Priority-Based Multidimensional Poverty

(in progress)

Christophe Muller
Aix-Marseille School of Economics,
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Introduction

- Multifarious measures of aggregate well-being
- Monetary-based poverty measures dominate
- Multidimensional dimensions should be accounted for in welfare evaluation
- What about basic needs approach?

LITERATURE

- Chakravarty and Bourguignon (1998, 2003), Atkinson (2003), Alkire and Foster (2007), Alkire and Santos (2010), Belhadj (2012), Decancq, Fleurbaey, and Maniquet (2013), etc, propose 'Multidimensional Poverty Indices' (MPI)
- Aggregate individual poverty features gathered into an 'individual poverty score'
- These scores can then be aggregated at country level
- A Multidimensional Poverty Index was incorporated into the UNDP's Human Development Reports from 2010
- *On the whole, MPIs are a big progress as they allow the mobilisation of useful and diverse qualitative information*

Issues with current MPIs

- In some middle-income countries: very few HHs living in a shack, or having toilets outdoors, or having a house with dirt soil, or malnourished children, etc. But they are poor people!
- Arbitrary welfare dimensions
- Which justification of adding such heterogeneous indicators such as income per capita and life expectancy?
- Command variables rather than genuine welfare attributes
- Pb of needs heterogeneity
- Arbitrary weights
- Is counting heterogeneous dimensions an accurate basis for multidimensionality poverty?
- Arbitrary count threshold

A NEW METHOD FOR MULTIDIMENSIONAL POVERTY

- Using responses to household spending priorities

- Q: 'To what would you spend a small additional sum of money?'

for:

- (1) To identify the relevant deprivations: **What?**

- (2) Top priorities to identify the poor: **Who?**

- (3) Deprivations are aggregated for each household using weights computed from these priorities: **How?**

Advantages

- Eliminates ‘Command variables’ in favour of ‘Intrinsic welfare variables’: basic needs
- Avoids the arbitrariness that typically arises in MANY stages of construction of multidimensional poverty indices
- Easier to elicit deprivations by looking at expenditure priorities
- Avoid issues of needs heterogeneity by using self-deprivation information

- Deprivation indices of individual i: d_i in R^m_+
- d_i is the i^{th} row of matrix D in M^n that is the set of all n x m matrices of nonnegative numbers.
- d_{ij} = deprivation j suffered by individual i
- *'Intersection' approach' : poor = individual poor in all welfare dimensions*
- PB: Very small number of poor people
- One would like to consider as poor some households with sufficient income but destitute on other grounds
- *'Union' approach: poor = she falls below at least one of the dimension-specific poverty lines*
- PB: Too large number of poor persons
- A&K propose to count the deprivations and use a count threshold
- PB: someone dying of hunger and fine otherwise may not be poor

In progress: axiomatics for indicators

- *Technical axioms:* continuity, normalisation, population, scale, derivability
- *Decomposition axioms* (or Pareto axioms): incidence, intensity, multidimensional poverty

- Weak/Strong *focus axioms*: incidence, intensity, and multidimensional poverty
- *Transfer and correlation axioms*
- *Priorities axioms*:

- Specification of the welfare attributes,
- selection of the top priorities for identifying the poor,
- aggregation of the deprivations

Identifying the poor

- We consider that less information is needed for the identification of the poor than for the computation of total poverty severity
- *Different sets of dimensions* are used for:

(1) identifying the poor, and (2) measuring poverty intensity

- Looks like the Union approach
- But, here, the set and ranking of considered deprivations can be heterogeneous across households
- *Only major deprivations are kept for defining the population of the poor: more realistic*
- Which ones are sometimes easy to see in data
- Or obtained from truncated count data model of priorities: *Estimated expected number of priorities*
- Justifies working without observing well all dimensions

Deprivation aggregation with priority data

- Weighted score of all deprivation indices, with decreasing weights according to decreasing priorities: *Non-arbitrary weights*
- E.g., if there is a ‘ladder of basic needs’ on which most people would agree
- Another way of specifying ‘priority weights’ is to account for explicit statements of households
- E.g., % of households stating a given priority
- Or shares of public budget allocation to each deprivation issue: ‘implicit priorities of the state’

Axioms for aggregating deprivations

- Subgroup Decomposability joint to One-Dimensional Transfer Principle implies that:

Derivable poverty indicators are a weighted mean of the individual poverty contributions associated with each individual i and each attribute j

Ins. formula

- Which weights?

