LECTURE 7

INCOME DISTRIBUTION AND GROWTH:

THE TWO-WAY INTER-RELATIONSHIP

A. Introduction

B. Size Distribution of Incomes: Measurements

C. Inter-relationships within Countries

* Effects of Growth on Distribution:

Theory and Evidence

*Effects of Distribution on Growth:

Theory and *Evidence*

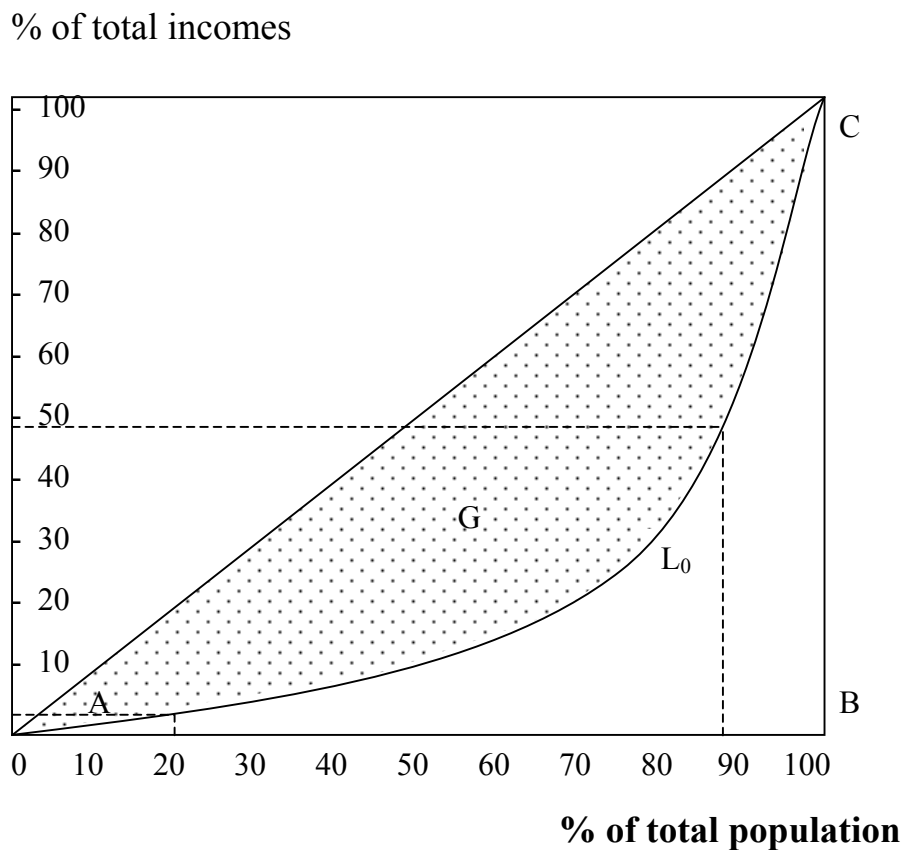
D. Global Income Distribution

Literature: Ray 1998, chs. 2, 6, 7 and 8; lecture notes.

Suggested further readings: IBRD, World Development Report 1990, 2000/01; Persson and Tabellini 1994; Alesina and Rodrik 1994, Clarke 1995, Dollar and Kraay 2000a, 2000b, Svedberg 2001.

[7.2] Measurements of Inequality

Figure 7.1. Lorentz diagram showing the relative distribution of income in a country ((or across countries)



Problems:

1) Two different distributions can yield exactly the same GINI coefficient

2) Gives only information on the shape of the entire distribution, not on how the poorest, for instance, relate to the mean or to the better off.

3) Very insensitive to changes in the lower (and upper) tails

[7.3] Selected Inequality Measurements and Indicators

1) The GINI coefficient (graphically area **a** as share of triangle **b** in [7.2])
   ($0<GINI<100$)

2) Share of total incomes of the richest 10 % of population as a ratio to the incomes of the poorest 10 % (or the 20% richest to 20% poorest)

3) The coefficient of variation in the distribution (CV)

$$CV = \sigma/\mu,$$

where σ is the standard deviation and μ is the mean income.

4) Theil index:

$$T = T_b + \Sigma\theta_g T_g,$$

where T_b is the index of inequality *between* groups and T_g is the inequality within group g and θg is the share of income of group g.

The choice of measurement depends upon what question it is intended to shed light on. If, for instance the question is how the poorest stand in relation to the richest, the 10 to 10 ratio may be useful.

The choice of measurement is usually ad hoc and the ranking of countries may be sensitive to the choice of measurement (see [7.4]).

