Seminar to Advanced Macroeconomics

Kuznets Curve

Economic Inequality and Development

Outline

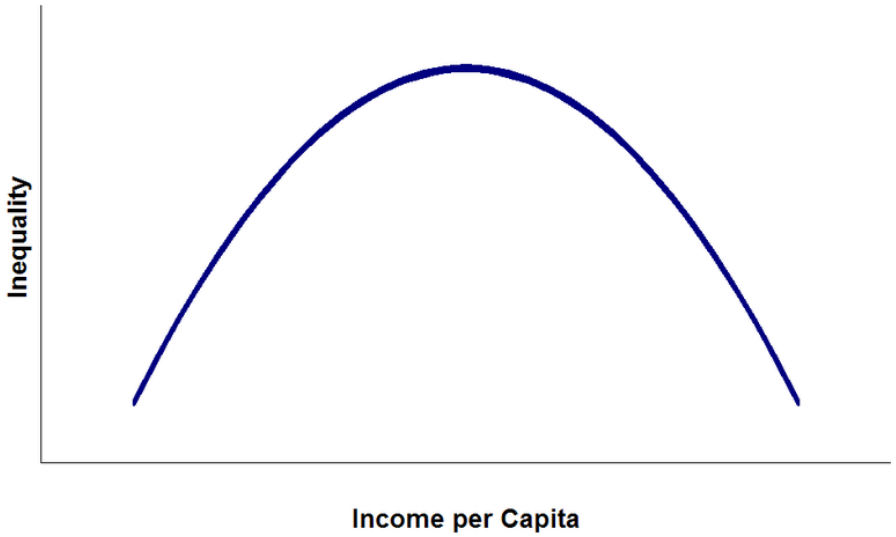
- Effects of unequal income distribution
- Kuznets' hypothesis
- Measuring economic inequality
- Estimation of Kuznets curve on cross-sectional and panel data
- Can many explanatory variables cause some problems?

Effects of Unequal Income Distribtion

- Shall we care about income distribution?
- Positive effects: motivational effects, incentive for education, better work...
- Negative effects: high unequality might destroy social cohesion of the community (R. Putnam (2000): they are mutually enforcing); crime and public safety.
- Does it have some consequences for economic growth?
- No consensus emerged...
- Cornia and Court (2001) tried to estimate optimal level of inequality: to low inequality creates incentive trap, labour shirking and increases supervision costs whereas high inequality creates incentive trap again (although of different nature) + might increases enforcement costs of property rights etc. (hypothesis of Alesina and Rodrik, 1994, empirically tested by Justino, 2005, data from India)
- http://en.wikipedia.org/wiki/Economic_inequality

Kuznets Hypothesis

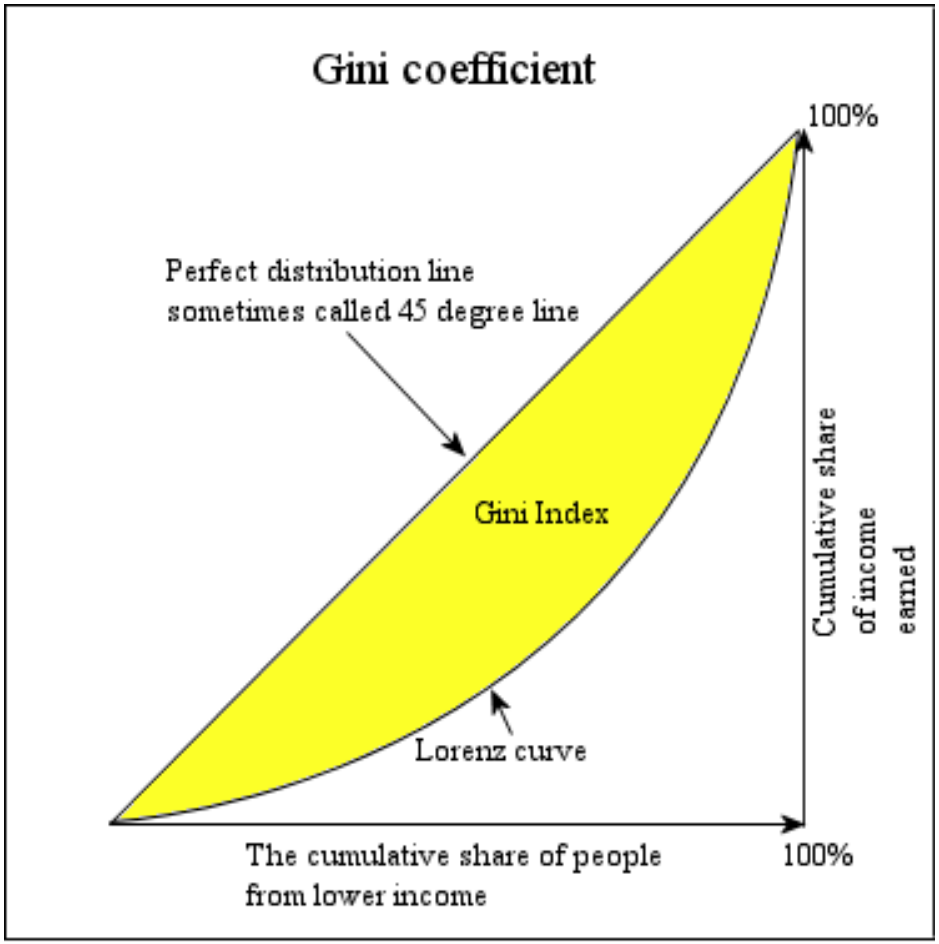
- Simon Kuznets – 1971 The Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel for his empirically founded interpretation of economic growth
- Relationship between economic inequality and economic development – inverted U-shape curve.



