

Chronic Poverty and all that: the measurement of poverty over time

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Background

- Massive literature on poverty measurement;
- Much rightly focuses on conceptualisation of a concept of the standard of living;
- Much of it is devoid of time – poverty without history or future; a timeless, static state;
- **HERE:** focus on “trajectories”: an assessment of the path of poverty over time;
- With explicit Link it back to other measurement approaches.

Motivating example

- 4 trajectories, as observed in Ethiopian panel data
- Uses consumption (mainly food)
- 6 observations in 10 year period.

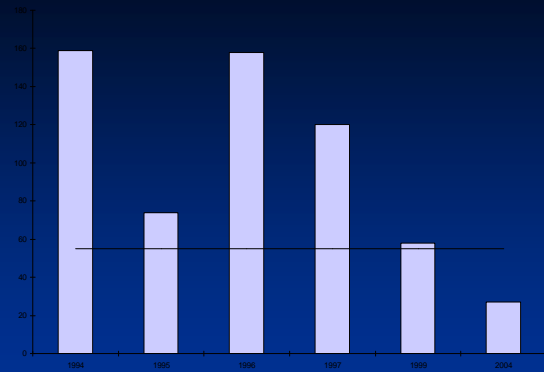


Figure 2a Abebe

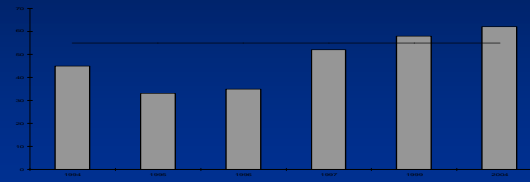


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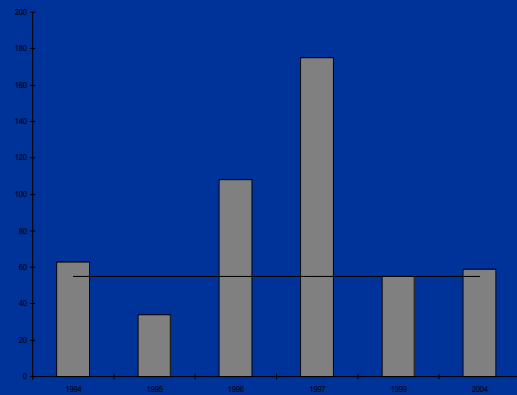


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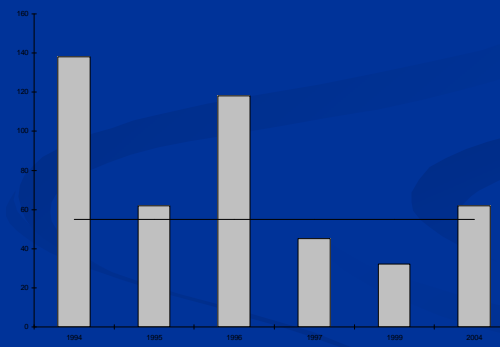


Figure 2d Asfaw

Lessons from this example?

- Focusing on 'end' or 'start' is not going to give a full picture of the (relative) poverty experience
- It is not obvious how to order these four families, let alone value them
- Dominance approach? It is clear there is not going to be a complete ordering ("crossing" of the consumption paths).
- We choose to look for index of entire path so complete ordering, using a normative approach.

Overview

1. Basic Normative Setup
2. A few measures
3. Extension 1: time preference
4. Extension 2: prolonged poverty
5. Extension 3: chronic poverty as the threat of a life of poverty
6. Application to Ethiopia

Basic Setup

- Assessing poverty over a lengthy period of time, period consists of spells.
- In each period, we observe the standard of living – we call it y
- Define poverty in a T -spell period as $P_T(y_1, y_2, \dots, y_T)$, where y_t stands for consumption at spell t . Let z be the poverty line (time-invariant for simplicity).
- T could be today, it could be in the future (so measurement could be ex-post or ex-ante)
- If ex-ante: *uncertainty-free* (perfect foresight); later on we drop this assumption.
- Our central question: find a metric for how much suffering or deprivation was or will be endured over a particular period.