[7.4] Table 7.1. Income distribution within selected countries with different measures

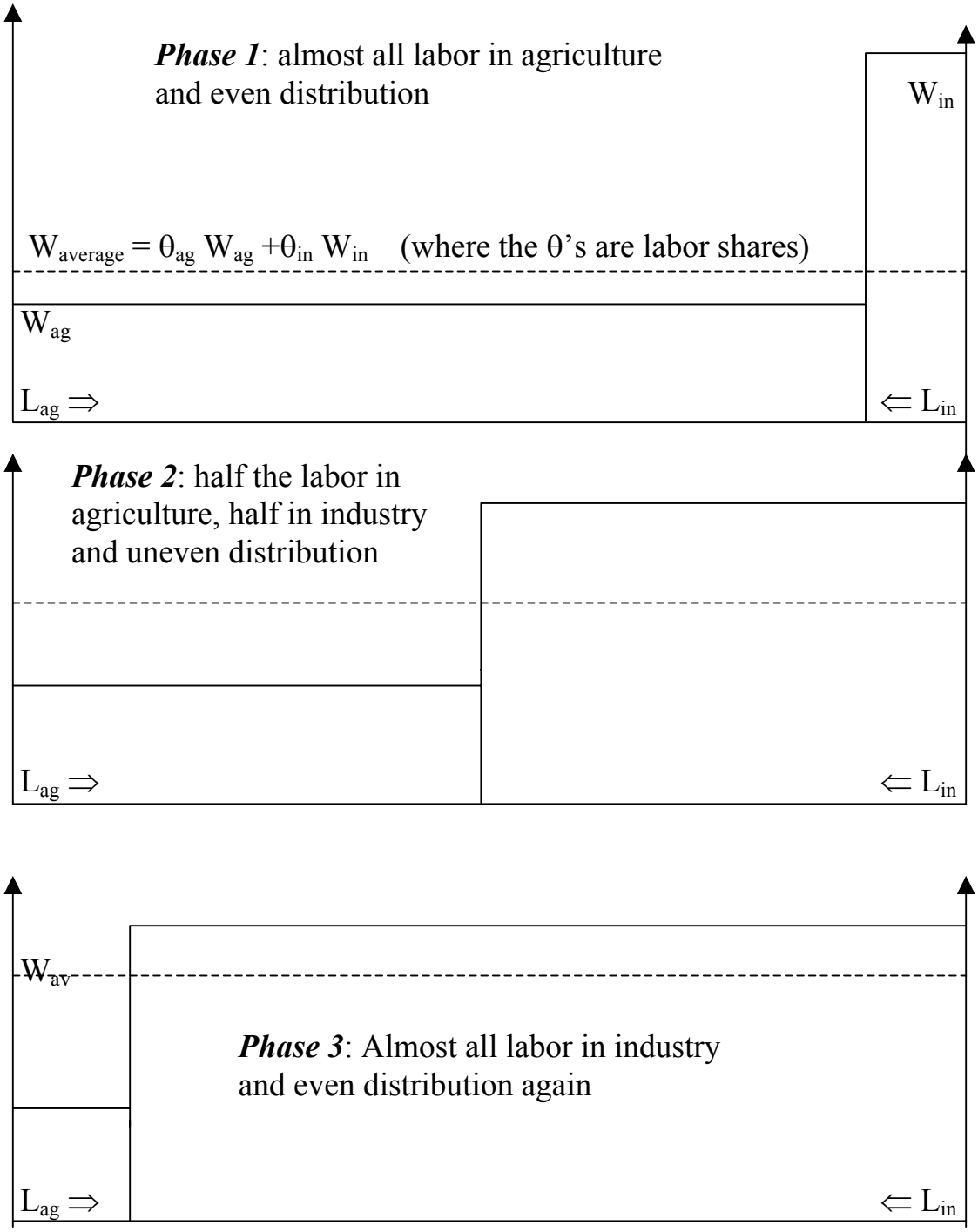
Country (year)	GNP per capita (ppp)	Share total income of rich and poor 10 per cent of population		Ratio rich/ poor	GINI
	1999	Rich 10	Poor 10	(2)/(3)	
	(1)	(2)	(3)	(4)	(5)
Most uneven					
Cent African Rep	1,130	47.7	0.7	**68**	**61**
Brazil	6,320	47.6	0.9	**53**	**60**
Colombia	5,710	46.1	1.1	**42**	**57**
South Africa	8,320	45.9	1.1	**42**	**57**
Relatively even					
China	3,290	30.4	2.4	**13**	**40**
India	2,150	33.5	3.5	**19**	**38**
Bangladesh	1,480	28.6	3.9	**7**	**34**
Tanzania	480	30.1	2.8	**11**	**38**
Developed countries					
USA	30,600	30.5	1.8	**17**	**41**
UK	20,880	27.3	2.6	**11**	**36**
Japan	24,040	21.7	4.8	**5**	**25**
Sweden	20,820	20.1	3,7	**5**	**25**

Source: *World Development Report* 2000/01, Tables 1 and 5.