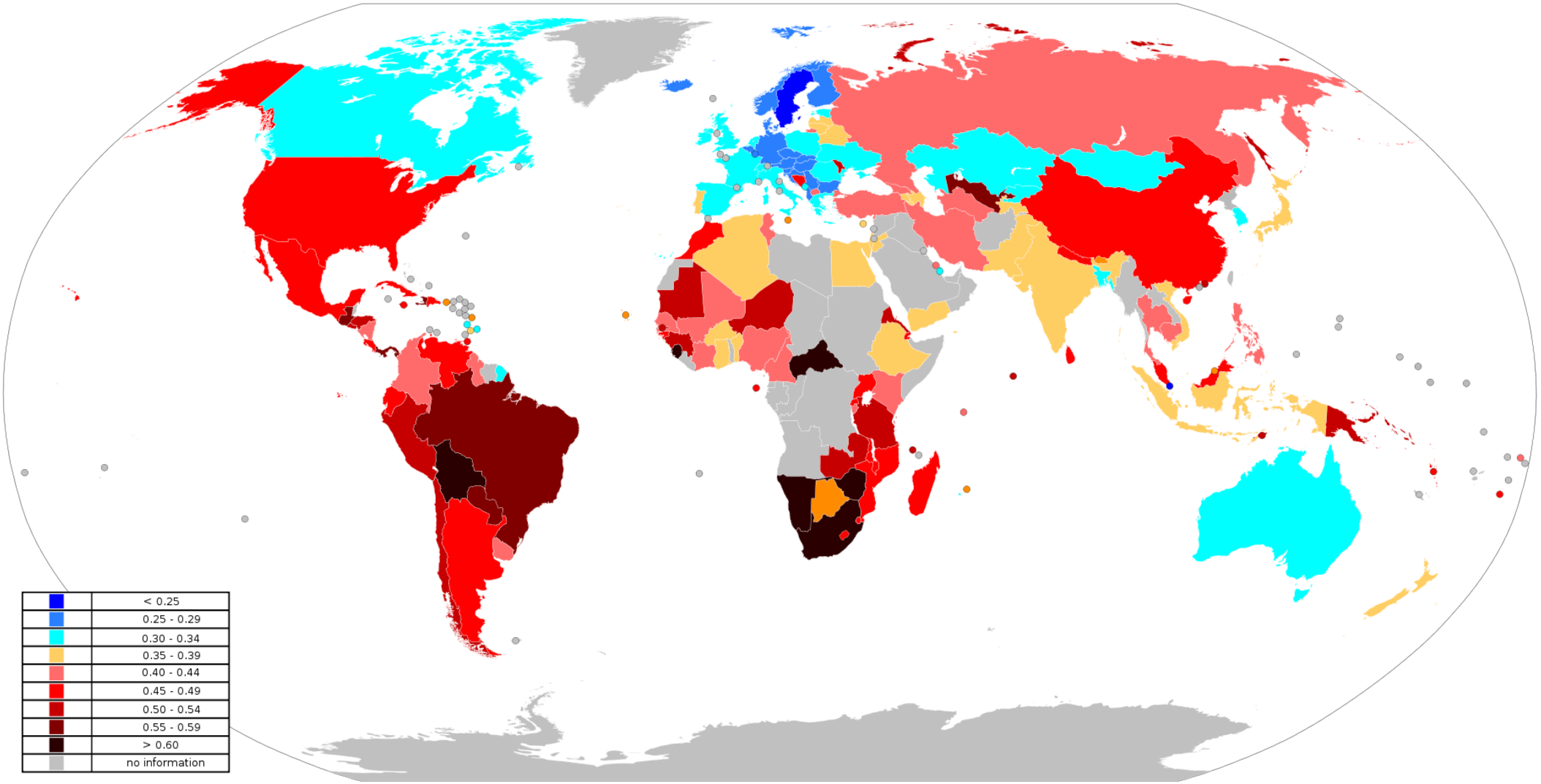
- In poor countries, economic growth increases the income disparity between rich and poor people, in wealthier ones the growth narrows the difference.
- Why? Workers migrate from agriculture to industrial sectors, high capital concentration at the initial stage of development; after higher impact of human capital, more people switch to higher paying sector...
- Empirical verification: mixing results. Still discussed phenomenon.