Precedents?

- Counting poverty spells (number of times someone was poor in a particular period);
- Ravallion's "Chronic Poverty" (based on "average" standard of living in particular period).

Structure?

- Three basic choices:
 - FOCUS: Applying focus axiom? (a focus on poverty – so outcomes censored at poverty line z);
 - TRANSFORMATION: Appeal to Pigou-Dalton, so poverty increases if poverty is redistributed for very poor to not-so-poor (strictly convex transformation of outcomes)
 - AGGREGATION: how to aggregate outcomes in different periods of time.
- SEQUENCE of these choices leads to different measures.

Axiomatic basis?

Put structure on our normative choices:

- Build on 'standard' axiomatic work for static poverty measurement
- ADD axioms governing intertemporal choices
- *Monotonicity in outcomes* (living standard rises should not cause a rise in poverty);
- *Increasing cost of hardship* (a Pigou-Dalton-type condition, related a transfer from a very-poor spell to a not-so-poor spell);
- Forms of *mean-preserving repetitions* (axioms providing the basis for comparison across periods of different lengths);
- *Sub-period decomposability* (axiom allowing whole period poverty to be written as a weighted average of two sub-period poverties); could be weakened to *sub-period consistency* (P_T cannot decrease if some sub-period exhibits a rise in poverty).

Sequences as Choices?

6 sequences (FTA, FAT, TFA, TAF, AFT, ATF)

Case 1: Focus-Transformation-Aggregation (FTA)

- Satisfies monotonicity, increasing cost of hardship, sub-period decomposability
- RULES OUT COMPENSATION ACROSS PERIODS
- Example is reminiscent of FGT – others are possible
- If $\alpha=0$ and $\beta=1$, then “counting poverty spells” – but this violates Pigou-Dalton condition

$$P_T(y_1, y_2, \dots, y_T) \equiv A_T(g(f(y_1), f(y_2), \dots, f(y_T)))$$

$$P_T(y_1, y_2, \dots, y_T) = \sum_{t=1}^T \beta^{T-t} \left(1 - \frac{\tilde{y}_t}{z}\right)^\alpha$$

Case 4: Transformation-Aggregation-Focus

- Satisfies monotonicity, increasing cost of hardship, but only sub-period consistency
- Compensation occurs across periods

$$P_T(y_1, y_2, \dots, y_T) \equiv f(A_T(g(y_1), g(y_2), \dots, g(y_T)))$$

$$P_T(y_1, y_2, \dots, y_T) = \text{Max} \left[0, \sum_{t=1}^T \beta^{T-t} \left(1 - \frac{y_t}{z} \right)^\alpha \right]$$

Case 5: Aggregation-Focus-Transformation (AFT)

- Satisfies monotonicity, increasing cost of hardship, but only sub-period consistency
- Compensation occurs across periods
- Example: Ravallion/Jalan's Chronic Poverty

$$P_T(y_1, y_2, \dots, y_T) \equiv g(f(A_T(y_1, y_2, \dots, y_T)))$$

$$P_T(y_1, y_2, \dots, y_T) = \left\{ 1 - \text{Min} \left[1, \frac{\sum_{t=1}^T y_t}{Tz} \right] \right\}^\alpha$$