Developments over time for some 40 countries, see Li, EJ 1999

[7.5] Effect of Economic Growth on Income Distribution
Figure 7.2. The Lewis type of model and the Kuznets curve

<u>Hypothesis 1</u>: the Kuznets curve (see [7.6])



[7.6] Effects of Economic Growth on Income distribution (cont'd)

Figure 7.3. The Kuznets Curve derived from the Lewis-type model

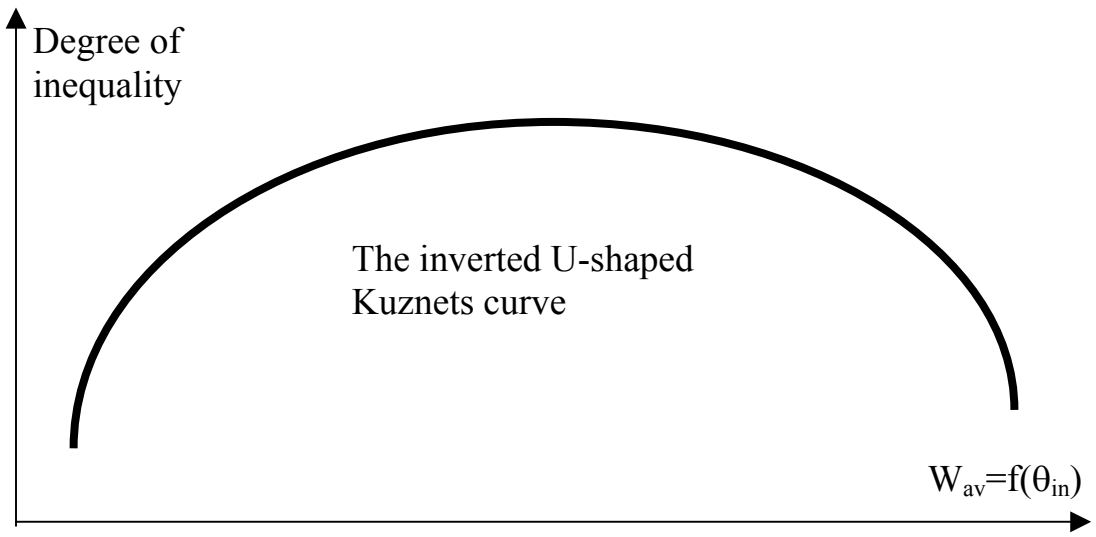
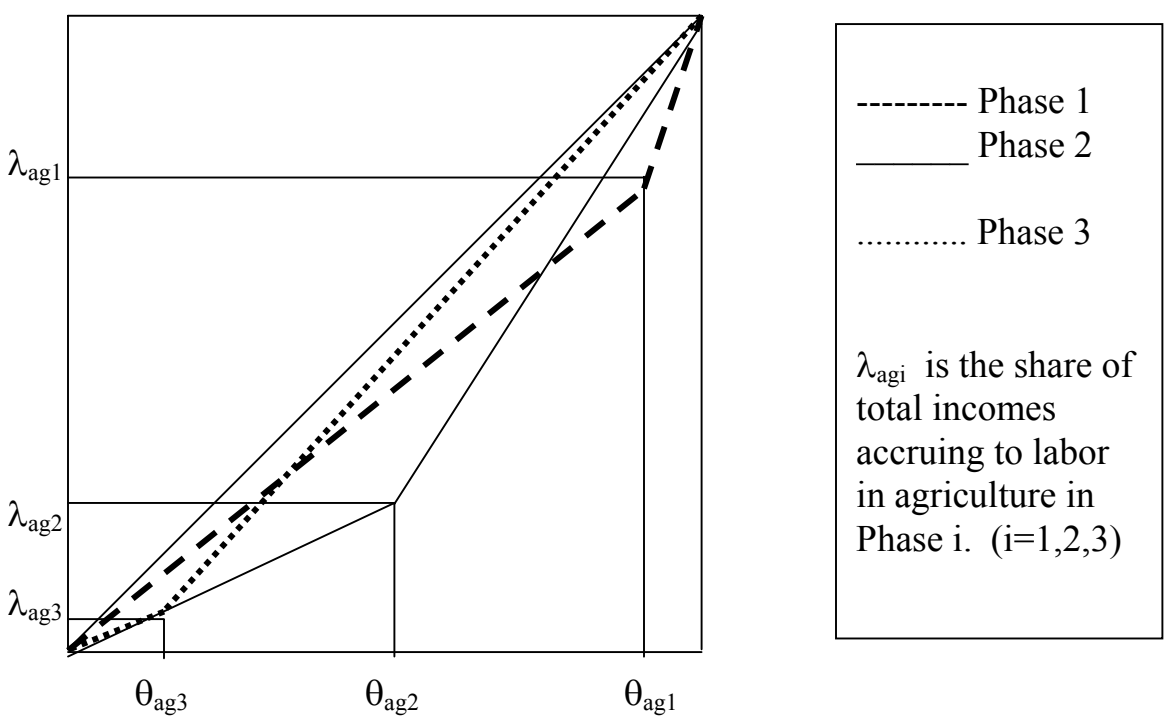


Figure 7.4. The Gini coefficient in the 3 phases of labor allocation



[7.7] Effects of Economic Growth on Income distribution (cont'd)

<u>Hypothesis 2</u>: Growth always leads to increased inequality

In the 1960s and 1970s, several economists argued that growth in market economies cannot take place without a worsening of the income distribution (read Ray, ch 7).