Measuring Economic Inequality

- Usually Gini coefficient uses.
- (0;1) or in %.
- Values can be found in various datasets.
- http://en.wikipedia.org/wiki/Gini_coefficient

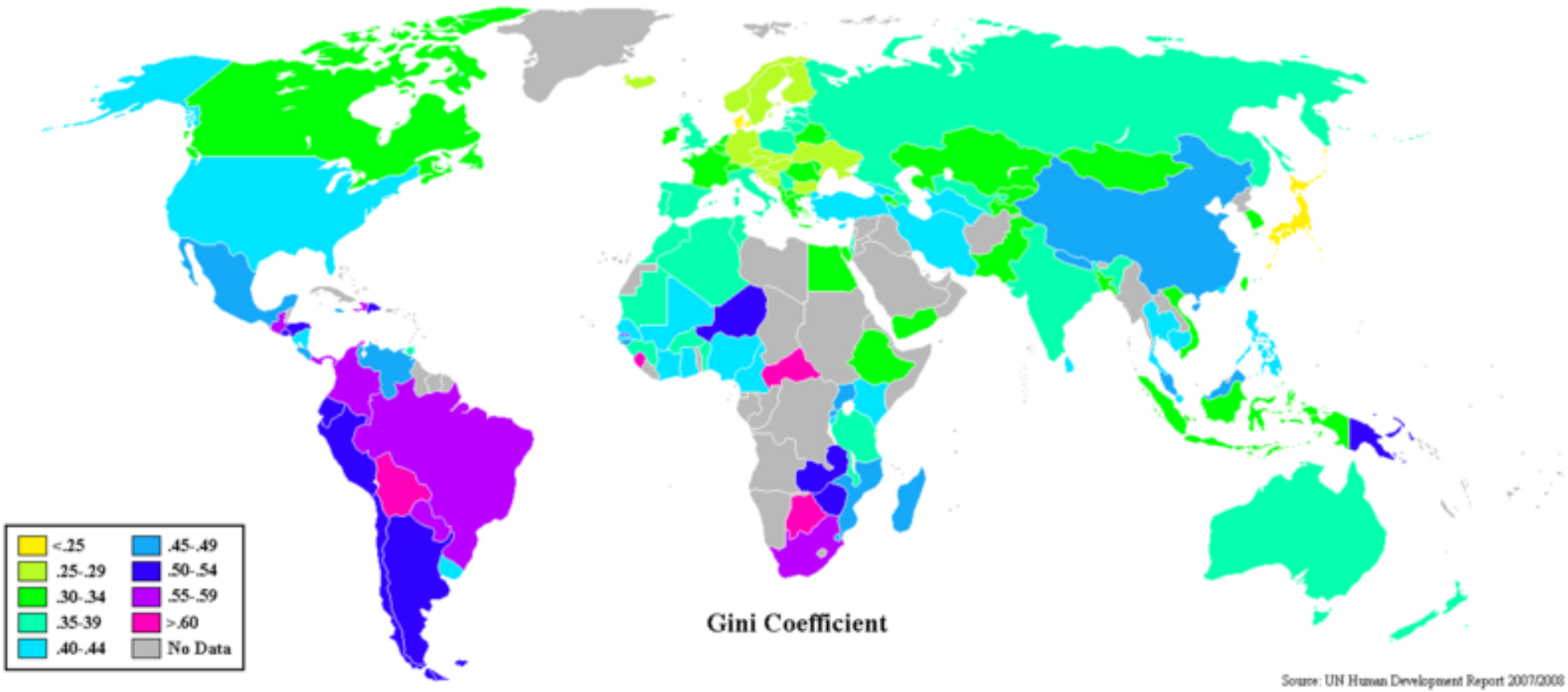


Economic Inequality in the World



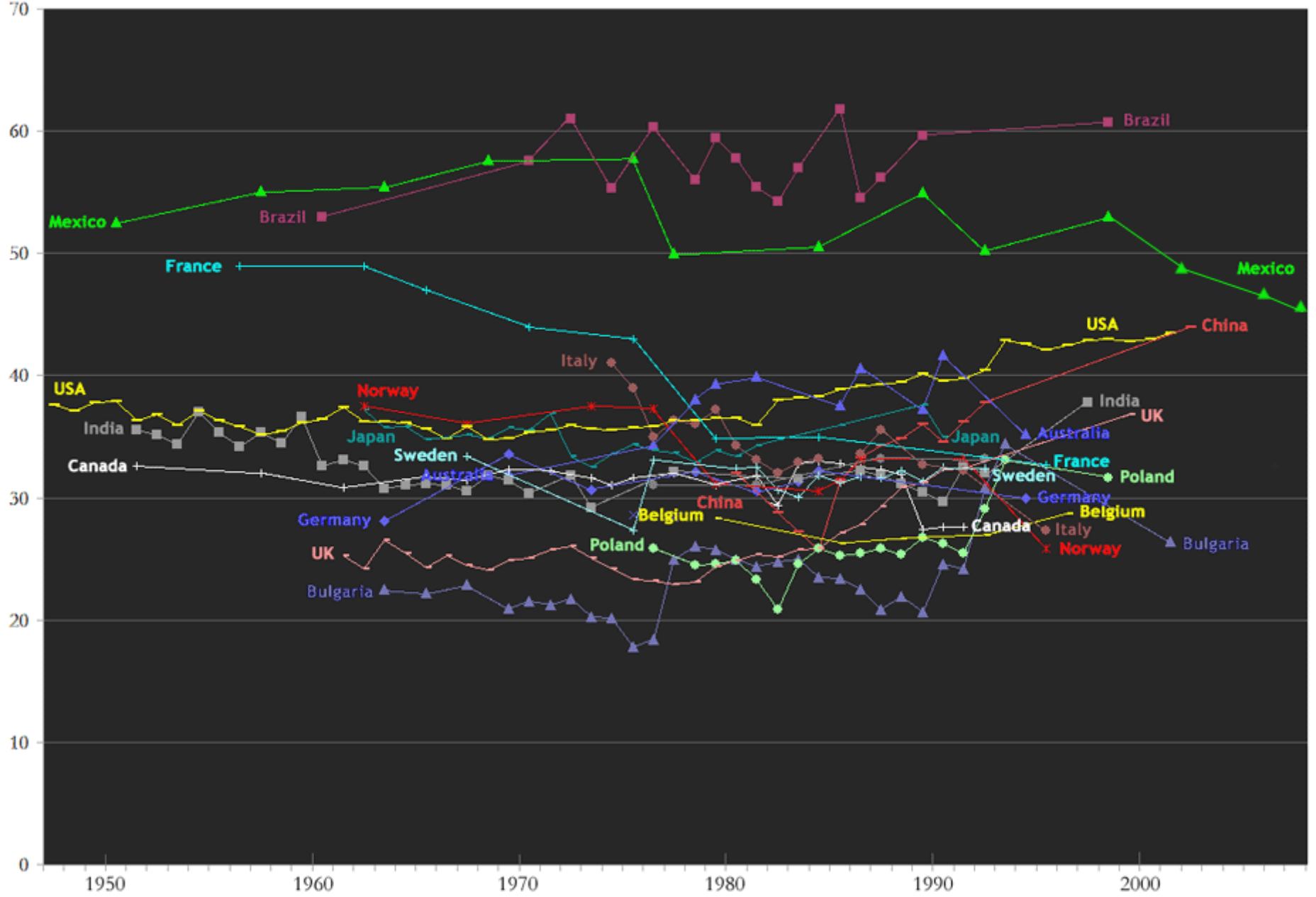
CIA World Factbook 2009, taken from en.wikipedia.org – economic inequality.

