5	7 000	6 650	350
Farmers	150 000	5	750 000	44	8.8	8.55	0.25	6 600	6 412.5	187.5
Persons in Liberal Arts and Sciences	16 000	5	80 000	60	12	11.5	0.5	960	920	40
Shopkeepers and Tradesmen	40 000	$4\frac{1}{2}$	180 000	45	10	9.5	0.5	1 800	1 710	90
Artisans and Handicrafts	60 000	4	240 000	40	10	9.5	0.5	2 400	2 280	120
Naval Officers	5 000	4	20 000	80	20	18	2	400	360	40
Military Officers	4 000	4	16000	60	15	14	1	240	224	16
	511 586	$5\frac{1}{4}$	2 675 520	67	12.9	12	0.9	34 495.8	32 048.7	2 447.1
Common Seamen	50 000	3	150 000	21	7	7.5	−0.5	1 050	1 125	−75
Labouring People & outservants	364 000	$3\frac{1}{2}$	1 275 000	15	4.3	4.4	−0.1	5 460	5 587	−127
Cottagers & Paupers	400 000	$3\frac{1}{4}$	1 300 000	5	1.5	1.75	−0.25	1 950	2 275	−325
Common Soldiers	35 000	2	70 000	14	7	7.5	−0.5	490	525	−35
	849 000	$3\frac{1}{4}$	2 795 000	10.5	3.25	3.45	−0.2	8 950	9 512	−562
Vagrants	..	..	30 000	..	2	4	−2	60	120	−60
	849 000	$3\frac{1}{4}$	2 825 000	10.5	3.19	3.41	−0.22	9 010	9 632	−622

So the General Account is

Increasing the Wealth of the Kingdom	511 586	$5\frac{1}{4}$	2 675 520	67	12.9	12	0.9	34 495.8	32 048.7	2 447.1
Decreasing the Wealth of the Kingdom	849 000	$3\frac{1}{4}$	2 825 000	10.5	3.19	3.41	−0.22	9 010	9 632	−622
Neat Totalls [and averages]	1 360 586	$4\frac{1}{20}$	5 500 520	32	7.9	7.55	0.33	43 505.8	41 680.7	1 825.1