*** Wealth and other income-generating assets are unevenly distributed historically and only the rich can save and invest, meaning that income growth goes to those initially rich.**

*** Technological progress is inherently biased in favour of the skilled and educated, whose marginal product goes up the most, while the unskilled falls behind.**

*** Only the rich can put up collateral and have access to credit for investment (cf. Grameen Bank and its 1000 offsprings)**

[7.8] Effects of Economic Growth on Income distribution (cont'd)

<u>Hypothesis 3</u>: There is no general linkage; growth affects distribution through many channels (also see Dollar and Kraay 2000a and Aghion et al in *JEL*, 1999:1615-1660):

1) Public health care provision (with a lag); positive?
2) Primary/secondary school enrolment (with a lag); positive?
3) Openness to trade; positive?
4) Rule of law democracy; positive?

5) Share of oil and minerals in exports: negative?
6) Macroeconomic instability (e.g. inflation); negative?
7) Corruption; negative?
8) Population growth; negative (population heterogeneity)?
9) Dependency ratio; negative (population heterogeneity)?

There are many hypotheses, and also a few attempts to **model** these relationships, but only one "mechanism" at the time ⇒ empirical problem to find out what mechanisms predominate.

[7.9] Effects of Economic Growth on Income Distribution: Empirical Findings, Cross-Country Observations

Tests of the Kuznets curve:

1) Ahluwalia's (1976) estimation model:

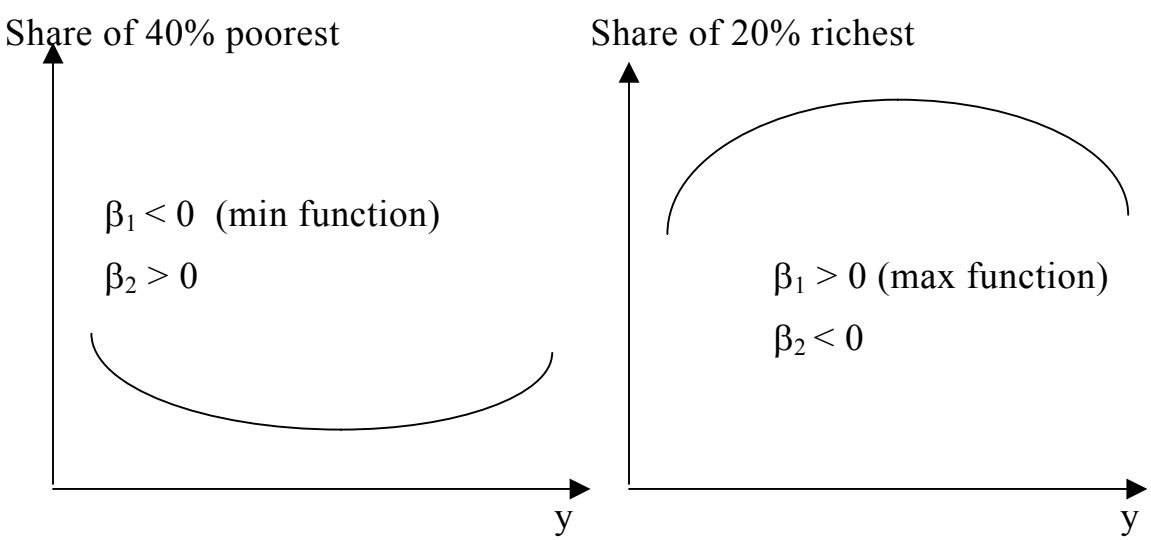
$$s_i = \alpha + \beta_1 y + \beta_2 y^2 + D + \varepsilon$$

where $s_i = 1,....5$ (is the share of five income quintiles in total incomes in respective country). **D** is a dummy distinguishing communist countries (at the time); **y** is per capita income. Two main improvements over earlier investigations: (1) strict statistical test; (2) more data.

Expected results (signs of coefficients)

	Income shares		
Coefficient	40% poorest	40% middle	20% richest
β_1	-	?	+
β_2	+	?	-

Figure 7.4. Expected Income Shares with Higher per capita Income



[7.10] Effects of Economic Growth on Income Distribution: Empirical Findings (cont'd)

Ahluwalia's main results (confirms the hypothesis):

Income group	β_1	β_2	R^2
Lowest 40 %	- 17 (3.71)*	3 (3.74)*	0.54
Middle 40 %	- 46 (3.43)*	9 (3.88)*	0.47
Top 20 %	90 (4.48)*	-18 (4.88)*	0.58

Note: t-values in paranthesis; * indicates significance above 0.95

Critique:

1) The income distribution data contain large margins of error and are not derived with comparable methods for the countries included

2) Income data not PPP-adjusted

3) No other explanatory variables =omitted variable bias

[7.11] Effects of Economic Growth on Income distribution: Empirical Findings, Cross-country observations (cont'd)

2) Deninger and Squire (1996, 1998)

