Session II: Poverty Accounting

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How does poverty react to income growth and changes in distribution?

Introduction

The questions we'll try to answer in this session:

- Is growth *always* good for the poor?
- What is pro-poor growth?
- How do we empirically measure pro-poor growth?
- How much of poverty alleviation is due to growth?
- How much of poverty alleviation is due to redistribution?
- What influences pro-poor growth?

Let's brainstorm: How would you define pro-poor growth?

Two definitions from the literature

Absolute definition

- Growth that reduces poverty. Period.
- The growth process is pro-poor if and only if poor people benefit in absolute terms, as reflected in an appropriate measure of poverty (Ravallion 2004).

Relative definition:

- Growth that *disproportionately* reduces poverty.
- Growth is pro poor if any distributional shifts accompanying economic growth favor the poor, meaning that poverty falls more than it would have if all incomes had grown at the same rate (Ravallion 2004).

The sources of pro-poor growth

According to Kraay (2006) these are

1. rapid *growth* in average incomes
2. a high *sensitivity* of poverty to growth in average incomes; and
3. a poverty-reducing pattern of growth in relative incomes.
    - Which can actually also be broken up further into a) distributional *change* and b) a high *sensitivity* of poverty to distributional change.

This implies four components: the observed changes and sensitivities, for both income growth and distributional change.

What is poverty accounting?

Allows us to decompose changes in poverty rates (the output) into the "proximate" sources of poverty reduction (the inputs).

Terminology

- The "impact" or "sensitivity" measures the reaction for a standardized change in the input.
- The "contribution" measures the share of the observed change that is due to the observed change in the input.

Just as with "growth accounting" (familiar to anyone?), we learn how important particular inputs are.

Contrary to growth accounting, we know for sure what factors belong in the equation.

Poverty accounting

At the micro-level, we can decompose poverty into changes in incomes and changes in inequality up to some error (Datt & Ravallion, 1992; Kakwani, 1993)

$$\begin{aligned} H_t - H_{t-1} = \Delta H_t =& H(\bar{y}_t/z, L_{t-1}) - H(\bar{y}_{t-1}/z, L_{t-1}) + \\ & H(\bar{y}_{t-1}/z, L_t) - H(\bar{y}_{t-1}/z, L_{t-1}) + \zeta_t \end{aligned}$$

where H is the poverty headcount ratio, $\bar{y}$ is mean income, z is the poverty line, and L denotes the Lorenz curve.

At the cross-national level, we typically don't have each unit record but only grouped data or just the Gini coefficient.

Calculus of poverty accounting I

Let the poverty line (z) be fixed (*absolute*) and assume the poverty headcount ratio is follows a two-parameter distribution, so that $H(\bar{y}_t/z, G_t) = H(\bar{y}_t, G_t) \equiv H_t$. A first-order Taylor expansion gives

$$\frac{\mathrm{d}H_t}{H_t} \approx \underbrace{\left(\frac{\partial H_t}{\partial \bar{y}_t}\frac{\bar{y}_t}{H_t}\right)\frac{\mathrm{d}\bar{y}_t}{\bar{y}_t}}_{\text{Growth}} + \underbrace{\left(\frac{\partial H_t}{\partial G_t}\frac{G_t}{H_t}\right)\frac{\mathrm{d}G_t}{G_t}}_{\text{Distribution}} = \varepsilon_t^{H\bar{y}}\frac{\mathrm{d}\bar{y}_t}{\bar{y}_t} + \varepsilon_t^{HG}\frac{\mathrm{d}G_t}{G_t}$$

where

- $\frac{\mathrm{d}H_t}{H_t}$ is the *relative change in the headcount ratio*
- $\frac{\mathrm{d}\bar{y}_t}{\bar{y}_t}$ is the *growth rate in mean incomes* and $\varepsilon_t^{H\bar{y}}$ is the *income elasticity of poverty* (recall: x% change for 1% change)
- $\frac{\mathrm{d}G_t}{G_t}$ is the *change in the Gini coefficient* and ε_t^{HG} is the *inequality elasticity of poverty*