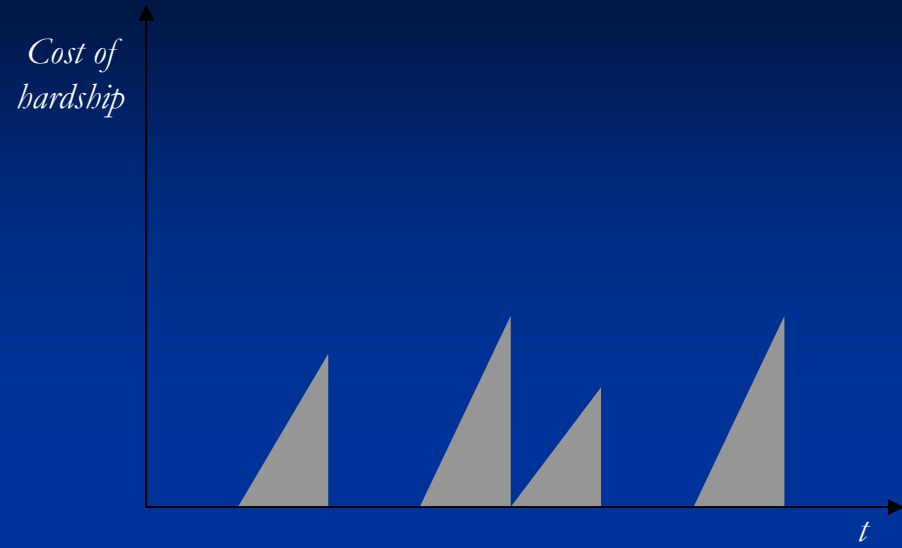
Extension 1: Time Preference

$$P_T(y_1, y_2, \dots, y_T) = \sum_{t=1}^T \beta^{T-t} \left(1 - \frac{\tilde{y}_t}{z}\right)^\alpha$$

- Much economic and other work assumes $\beta < 1$
- Should we value each period equally? Not much basis for standard ‘discounting’ (future should get lower weight? Surely not)
- Is there a case to give higher value to ‘end’ state?
 - Implicit in MDG narrative
 - Would suggest $\beta > 1$

Extension 2: Prolonged Poverty

- Trajectories have patterns – should we take this into account (up to now: in all measures, periods can be jumbled, up to β)
- Is there additional cost to ‘prolonged’ hardship, does ‘history’ matter?
- Don’t confuse with the “production and reproduction” of poverty (once poor, you stay poor), but rather whether which should give extra weight to persistence (from normative point of view).



Interpretation?

- Graph 1: “hardship” as measured in period-long poverty takes each poverty spell separately
- Graph 2: “history matters”: the valuation of each spell takes into account the previous spell
- For example:

$$P_T(y_1, y_2, \dots, y_T) = \sum_{t=1}^T \beta^{T-t} \left[\left(1 - \frac{\tilde{y}_t}{z}\right) + \delta \left(1 - \frac{\tilde{y}_{t-1}}{z}\right) \left(1 - \frac{\tilde{y}_t}{z}\right) \right]^\alpha$$

Extension 3: Bringing in Risk: The threat of a life of poverty

- Previous work: vulnerability measures as forward-looking measures of the threat of future poverty
- Axiomatic structure: risk-related axioms (on assessing poverty across states of the world, combined with standard poverty axioms)
- Calvo and Dercon (2006) show that the only measures satisfying reasonable assumptions are:

$$V_{(\alpha)} = 1 - E\left(\frac{\tilde{y}}{z}\right)^\alpha$$

Extension 3: Bringing in Risk: The threat of a life of poverty

- Can be phrased in our ‘sequencing framework’:

Focus followed by transformation and then aggregation over states of the world.

Implies: NO COMPENSATION ALLOWED
(higher top prize in national lottery does not make you less vulnerable)

$$V_{(\alpha)} = 1 - E\left(\frac{\tilde{y}}{z}\right)^\alpha$$

Extension 3: Bringing in Risk: The threat of a life of poverty

- Bringing in time? A measure of the threat of a lifetime of poverty (or threat to long-term poverty).
- Every future spell-specific measure is
- Aggregate over time (FTAA)