Similar model:

$$s_i = \alpha\beta + by + c(1/y) + D + \varepsilon$$

Main improvement: Much better and more comprehensive data

Result: Confirms Ahluwalia's findings of an inverted U-shaped relationship, but **weak significance**

[Results in a graph to be presented in class]

Reservations:

1) When controlled for **regional-specific** differences, significance disappears (Latin America effect)

2) Sensitive to **alternative specifications** of the estimated function (Ray p. 206)

3) Few other explanatory factors than income and investment (**omitted variable bias?**) (e.g. trade regime and human capital)

4) No **robustness** test

5) **Cross-section**; time-series inferences difficult to draw

[7.12] Relationship between Growth and Income Distribution: Further Empirical Findings

Figure 7.5: Results from Dollar and Kraay (2000)

[Pasted graph to be shown in class]

Figure 7.6. Results from Barro (2000) on the basis of panel data

[Pasted graph to be shown in class]

Barro's investigation is the most extensive one so far using cross-country observations (i.e. a panel)

The main conclusion to be drawn from the cross-country studies are:

1) There is a **weak support** for the Kuznets hypothesis.

2) There is ***no*** **support** for the alternative hypothesis that as countries grows richer, income distribution will become more uneven.

3) Cross-country evidence is **not sufficient** to allow strong conclusions.

[7.13] Time series-estimates; Deninger and Squire (1996, 1998), Li (1998)

Time series data (observations for more than one year) available only for about 40 countries for relatively short periods (about 40 years)

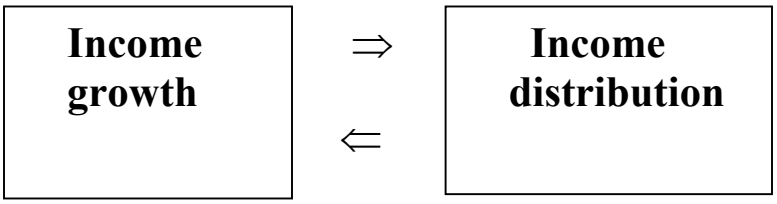
In Deninger and Squire's (1996) **original data set**, only five of the about 40 countries had a change in the **GINI-coefficient of more than plus/minus 5 points**. This seems to tell us that income distribution, although very different across countries, does not change much over time in most countries.

In Deninger and Squire's **test** (1998, Table 7) on time series data, only 5 countries (Brazil, Hungary, Mexico, Philippines and Thailand) had a statistically significant **inverted** U-curve development. Another 4 countries had a statistically confirmed development of a U-curve **proper**, signifying that first income distribution became more even and then more uneven (Costa Rica, India, United States and UK). The remaining 30 countries had **no statistically significant change** in either direction.

It may also be that changes are **reversed**: In the US, income and wealth distribution grow more unequal up to around 1870, then declined over the period up to 1970; and then became considerably more unequal again.

[7.14] The Reverse Relationship: Effects of Income Distribution on Growth—Theory

Note that even if one is *not* concerned with income distribution from a normative perspective, the effect of growth on distribution has to be assessed if there are causal effects in both directions (feedback effects):



Three types of mechanisms for income distribution to affect economic growth considered:

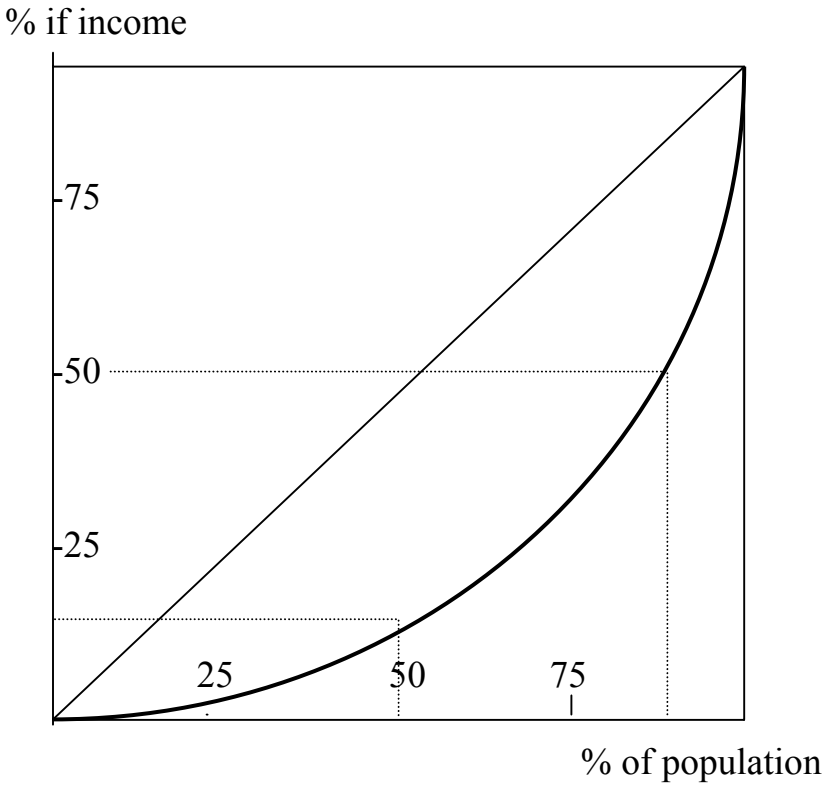
1. Through demand for redistribution policies that induces distortions [7.15]

2. Through savings and investment [7.16]

3. Through imperfections in credit markets and markets for human capital creation [not explicitly dealt with here; read Ray, chapter 7].