Calculus of poverty accounting II

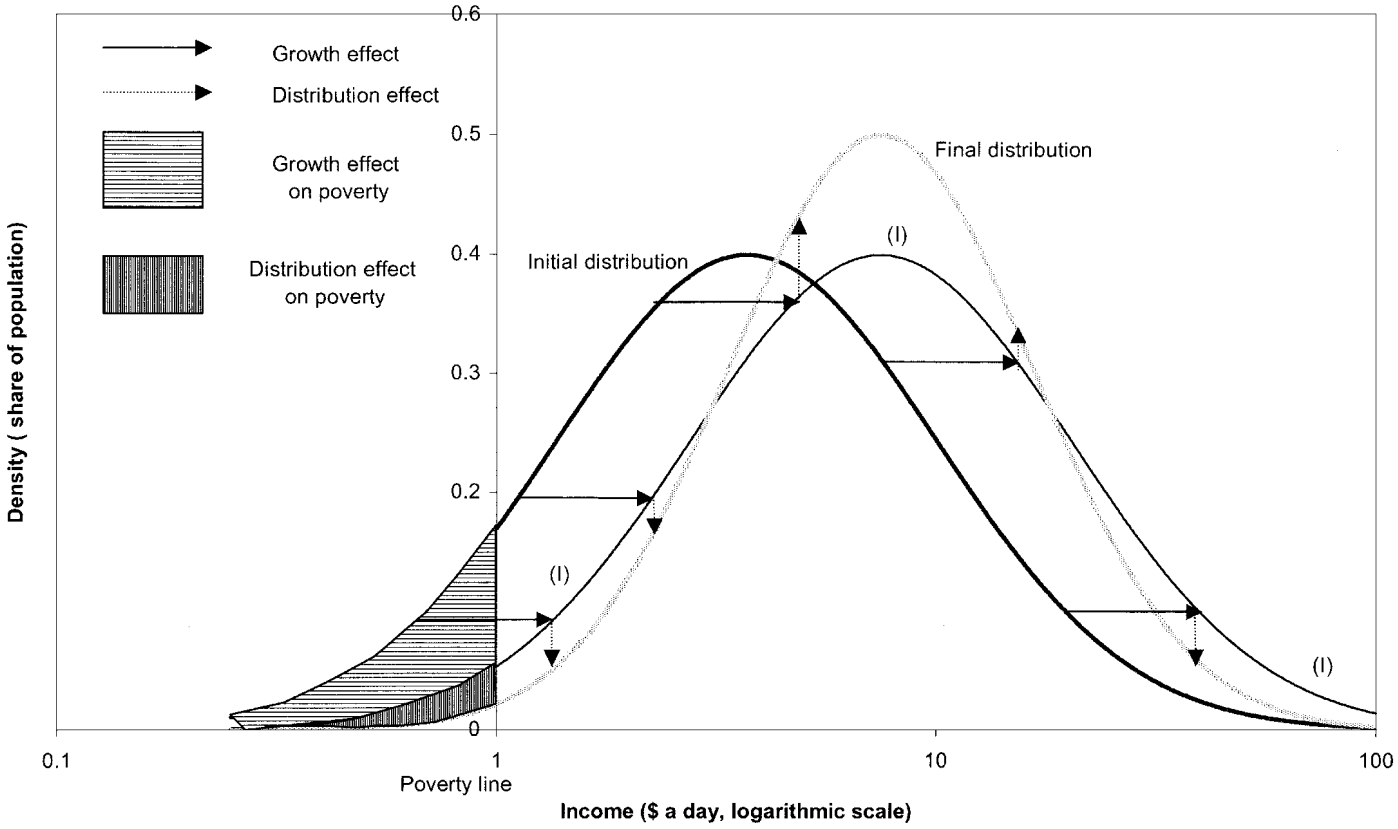
Same argument can be made with absolute changes and semi-elasticities

$$\mathrm{d}H_t \approx \underbrace{\left(\frac{\partial H_t}{\partial \bar{y}_t}\frac{\bar{y}_t}{1}\right)\frac{\mathrm{d}\bar{y}_t}{\bar{y}_t}}_{\text{Growth}} + \underbrace{\left(\frac{\partial H_t}{\partial G_t}\frac{G_t}{1}\right)\frac{\mathrm{d}G_t}{G_t}}_{\text{Distribution}} = \eta_t^{H\bar{y}}\frac{\mathrm{d}\bar{y}_t}{\bar{y}_t} + \eta_t^{HG}\frac{\mathrm{d}G_t}{G_t}$$

where

- $\mathrm{d}H_t$ is the *absolute change in the headcount ratio*
- $\frac{\mathrm{d}\bar{y}_t}{\bar{y}_t}$ is the *growth rate in mean incomes* and $\eta_t^{H\bar{y}}$ is the *income semi-elasticity of poverty* (recall: unit change for 1% change)
- $\frac{\mathrm{d}G_t}{G_t}$ is the *change in the Gini coefficient* and η_t^{HG} is the *inequality semi-elasticity of poverty*

Putting it together



Calculating the contributions

We can simplify the previous to

$$dH = Y + D + R$$

where Y is the growth component, D is the distribution component and R is the remainder. Careful, Y and D involve unobserved counterfactuals.

Now we can decompose the variance of a sum as

$$\text{VAR}(dH) = \text{VAR}(Y) + \text{VAR}(D) + 2\text{COV}(Y, D)$$

Hence, the contribution of growth is

$$\frac{\text{VAR}(Y) + \text{COV}(Y, D)}{\text{VAR}(Y) + \text{VAR}(D) + 2\text{COV}(Y, D)}.$$