SIMPLE EXPS OF PRAGMATIC INDICATORS

- Exp: Shelter and Food for Seychelles are found to be the two dimensions identifying the poor
- Multidimensional poverty incidence is the following proportion of the poor based on the two highest priorities
- $IM = 1/n \sum_i \{ 1[d_{i1} > 0] + (1 - 1[d_{i1} > 0]) 1[d_{i2} > 0] \}$
- Union criterion for these dimensions for identifying the poor AND measuring poverty

An exp of 'amount of poverty' indicator

- Other dimensions can be mobilised beyond identification of the poor

- $M = 1/n \sum_i \{ 1[d_{i1} > 0] + (1 - 1[d_{i1} > 0])1[d_{i2} > 0] \}$
  $. \{\sum_j w_j 1[d_{ij} > 0] \}$

where w_j is the 'priority' weight allocated to dimension j

- Representative and objective weights
- Exp: w_j = proportion of monetary poor households who stated j as their first priority
- Alternatively, weights arising from a pseudo-vote (e.g., proportional ballot)

- STRONG FOCUS (SF). For any $n \in N$, $(X, Y) \in M^n$, $z \in Z$, $j \in \{1, 2, \ldots, m\}$, if
- for any i such that $xij \geq zj$, $yij = xij + \delta$, where $\delta > 0$,
- $ytj = xtj$ for all $t \neq i$, and (iii) $yis = xis$ for all $s \neq j$ and for all i,
- then $P(Y; z) = P(X; z)$.
- WEAK FOCUS (WF). For any $n \in N$, $(X, Y) \in M^n$, $z \in Z$, if for some i , $xik \geq zk$ for all k and
- for any $j \in \{1, 2, \ldots, m\}$, $yij = xij + \delta$, where $\delta > 0$,
- $yit = xit$, for all $t \neq j$, and
- (iii) $yrs = xrs$, for all $r \neq i$ and all s, then $P(Y; z) = P(X; z)$.
- SYMMETRY (SM). For any $(X; z) \in M \times Z$, $P(X; z) = P(\Pi X; z)$, where Π is any permutation matrix of appropriate order.

- MONOTONICITY (MN). For any $n \in N$, $X \in M^n$, $z \in Z$, $j \in \{1, 2, \ldots, m\}$, if:
- for any i, $yij = xij + \delta$, where $xij < zj$, $\delta > 0$,
- (ii) $ytj = xtj$ for all $t \neq i$, and
- (iii) $yis = xis$ for all $s \neq j$ and for all i, then $P(Y; z) \leq P(X; z)$.
- CONTINUITY (CN). For any $z \in Z$, P is continuous on M.
- PRINCIPLE OF POPULATION (PP). For any $(X; z) \in M \times Z$, $k \in N$, $P(X^k; z) = P(X; z)$, where X^k is the k-fold replication of X.
- SCALE INVARIANCE (SI). For any $(X; z) \in M \times Z$, $P(X; z) = P(X'; z')$ where $X' = \Lambda X$, $z = \Lambda z$, Λ being the diagonal matrix diag$(\lambda 1, \ldots, \lambda m)$, $\lambda i > 0$ for all i.

- SUBGROUP DECOMPOSABILITY (SD). For any $X1, X2, \ldots, XK \in M$ and $z \in Z$:
- $P(X1, X2, \ldots, XK; z) = \Sigma^{n}i=1\ (ni/n)P(Xi; z)$, where ni is the population size corresponding to Xi and $n = \Sigma^{n}i=1\ ni$.
- DEFINITION OF A PIGOU–DALTON PROGRESSIVE TRANSFER. Matrix X is said to be obtained from $Y \in M^n$ by a *Pigou–Dalton progressive transfer of attribute j* from one poor person to another if for some *persons i, t* : (i) $ytj < yij < zj$,
- (ii) $xtj - ytj = yij - xij > 0$, $xij \geq xtj$, (iii) $xrj = yrj$ for all $r \neq i, t$, and
- (iv) $xrk = yrk$ for all $k \neq j$ and all r.
- ONE DIMENSIONAL TRANSFER PRINCIPLE (OTP). For all $n \in N$ and $Y \in M^n$, if X is obtained from Y by a Pigou–Dalton progressive transfer of some attribute between two poor, then $P(X; z) \leq P(Y; z)$, where $z \in Z$