Economic Inequality in the World



Income Disparity since World War II – the Gini Index

where 0 is perfect equality, and 100 is perfect inequality (i.e., one person has all the income)



Data

- Gini coefficients, GDP, data on education, trade openness, dummies for continents and opennes of economies, proxy variable “rule of the law” about institutional quality and enforcement of property rights.
- Dataset from Dollar, D. - Kraay, A.: Growth is Good for the Poor. The World Bank, 2001.
- 6data1.gdt and 6data2.gdt

Estimation

- First we explore if there is any correlation between Gini and GDP
- Model $GINI_i = \alpha + \beta_1(logGDP_i)$
- Then the quadratic model, which corresponds to expected inverted U-shaped relation.
- $GINI_i = \alpha + \beta_1 logGDP_i + \beta_2(logGDP_i)^2$
- β_i should be significant.
- Add other variables that might influence Gini coeff.
- Consider the panel data structure

Estimation – Basic Model

Results:

	coefficient	std. error	t-ratio	p-value	
const	68,7523	4,82404	14,25	7,53E-033	***
Y	-3,77753	0,593767	-6,362	1,19E-09	***

	coefficient	std. error	t-ratio	p-value	
const	-6,86713	36,9636	-0,1858	0,8528	
Y	15,4324	9,32958	1,654	0,0996	*
sq_Y	-1,20081	0,582026	-2,063	0,0403	**

Estimation – Other Variables Added

- See the dataset for the details...

	coefficient	std. error	t-ratio	p-value	
const	-156,158	52,3390	-2,984	0,0034	***
Y	49,3055	13,2836	3,712	0,0003	***
sq_Y	-3,02291	0,845941	-3,573	0,0005	***
OPENAV	3,72623	2,80514	1,328	0,1866	
GOVAV	39,0879	14,4793	2,700	0,0079	***
RULELAW	-3,60360	1,24289	-2,899	0,0044	***
SECEDAV	-0,830246	1,14913	-0,7225	0,4714	
PRIMEDAV	-1,16868	0,687752	-1,699	0,0918	*
AGRPRODAV	-4,21523	2,22360	-1,896	0,0604	*

Panel Data: Fixed Effects

- Why fixed effects? Countries. Problem: high number of cross- sectional dummies.
- Problems with the results: nothing significant.
- Possible explanations:
  - Collinearity - Some variables explain the same thing.
  - Omitted variable bias - Inclusion of another variable might help.
  - Unbalanced dataset – too many missing observation and perhaps it is not representative anymore.

Panel Data: Fixed Effects

- Results of the Fixed effect model (run the diagnostics and also the random effect model!)

	coefficient	std. error	t-ratio	p-value
const	-66,8369	81,7176	-0,8179	0,4170
Y	25,9908	20,8022	1,249	0,2169
sq_Y	-1,52456	1,31693	-1,158	0,2521
OPENAV	6,00652	7,94269	0,7562	0,4528
GOVAV	-3,02254	29,4631	-0,1026	0,9187
SECEDAV	-0,745902	1,71105	-0,4359	0,6646
PRIMEDAV	-0,759205	1,63302	-0,4649	0,6439
AGRPRODAV	-1,73136	4,58582	-0,3775	0,7072

Panel Data: Including even more variables

- All possible variables in fixed effects estimation:

	coefficient	std. error	t-ratio	p-value	
const	-3,73094E+07	1,95990E+07	-1,904	0,0812	*
Y	81,2200	29,0157	2,799	0,0161	**
sq_Y	-2,27256	1,66932	-1,361	0,1984	
YP	-31,9043	3,42598	-9,312	7,69E-07	***
DY5	-15,8734	4,06487	-3,905	0,0021	***
OPENAV	1,19299E+08	6,26691E+07	1,904	0,0812	*
GOVAV	-7,73528	21,8397	-0,3542	0,7293	
LNINFLAV	-8,70170	1,61188	-5,398	0,0002	***
DMBCBAV	-25,9232	5,25035	-4,937	0,0003	***
SECEDAV	0,0639160	1,51798	0,04211	0,9671	
OPENADJAV	-1,19299E+08	6,26691E+07	-1,904	0,0812	*
SWAV	12,8125	3,16523	4,048	0,0016	***
IMPTAXAV	-13,8905	20,7091	-0,6707	0,5151	
WTOAV	-0,878997	2,28538	-0,3846	0,7073	
KARESTRAV	-7,26934	2,44333	-2,975	0,0116	**
PRIMEDAV	-3,17395	1,52600	-2,080	0,0596	*
AGRPRODAV	-3,09607	3,89438	-0,7950	0,4420	
LANDAV	6,31105	4,14868	1,521	0,1541	

Dependent variable: GINI; Omitted due to exact collinearity: EAP ECA MENA LAC SA SSA YIN AREAIN RULELAW VOICE

Panel Data: After Some Experimentation...