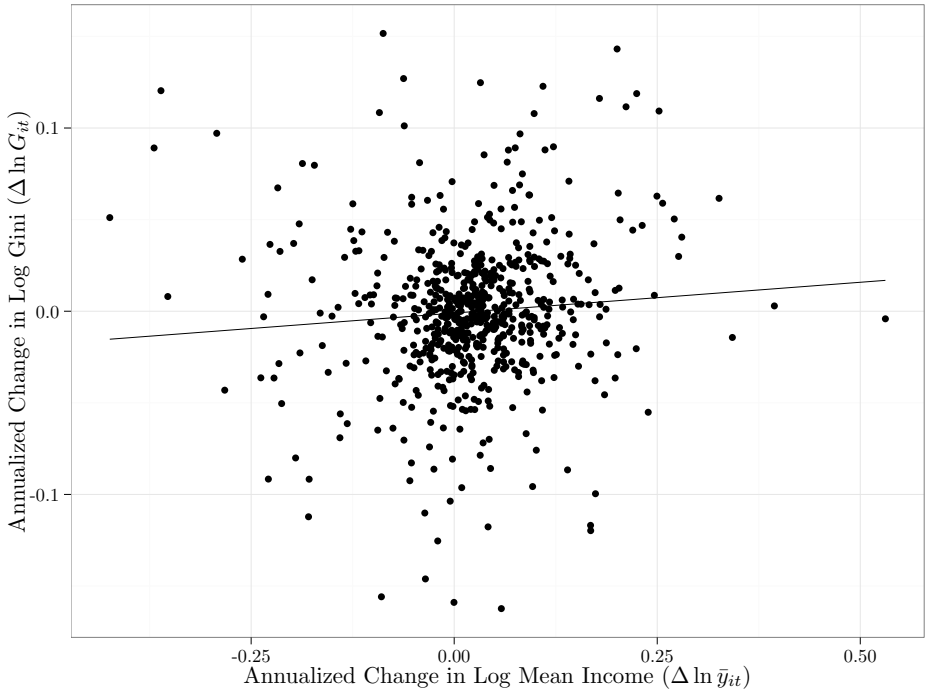
Back to Aart Kraay (2006)

For the absolute pro-poor definition and the 1.08$ a day line, Kraay finds

- In the short run, about 2/3 of poverty reduction are due to growth and about 1/3 is due to changes in distribution.
- In the long-run, it's even 97% due to growth!
- The contribution of growth decreases as the poverty measure becomes more bottom sensitive.

This is not set in stone. It's an analysis of the historical contributions, which could have involved a higher contribution from distribution. The story is a little more intricate...

Changes in (within) inequality and changes in incomes



- Basically no trend; also over time, trend rate is mildly positive, so Kraay (2006) cannot find a large contribution of inequality.

Properties of elasticities and semi-elasticities

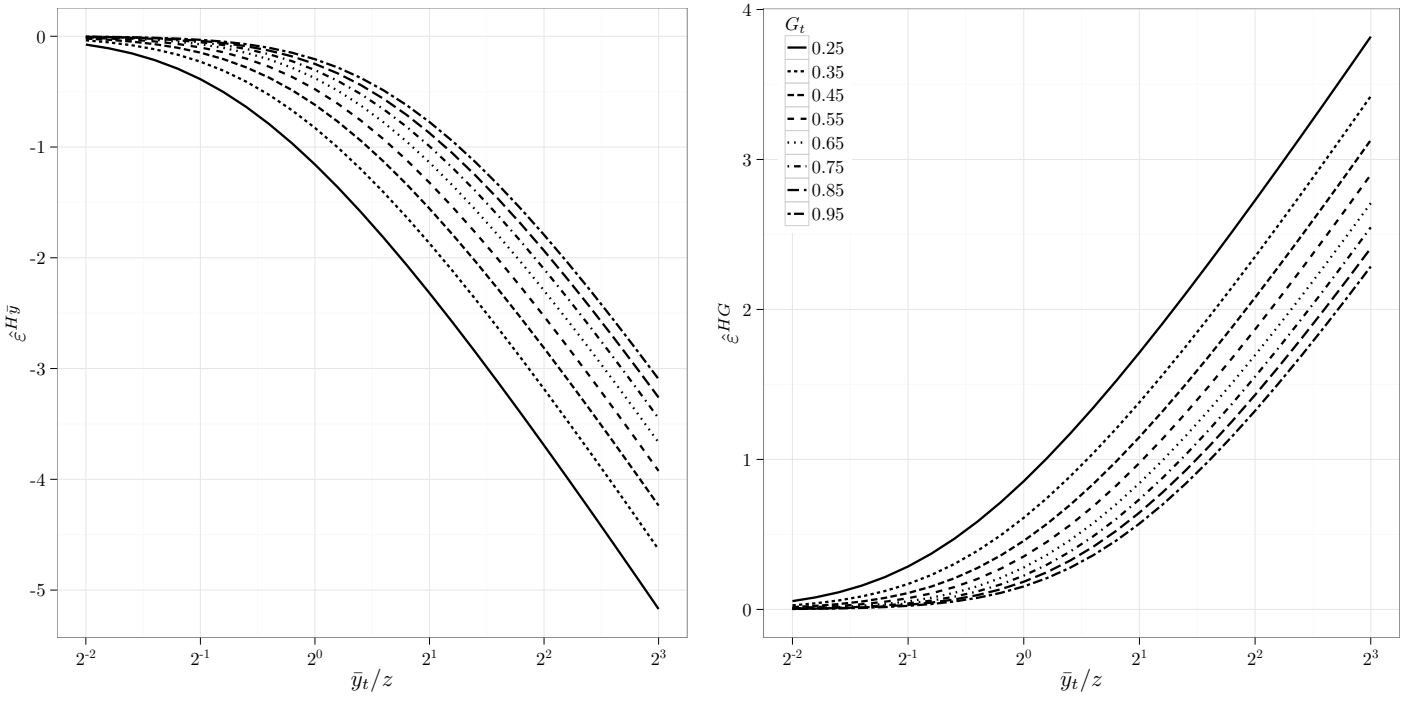
Elasticities:

- The income elasticity is weakly negative ($\varepsilon_t^{H\bar{y}} \leq 0$) and decreasing in average income but increasing in inequality
- The inequality elasticity is weakly positive ($\varepsilon_t^{HG} \geq 0$) and increasing in average income but decreasing inequality

Semi-elasticities:

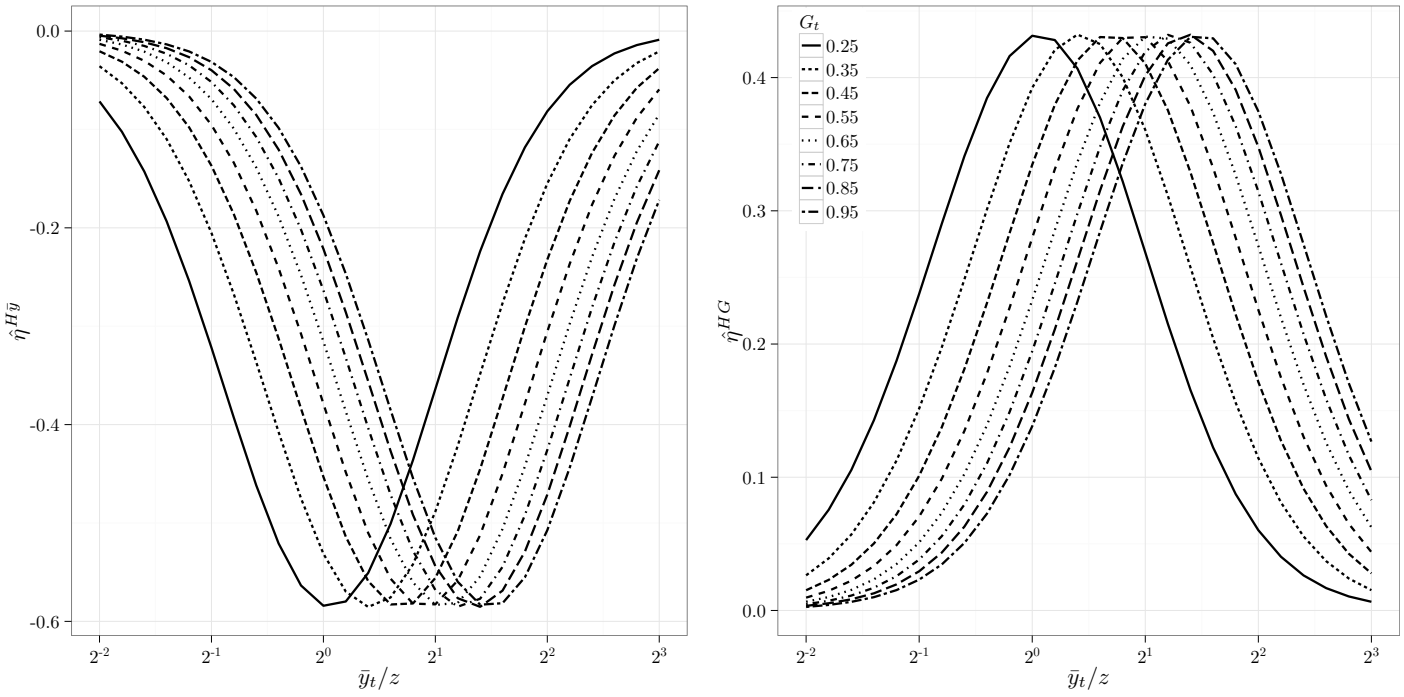
- The income semi-elasticity is weakly negative ($\eta_t^{H\bar{y}} \leq 0$). It first decreases (increases) then increases (decreases) in incomes (inequality). Bounded by zero on each side.
- The inequality semi-elasticity is weakly positive ($\eta_t^{HG} \geq 0$). It first increases (decreases) then decreases (increases) in incomes (inequality). Bounded by zero on each side.

The shape of poverty elasticities



- Strictly (decreasing) increasing in incomes.
- Bounded on the left, unbounded on the right.

The shape of poverty semi-elasticities



- Very non-linear when we look at absolute changes.
- Bounded on the left and right.

Estimates of income elasticities

	Time period				
	1981–1989	1990–1994	1995–1999	2000–2004	2005–2010
EAP	-0.991	-1.029	-1.237	-1.139	-1.578
	(0.030)	(0.033)	(0.055)	(0.043)	(0.101)
ECA	-4.358	-2.892	-2.700	-2.846	-3.304
	(0.555)	(0.309)	(0.277)	(0.304)	(0.384)
LAC	-2.284	-2.374	-2.425	-2.349	-2.985
	(0.243)	(0.257)	(0.271)	(0.258)	(0.366)
MNA	-2.176	-2.116	-2.024	-1.966	-2.501
	(0.203)	(0.188)	(0.168)	(0.161)	(0.246)
SAS	-0.548	-0.629	-0.810	-1.024	-1.192
	(0.053)	(0.048)	(0.030)	(0.032)	(0.046)
SSA	-0.831	-0.437	-0.436	-0.592	-0.632
	(0.027)	(0.039)	(0.040)	(0.035)	(0.033)