2 How to quantify inequality?

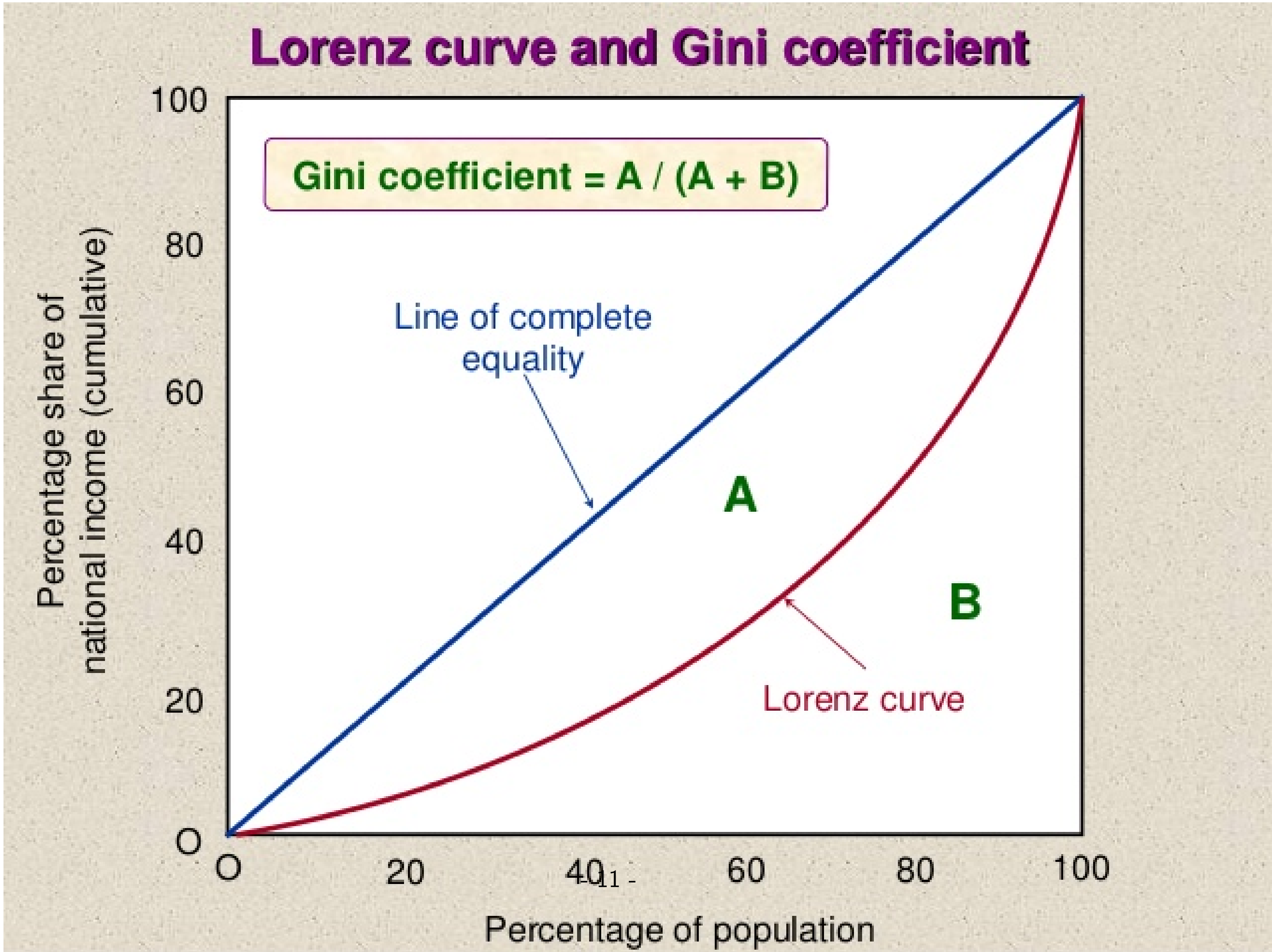
2.1 Gini coefficient

- Inequality often summarized by Gini coefficient G

- Lorenz curve shows % of income earned by people below fractile p

- G $=$ 2 x area between 45 degree line and Lorenz curve

- G $=$0 means Lorenz curve is the 45 degree line $=$ perfect equality


Lorenz curve and Gini coefficient
Gini coefficient = A / (A + B)
Line of complete equality
A
B
Lorenz curve
Percentage share of national income (cumulative)
100
80
60
40
20
O
O
20
40
60
80
100
Percentage of population

2.2 Top shares

- Problem of Gini: quite abstract & requires lots of data

- Top shares are more concrete ("the top 1%")

What is the link between the Gini coefficient and top shares? See Alvaredo (2011)