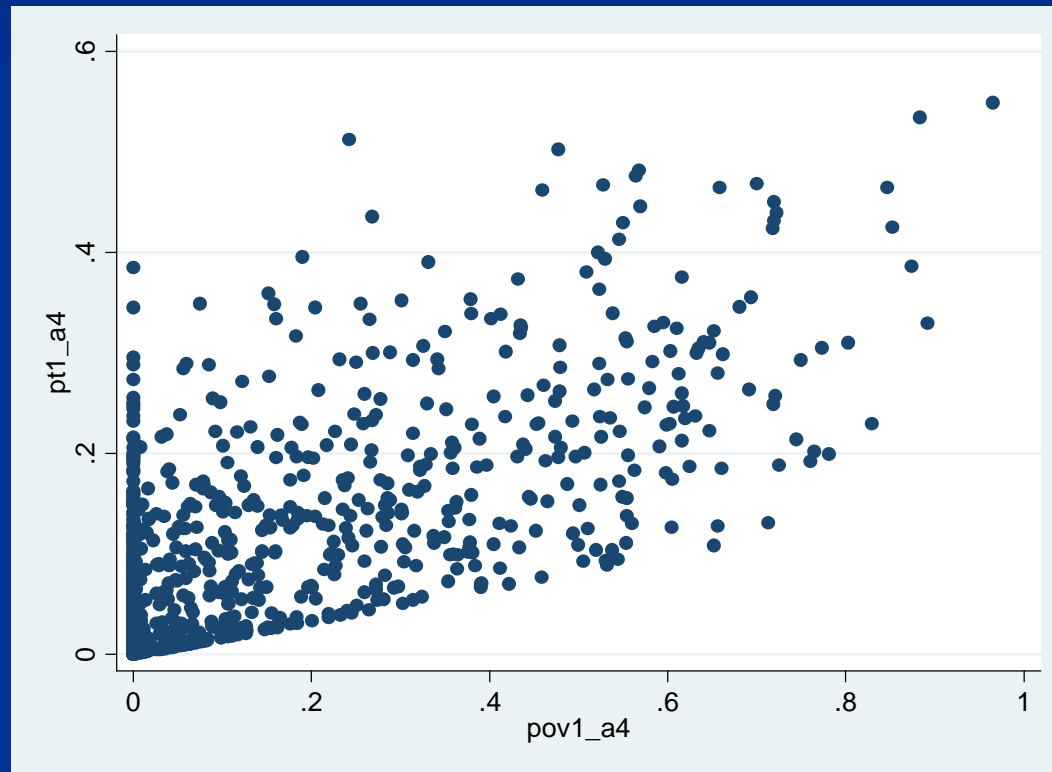
$$V_{(\alpha)} = 1 - E\left(\frac{\tilde{y}}{z}\right)^\alpha$$

$$V_T(y_1, y_2, \dots, y_T) = \sum_{t=1}^T \beta^{T-t} \left[1 - E\left(\frac{\tilde{y}_t}{z}\right)^\alpha \right]$$

Application to Ethiopia

- Back to Ethiopian Rural Household Panel Data
- 6 observations over ten years
- Period-long poverty measurement?
 - Does it affect our inference on poverty (ordering or cardinal measurement), compared to a standard static measure of poverty in one period?
 - Does it matter **how** we measure long-term poverty?
 - Do different approaches give different profiles of the poor?

Relationship 'static' with long-term poverty



Rank-Correlation between measures?

	FTA (FGT like)	Jalan Raval	Prolonged Poverty
FTA (FGT like)	1		
Jalan Raval	0.7030	1	
Prolonged Poverty	0.7271	0.8680	1

Poverty Profiles?

	POVERTY IN PERIOD 1		FTA (FGT)		Ravallion		Prolonged Poverty	
Female ad	.041	**	.021	**	.026	**	.001	**
Fem infant	.033	*	.022	**	.036	**	.001	**
Fem child	.028	**	.010	**	.015	**	.001	**
Fem elder	.034		.022	*	.023		.001	**
Male ad	.018	*	.004		.005		.000	
Male inf	.071	**	.023	**	.041	**	.001	**
Male child	.052	**	.019	**	.023	**	.001	**
Male elder	-.009		-.010		-.028		-.001	
Livestock	-.0002	**	-.0001	**	-.0002	**	-0.000	**
Cv rain	.002	**	.001	**	.001		.0001	
Road qual	-.010		-.009	**	-.012	**	-.001	**
Sex head	-.109	**	-.020	*	-.013		-.000	
Constant	-.148	**	.0193		-.150	**	-.002	**

Conclusions?

- Different effects related to many variables (size)
- Significance:
 - CV of rain
 - Gender of head
 - Role of Road Quality