Estimates of income semi-elasticities

	Time period				
	1981–1989	1990–1994	1995–1999	2000–2004	2005–2010
EAP	-0.568	-0.573	-0.585	-0.583	-0.552
	(0.034)	(0.036)	(0.046)	(0.042)	(0.051)
ECA	-0.031	-0.214	-0.260	-0.225	-0.134
	(0.008)	(0.015)	(0.020)	(0.015)	(0.010)
LAC	-0.374	-0.348	-0.334	-0.355	-0.194
	(0.028)	(0.025)	(0.024)	(0.026)	(0.013)
MNA	-0.405	-0.422	-0.447	-0.463	-0.313
	(0.034)	(0.037)	(0.042)	(0.043)	(0.024)
SAS	-0.418	-0.458	-0.526	-0.572	-0.585
	(0.023)	(0.019)	(0.022)	(0.036)	(0.044)
SSA	-0.532	-0.354	-0.353	-0.440	-0.459
	(0.024)	(0.020)	(0.020)	(0.015)	(0.015)

What does this mean for poverty reduction?

Elasticities:

- Depend on the initial level of income and inequality
- Very popular measure of the sensitivity of poverty but somewhat misleading: richer countries appear to become ever better at reducing (absolute) poverty

Semi-elasticities:

- Depend on the initial level of income and inequality
- Much more useful to think of *the percent of population lifted out of poverty*, more policy relevant!
- Highlight the non-linearity much better (are more intuitive?)

Returns vary depending on location on the curves!

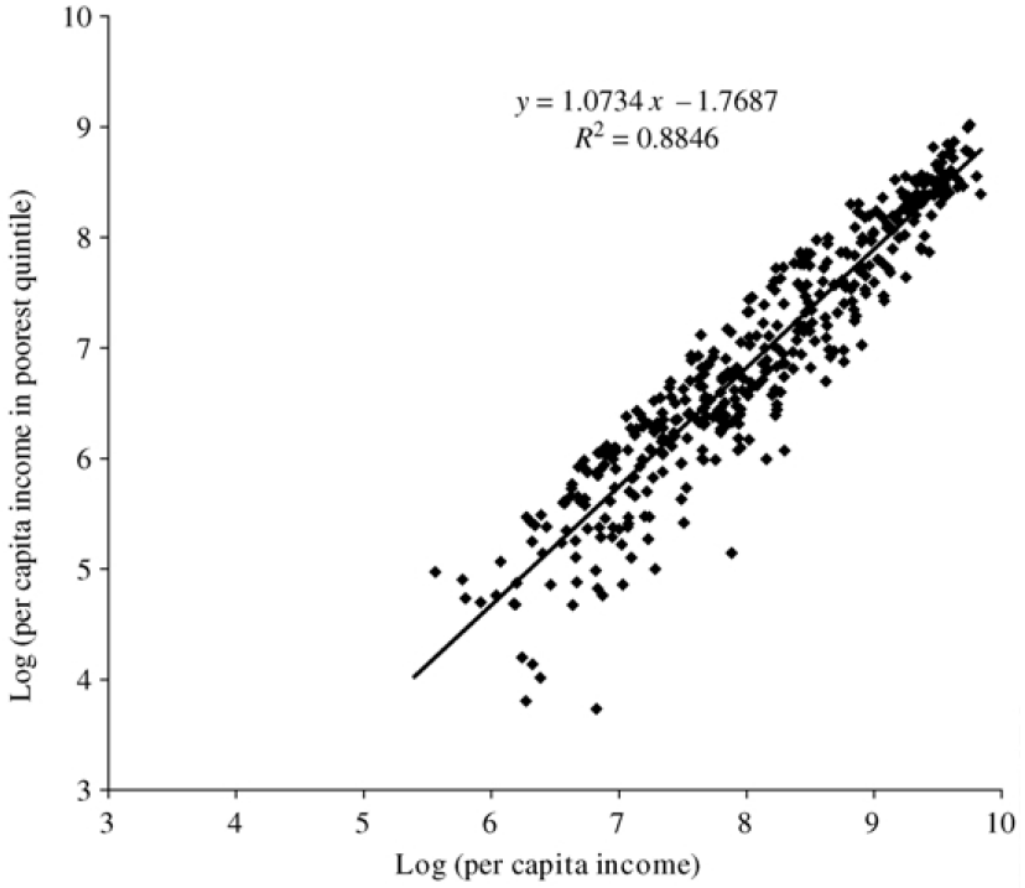
A strangely relative perspective

If we define poverty as *relative* not absolute poverty, and a rising tide lifts all boats, then growth should lead to a one-to-one increase in incomes of the poor.