[7.15] Income Distribution: Effects on Growth (cont'd)

Figure 7.7. Median voter type of model and redistribution

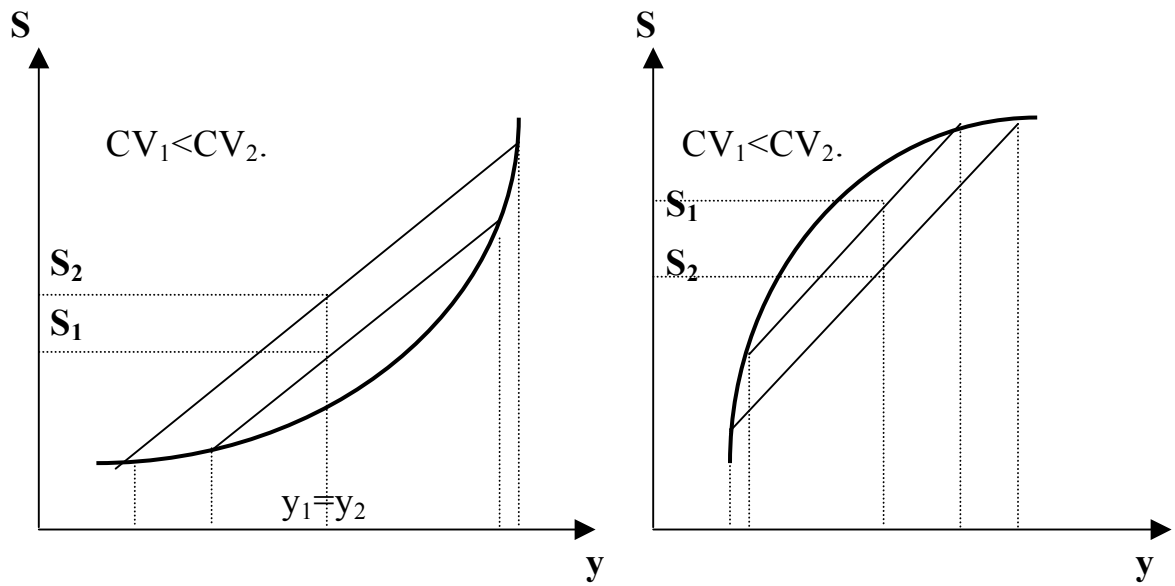


The Figure depicts a situation with a relatively uneven distribution in a country. Half the population only have some 15% of total incomes and about 12% of the population have half of all incomes.

Since median income is lower than average income, more than half the population will favour redistribution, from the rich with above average income, to those below. If accomplished through taxation that induces distortions in the allocation of factors of production and/or the investment ratio, income redistribution will lead to lower growth.

[7.16] Income Distribution: Effects on Growth (cont'd)

Figure 7.8: Different savings functions and income distribution



(1) Kaldor/Stiglitz; the rich save more

(2) Conspicuous consumption by the rich (Ray)

Assumptions:

1) Two countries with the same per-capita income ($y_1=y_2$)

2) The income are assumed to be more equally distributed in country 1 (as measured by the coefficient of variation ($CV=\sigma/y$); that is $CV_1<CV_2$.

Outcomes:

1) When the rich save proportionally **more** (the savings function is **convex**), the more uneven distribution (country 2), the higher the savings ratio

2) When the rich saves proportionally **less** (the savings function is **concave**), the more even distribution (country 1), the higher the savings ratio.

[7.17] Income Distribution: Effects on Growth: Empirics

Up to rather recently, the conventional view was that an uneven distribution of incomes was beneficial for subsequent growth, mainly through the Kaldor/Stiglitz savings/investment mechanism [7.16], although very little empirical evidence was available.

In the mid 1990s, three independent studies, based on cross-country regressions and new data on income distribution, came to the opposite result: even income distribution enhances growth in subsequent periods!

[Regression results from Clarke (1996) will be shown in class]

Barro (Journal of Economic Growth, 2000) extended the analysis by using **panel data** and examined the relationship distinguishing between low- and higher income countries.

His results **confirmed** the findings of earlier studies, but only for developing countries. For the **rich countries**, he found that inequality in income distribution have a positive effect on subsequent growth.