- After some experimentation with inclusion and exclusion of variables following results were obtained. Dataset 6data2.gdt
- Seems that omitted variable bias was the problem. What was the "magic variable" that solved the problem with "everything insignificant". Here it was the log of average income of the poors.

	coefficient	std. error	t-ratio	p-value	
const	-4,06761E+07	1,55794E+07	-2,611	0,0189	**
Y	80,4268	22,5157	3,572	0,0025	***
sq_Y	-2,49617	1,26513	-1,973	0,0660	*
YP	-31,2900	2,96986	-10,54	1,32E-08	***
DY5	-12,0027	2,93727	-4,086	0,0009	***
OPENAV	1,30064E+08	4,98161E+07	2,611	0,0189	**
LNINFLAV	-8,30740	1,48217	-5,605	3,95E-05	***
DMBCBAV	-24,0075	4,59977	-5,219	8,43E-05	***
OPENADJAV	-1,30064E+08	4,98161E+07	-2,611	0,0189	**
SWAV	9,47875	2,14354	4,422	0,0004	***
IMPTAXAV	-12,3193	18,9414	-0,6504	0,5247	
KARESTRAV	-7,28208	1,72863	-4,213	0,0007	***
PRIMEDAV	-3,21428	1,03414	-3,108	0,0068	***
AGRPRODAV	-2,76047	3,17049	-0,8707	0,3968	

Even better results

- Originally, the aim was to replicate a paper by Robert Barro, Inequality and Growth in a Panel of Countries, Journal of Economic Growth (2000).
- Here is table with his results:

Table 6. Continued. Determinants of inequality.

Part II: Fixed Country Effects

Variable		
log(GDP)	0.132	0.127
	(0.013)	(0.013)
log(GDP) squared	−0.0083	−0.0085
	(0.0014)	(0.0015)
Dummy: net income or spending	−0.0542	−0.0479
	(0.0108)	(0.0111)
Dummy: individual vs. household data	−0.0026	−0.0105
	(0.0078)	(0.0083)
Primary schooling	−0.0025	0.0036
	(0.0091)	(0.0092)
Secondary schooling	−0.0173	−0.0269
	(0.0099)	(0.0097)
Higher schooling	0.102	0.116
	(0.030)	(0.033)
Openness	—	0.061
		(0.025)
Number of observations	36, 56 57, 59	35, 54 53, 54

Key Points

- Although most of the models in current macroeconomics is based on the assumption of heterogenous agents, economic inequality is an important phenomenon.
- Inequality is measured by Gini coefficient (among other indicators such as ratio of incomes of upper and lower quintile etc.).
- If nonlinear relationship shall be tested, squares or cubes of regressors can do the job (nonlinear terms significant => relationship confirmed).
- Bad results => experimentation needed.

Command Log

```
open ...5Data1.gdt
# model 1
panel GINI const Y --pooled
# model 2
panel GINI const Y sq_Y --pooled
# model 3
panel GINI const Y sq_Y OPENAV GOVAV RULELAW SECEDAV PRIMEDAV AGRPRODAV --pooled
# model 4
panel GINI const Y sq_Y OPENAV GOVAV RULELAW SECEDAV PRIMEDAV AGRPRODAV
open ...5Data2.gdt
# model 5
panel GINI const Y sq_Y DY5 YIN AREAIN OPENAV GOVAV LNINFLAV DMBCBAV RULELAW SECEDAV
OPENADJAV SWAV IMPTAXAV WTOAV KARESTRAV PRIMEDAV AGRPRODAV LANDAV VOICE YP EAP ECA
MENA LAC SA SSA
# model 6
panel GINI const Y sq_Y YP DY5 OPENAV LNINFLAV DMBCBAV OPENADJAV SWAV IMPTAXAV
KARESTRAV PRIMEDAV AGRPRODAV
```

Note: Simon Kuznets

- Simon Kuznets (1901-1985): American economist
- 1971 The Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel "for his empirically founded interpretation of economic growth which has led to new and deepened insight into the economic and social structure and process of development"
- His central thesis: underdeveloped countries of today possess characteristics different from those that industrialized countries faced before they developed => growth is not automatic.
- http://en.wikipedia.org/wiki/Simon_Kuznets
- http://cepa.newschool.edu/het/profiles/kuznets.htm