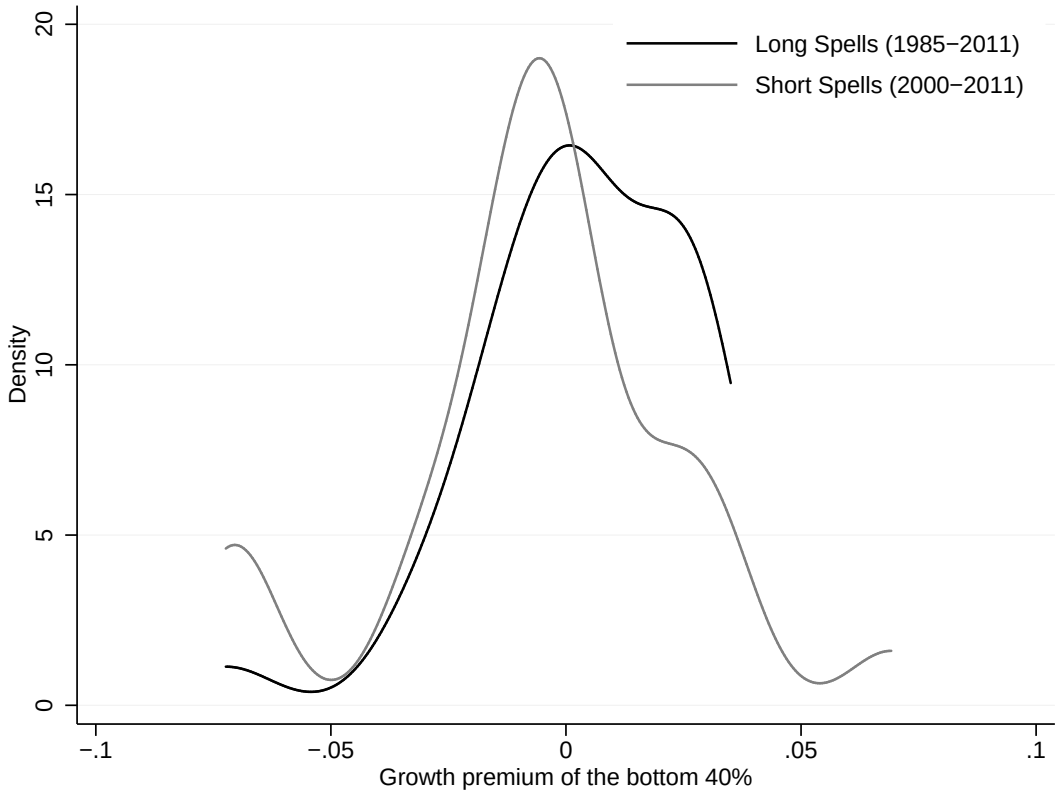
Dollar and Kraay (2002) "Growth is good for the poor" JEG:

- Test the relationship between growth of income shares of the poorest quintile and GDP per capita growth
- Strongly confirm one-to-one relationship even after accounting for reverse causality
- Paper only proves that growth is *distribution-neutral* it does *not* show that growth is pro-poor on average
- Should have been titled "growth does not affect inequality", has *nothing* to do with absolute poverty reduction!

Incomes of the poor and average incomes



"Growth premium" of bottom 40% in SSA



Better definitions of pro-poor growth

Why don't we simply compute the growth rates of each quintile/ percentile over time?

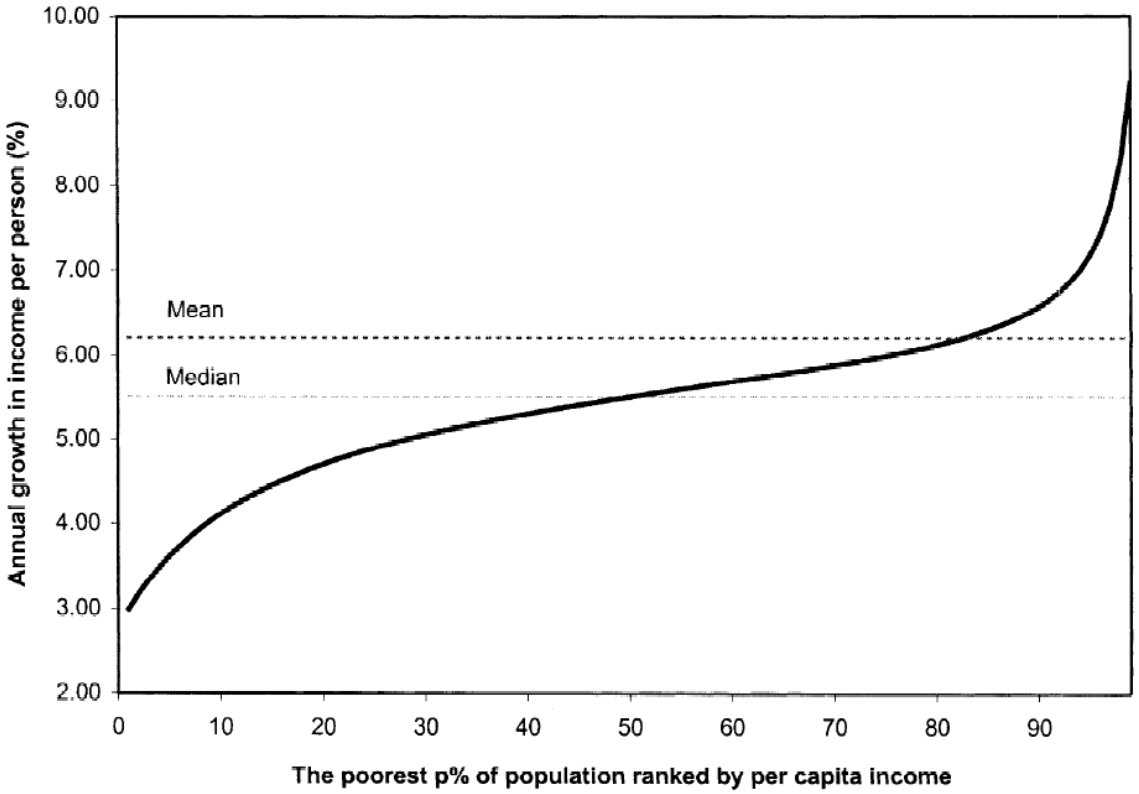
Ravallion and Chen (2003) propose the following:

Let $y_t(p)$ the income of the pth quantile, then the growth rate in income of the pth quantile is $g_t(p) = (y_t(p)/y_{t-1}(p)) - 1$ (for one period).