[7.18] Summary of Inter-linkage between Income Distribution and Economic Growth at the Level of Countries

1) Effects of Growth on Distribution

a) No strong evidence on inverted U-shape on cross-country data

b) No systematic effect of growth on income distribution <u>in any direction</u>, either on <u>cross-country</u> or <u>time-series</u> data

2) Effects of Distribution on Growth

a) Significant and <u>robust correlation</u> between initial equality and subsequent growth among developing countries

b) <u>Size of effects</u>. Countries with one SD of income inequality below the average have between 1.3 and 2.5 percentage points <u>higher growth</u> than countries with 2 SD above the mean.

c) <u>Policy implications</u>: (1) not necessarily to redistribute income through government action, but rather for (2) governments to follow income-distribution friendly growth strategies.

[7.19] World Income Distribution — Which Way?

A. World income distribution has deteriorated dramatically according to some—improved according to others

Study	Period	Distribution	Results
UNDP 1999	1960-1995	Ratio rich 20% /poor 20%	Drastic increase in ratio
World Bank 2000/ 01	1960-1997	Ratio rich 5%/ poor 5 %	Drastic increase in ratio
Firebaugh 1999 Schultz 1998 Melchior 2000	1960-1988 1960-1988 1965-1997	Various ratios and Gini	Slight *fall* in Gini and in ratios

(Graphic presentation of main results in [7.20])

B. Main reasons for differences in results:

*** Different ratios are used and, hence, countries covered**

*** Measures of income differs (PPP or unadjusted**

*** Definition of distribution differs (ratios vs Gini)**

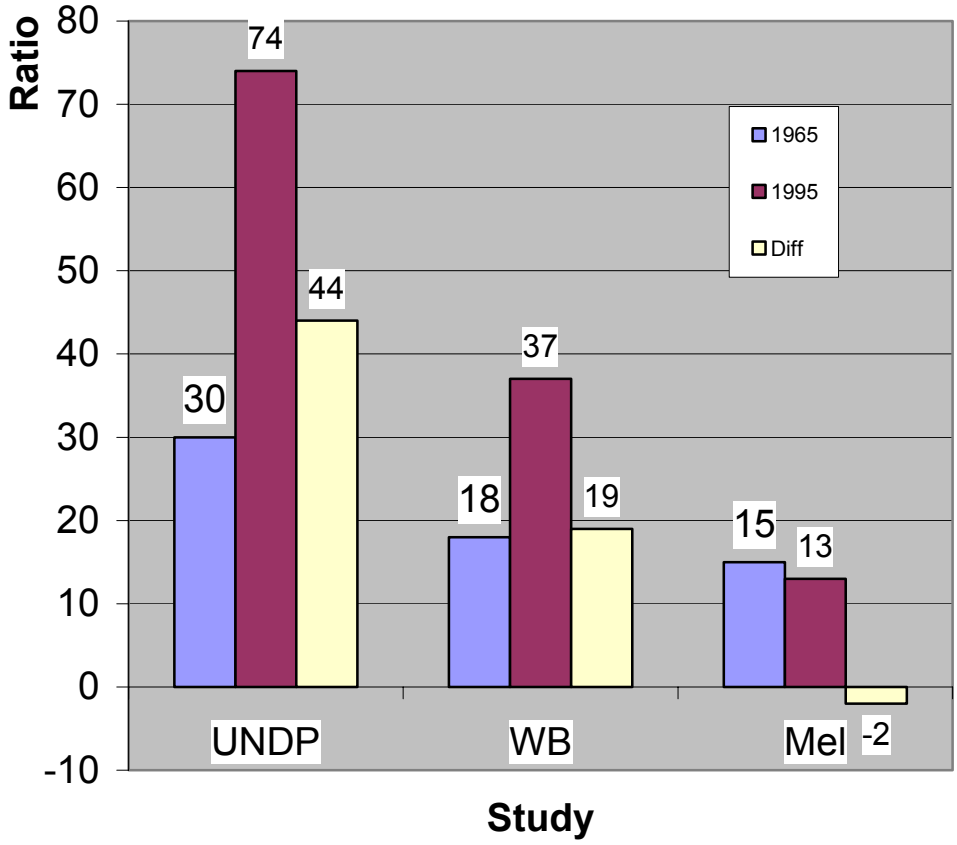
Other reasons:

*** Different years of comparison**

*** Data sampling differ (two years or time series)**

[7.20] World Income Distribution — Which Way? (cont'd)

Figure 7.9. Ratio of per capita income in the richest and the poorest countries, selected studies, 1965 and 1995



[7.21] World Income Distribution — Which Way? (cont'd)

Charateristics and Flaws in the Various Studies

1) UNDP

a) Per-capita incomes in the countries with the 20% richest population to per-capita income in the countries with 20% poorest population

b) No adjustment for PPP in income data

c) Comparison of two random years

2) World Bank

a) Per-capita incomes in the 20 countries with the highest income as a ratio to the 20 countries with the lowest incomes (irrespective of the size of the population) (ad hoc exclusion of China!)