- Let's consider a finite number of income groups

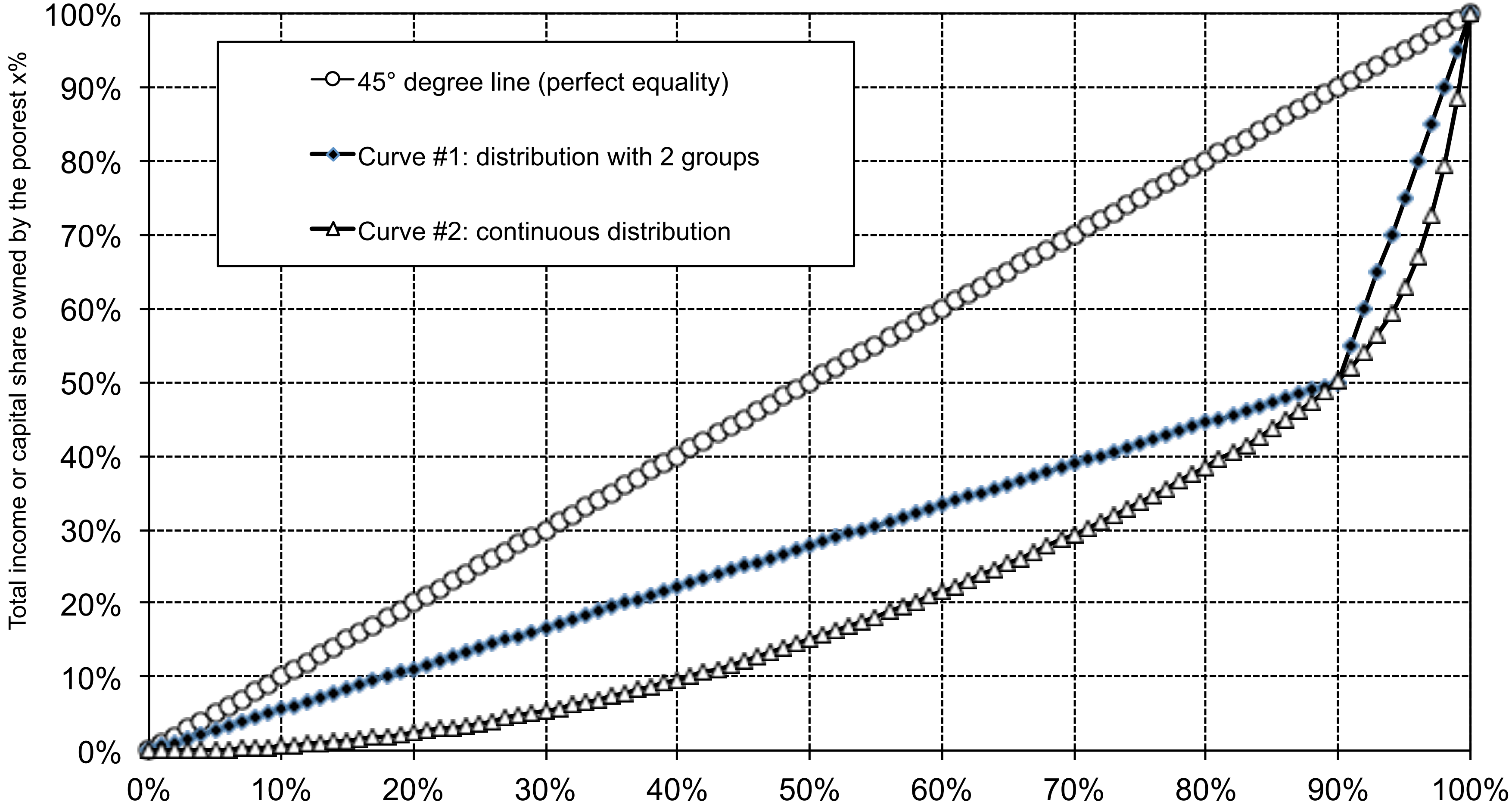
- Individuals below percentile p_1 own a share s_0 of income, individuals between p_1 and p_2 own a share s_1, etc.

- Ex: Assume there are 2 groups, and that both groups are homogenous

- Ex: p_1 =0.9, s_0 =0.5, s_1 =0.5. I.e., the bottom 90% and the top 10% both own 50% of total income

- With two homogenous groups, geometrically easy to show that $G = s_1 + p_1 - 1$

Examples of Gini-Lorenz curves



Curve 1 assumes that the poorest 90% and the richest 10% own 50% of total income or capital each, and that both groups are homogenous (hence a linear curve); curve 2 assumes a continuous distribution

2.3 Pareto coefficients

- Another useful metric of inequality is the Pareto coefficient
- At the top, income & wealth well approx. by Pareto distributions
- Pareto distributions have a probability density function

$$f(y) = \frac{ac^a}{y^{1+a}}$$

- and a cumulative distribution function $1 - F(y) = (c/y)^a$
- with $c =$ constant and $a =$ Pareto coefficient

- Key property of Pareto distributions: ratio average/threshold = constant

- Note $y^*(y)$ average income of pop. above threshold y. Then:

$$y^*(y) = y\frac{a}{a-1} = yb$$

- b is called the inverted Pareto-Lorenz coefficient

- If a=2, b=2: average income above \$100,000 = \$200,000; average income above \$1 million = \$2 million, etc.

- US 1970s, income: b = 1.7–1.8 (a = 2.2–2.3)

- US 2010s, income: $b = 2.2$–2.5 ($a = 1.7$–1.8)

- For wealth distributions, b can be larger than 3

- $b =$ index of concentration

- Pareto coefficients are easy to estimate using tabulations

- See Kuznets 1953, and Atkinson, Piketty and Saez 2011 for graphs on b coeff over time & across countries

References

Alvaredo, Facundo, “A Note on the Relationship between Top Income Shares and the Gini Coefficient”, *Economics Letter*, 2011 (web)

Atkinson, Anthony, Thomas Piketty, and Emmanuel Saez “Top Incomes in the Long-Run of History”, *Journal of Economic Literature*, 2011 (web)

King, Gregory, *Natural and Political Observations and Conclusions Upon the State and Condition of England*, 1696, 45p.

Kuznets, Simon *Shares of Upper Income Groups in Income & Saving*, 1953