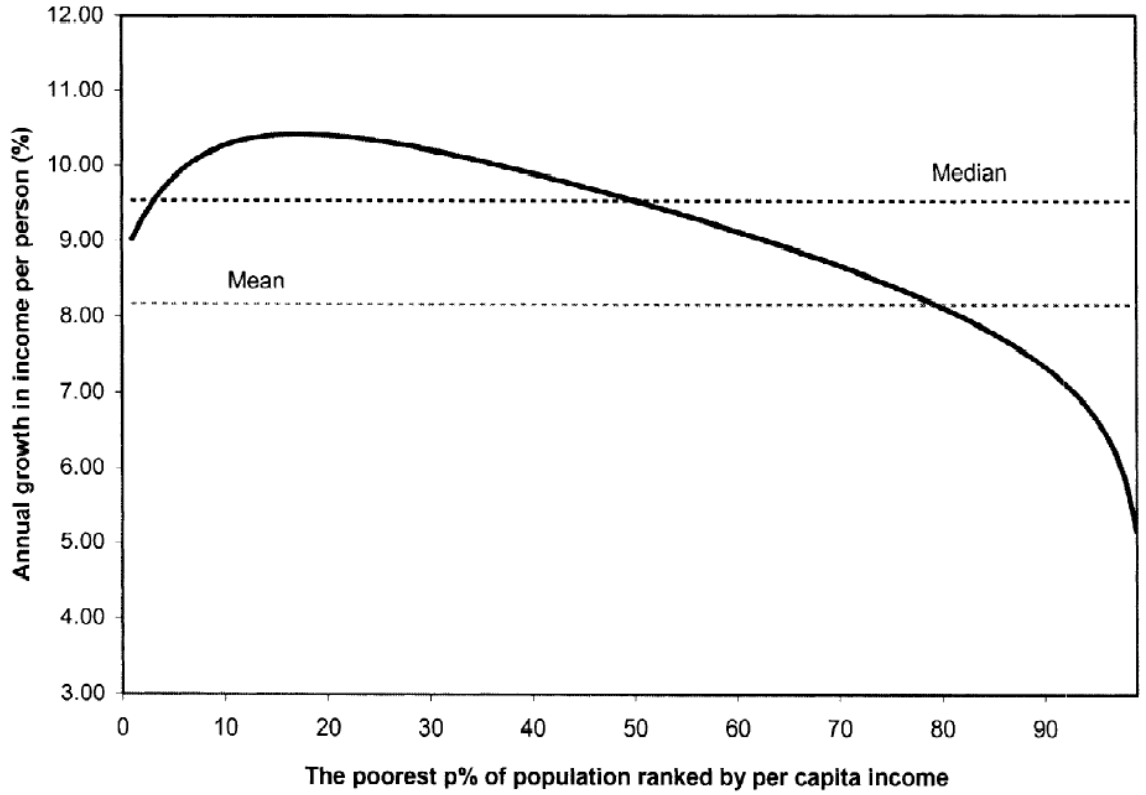
More generally, let $g_t(p) = \frac{L'_t(p)}{L'_{t-1}(p)}(\gamma_t + 1) - 1$ where where $L_t(p)$ is the Lorenz curve (with slope $L'_t(p)$) and μ_t is the mean and $\gamma_t = (\mu_t/\mu_{t-1}) - 1$ is the growth rate in the mean.

Very easy to estimate in Stata if you have at least two household surveys for the same country. Visually intuitive (next slide).

GIC for China 1990-1999: is this pro-poor?



GIC for China 1993-1996: or, is this pro-poor?



The pro-poor rate of growth

Based on the graph we can come up with many relative definitions (e.g. growth of the poor must be higher than the rest). Ravallion and Chen (2003) define pro-poor growth as the mean growth rate of the poor:

$$PPG_t = \int_0^{H_{t-1}} g_t(p)dp/H_{t-1}$$

- absolute interpretation: it's the growth rate in the mean scaled up or down according to whether the distributional changes were pro-poor
- relative interpretation: higher than mean growth = pro-poor, lower than mean growth = not pro-poor