b) Adjustment for PPP in income data

c) Comparison of two random years

3) Melchoir (but also several other studies)

a) Per-capita incomes in the countries with the 20% richest to the per-capita income in the countries with 20% poorest (same as UNDP)

b) Adjustment for PPP in income data (same as World Bank)

c) Estimates for every single year 1965-1997

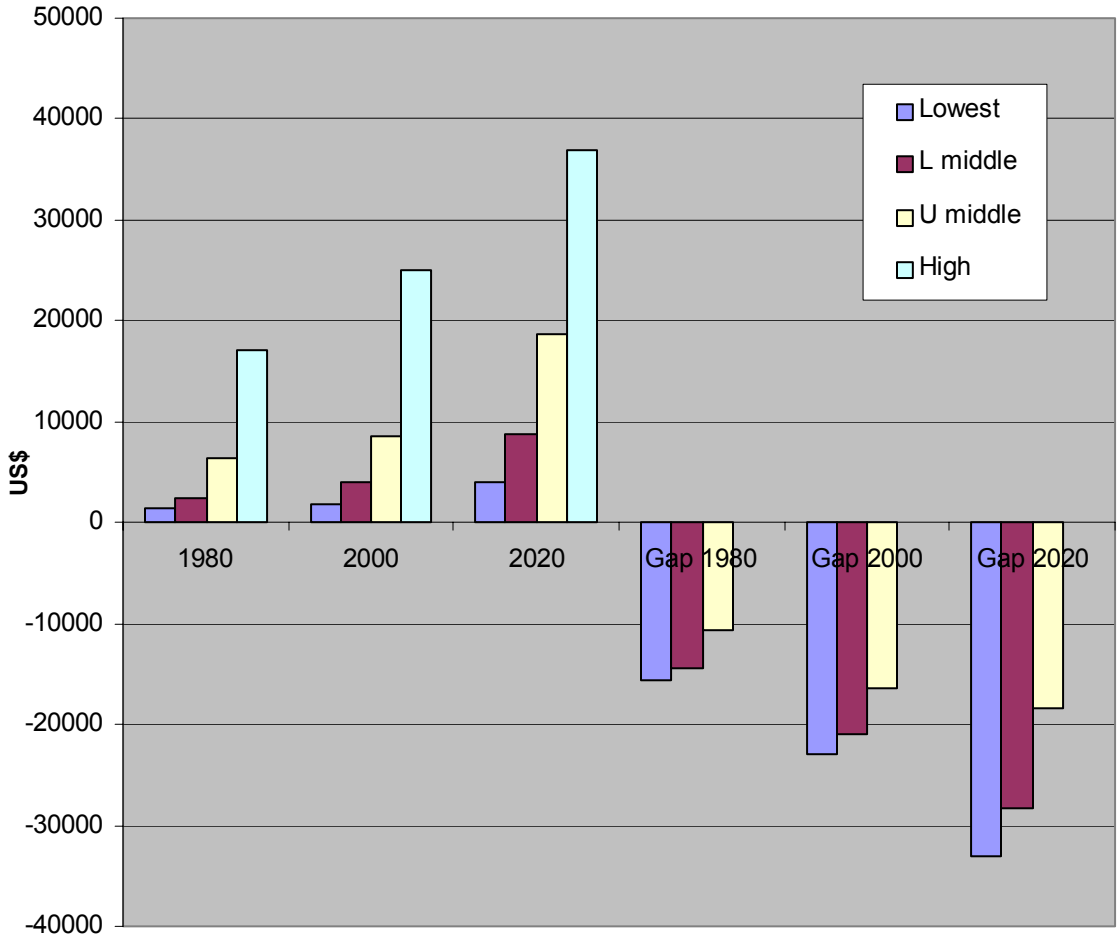
C. Tentative conclusions: the Melchior study the most reliable

*** Distribution deteriorated before 1965 but has been rather stable since**

*** Distribution in the bottom end deteriorated (SSA)**

[7.22] More or less unchanged relative distribution across countries, but growing absolute income gaps

Figure 7.10. Absolute income and income gaps between developing countries, by income group, and the high income countries in 1980, 2000 and projection for year 2020 (real per-capita income in US$, PPP-adjusted)



Year of per-capita income and gaps

[7.23] Comments to Figure 7.10

The two most left-ward sets of bars show actual per-capita incomes in 1980 and 2000, in four broad groups of developing countries, differentiated by income level, as estimated by the World Bank. The third set of bars from the left depicts projections of per-capita incomes, based on the assumption that between 2000 and 2020, per-capita income will grow by 4% annually in all the three categories of developing countries, while only by 2% in the high income countries.

The two next sets of bars as we move to the right in the figure show the actual absolute income gaps in 1980 and 2000. These gaps have increased for all three groups of developing countries. Finally, the projected income gaps in year 2020 are found in the right-most part of the figure. The projected absolute gaps will tend to grow notably even though the relative growth rate is assumed to be twice as high in the developing countries as compared to rich countries.

In the growth literature, when developing countries are growing faster in relative terms, this is referred to as "convergence", or that they are "catching up". Without bringing in the time dimension for this process explicitly, this terminology is misleading. If the relative growth rate is higher in poor countries than in rich countries, they will eventually "catch up", but this may take many generations and in between, the absolute income gaps will inevitably increase.