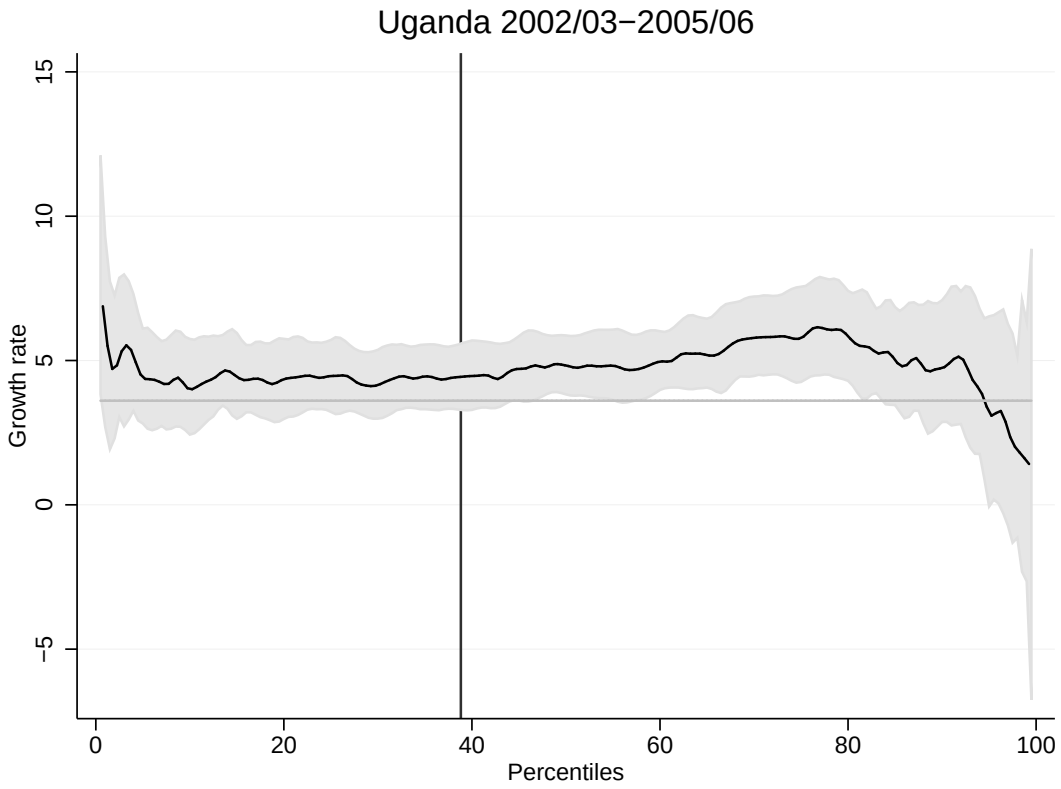
GIC with Stata

```
* get required software
net install gicurve, replace ///
from(http://www.adeptanalytics.org/download/ado)

* get example data
local url1 "http://siteresources.worldbank.org/"
local url2 "INTPGI/Resources/342674-1223471357039"
use  "`url1'/`url2'/ugahh05.dta", clear
save ugahh05, replace
use  "`url1'/`url2'/ugahh02.dta", clear

* compute GIC (normally use pw, here aw needed!)
gicurve using ugahh05 [aw=iwe], var1(welfare) ///
var2(welfare) yperiod(3) np(200) ci(500 95) ginmean ///
hcindex(38.82) title("Uganda 2002/03-2005/06") ///
ytitle("Growth rate") legend(off) xline(38.82)
```

Results



- Pro-poor growth 4.44, growth in mean 3.61, z is at 38.82

Extensions and other measures

Kakwani (2000) defines pro-poor growth as "any distributional shift accompanying economic growth that favors the poor". Basically targets inequality. This has some problems:

- In a contraction the rich may be hit harder, does that qualify as pro-poor growth?
- In a growth spurt everyone may gain but the rich a little more, is that not pro-poor?

Son (2003) proposes a poverty growth curve (PGC). Growth is pro-poor, if the generalized Lorenz curve ($L_t(p) \times \mu_t$) shifts up.

Kakwani and Son (2008) discuss the poverty equivalent growth rate (PEGR). It's "the growth rate that will result in the same level of poverty reduction as the present growth rate if the growth process had not been accompanied by any change in inequality".

Is growth typically pro-poor?

- Kraay (2006) and many other have shown: yes, in the *absolute* sense. Growth is the main driver behind poverty reduction.
- However, in the *relative* sense growth is typically distribution-neutral. Neither pro-poor, nor pro-rich.
- The (semi)elasticity perspective gives a complicated picture:
  - In extremely poor countries growth takes precedent. Period.
  - Reductions in inequality matter a lot for high-inequality countries and have a double dividend (direct effects and indirect effects through growth).
  - Very different picture depending on whether we target relative changes in the headcount or changes in the percent of population that is poor.

What influences pro-poor growth?

Most of the variation in changes in poverty can be attributed to growth in average incomes, suggesting that policies and institutions that promote broad-based growth should be central to the pro-poor growth agenda. Most of the remainder of the variation in changes in poverty is due to poverty-reducing patterns of growth in relative incomes, rather than differences in the sensitivity of poverty to growth in average incomes. Cross-country evidence provides relatively little guidance as to the policies and institutions that promote these other sources of pro-poor growth. (Kraay 2006)

Conclusions on 'pro-poor growth'

In the long-run:

- Growth matters more than anything else for poverty reduction.
- We need to understand the sources of sustained growth (and absence of crises).
- Can we have high long-run growth with high inequality?

In the short-run:

- Growth is a blunt instrument. Reductions in inequality will almost always help. Double dividend.
- (Semi)elasticity perspective shows that effect of growth depends on inequality.
- No relative pro-poor growth in the past. Huge unused potential.