- MULTIDIMENSIONAL TRANSFER PRINCIPLE (MTP). For any $(Y ; z) \in M \times Z$, if X is obtained from Y by multiplying Yp by a bistochastic matrix B and $B.Yp$ is not a permutation of the rows of Yp, then $P(X; z) \leq P(Y; z)$, given that the attributes of the non-poor remain unchanged, where Yp is the bundle of attributes possessed by the poor as defined with matrix Y .
- CORRELATION INCREASING SWITCH (CIS). For any $X \in M^n$, $n \geq 2$, f*or all* $(j, k) \in \{1, 2, \ldots, m\}$, suppose that for some i, t , $xij < xtj < zj$ and $xtk < xik < zk$. Y is then said to be obtained from X by a 'correlation increasing switch between two poor if:
- (i) $yij = xtj$, (ii) $ytj = xij$; (iii) $yrj = xrj$ for all $r \neq i, t$, and
- (iv) $yrs = xrs$ for all $s \neq j$ and for all r.
- NON-DECREASING POVERTY UNDER CIS

(NDCIS). For any $n \in N$ and $n \geq 2$, $X \in M^n$, $z \in Z$, if Y is obtained from X by a correlation increasing switch,

then $P(Y; z) \geq P(X; z)$

Empirical application

- Seychelles is a middle-income country with rather satisfactory social indicators
- Transition from a welfare state to a market-based economy
- Vulnerable to global shocks
- Macro-economic stabilization plan
- Medium-term structural reforms
- Inefficient targeting of social transfers plagues Seychelles' generous social security system
- Public sector transfers fell from 5.5 % GDP in 2005 to 1.9 % in 2009

- *A new collection instrument: 'Living Condition Survey'* : LCS (Muller, 2013)

- Re-surveyed households from the 2006/07 Household Budget Survey
- 1,125 households interviewed from February to May 2011
- Subjective information about the unsatisfied needs of households in diverse welfare dimensions
- Data on spending priorities

- Broad notion of poverty based on the opinions of Seychelles households on subsistence minima in terms of total consumption expenditure, inc. housing expenses
- Poverty monetary rate is 17 percent of the population: 12 percent of poor households
- Monetary poverty rate higher in households led by unemployed heads, or by female or little educated heads
- Also: for large families and fishermen families

- *29 % households feel that they don't enjoy an adequate number of rooms*. Often living in dwelling with three to five rooms
- *One third of households state some difficulty to obtain daily food, and another 5 % considerable difficulty*
- 7 % of households: wear worn clothes and 10 % not to have adequate clothing for outing
- 15 % of persons: health problems in the last twelve months

- 7 % of households: electricity disconnected because of failure of payment during the past 12 months. 11 % of households not paying electricity in time.
- 10 % of households: not paying their water bill every month in the last twelve months, and 5 % water disconnection.
- One fifth of households encounter difficulties in financing their transport needs, and other 3 % meet considerable difficulties or cannot.
- Education needs almost inexistent when no child of schooling age. However, 21 % of households cannot afford school items. 5.5 % of households cannot buy children lunch for school

Priorities of the monetary poor

Food	**12.20**
Water/Electricity bill	9.06
Household appliances	5.57
Health	6.97
Shelter	**34.49**
Uniforms/Shoes/School necessities	1.39
Private school	0.35
Clothing	0.35
Transportation	1.05
Debt repayment	9.76
Set aside for worst times	13.94
Don't know	0.35
Holiday	1.05
Other	3.48

- 5 significant basic needs: shelter, food, electricity/water, health, education
- Union criterion: 42 percent of poor households: Exaggerated

- Omitting education and health reduces the percentage of multidimensional poor households to 17.6 percent

- Keeping only the two main priority dimensions, shelter and food, leads to 8.16 percent, closer to the estimated incidence of monetary poor households (12 percent)

Count model estimates

	Truncated Negative Binomial	Tobit truncated in 0 and 3
Expected number of priorities:	**1.90**	**1.84**
Region 1	.213 (.16)	-.389* (.221)
Region 2	.177* (.10)	-.312** (.130)
Region 3	.077 (.10)	-.135 (.136)
Region 4	.175* (.10)	-.323** (.140)
Region 5	.216** (.10)	-.401*** (.137)
Children	-.046* (.026)	.084*** (.033)
Cons. per adult eqt	8.57e-07* (5.43e-07)	-2.06e-06** (8.79e-07)

Education of Head	Amount of Multidimensional Poverty	Incidence of Multidimensional Poverty	Incidence of Monetary Poverty
No Schooling	1.8	6.9	33.0
Primary	3.8	8.3	20.7
Secondary	4.0	10.0	14.1
Vocational/ Polytechnic	3.1	5.8	12.0
University (&pre)	2.7	6.5	0.0
Whole Country	3.6	8.1	17.0

- Multidimensional poverty amount and multidimensional poverty incidence are highly correlated, while not with Union or Intersection
- Multidimensional poverty dominated by deprivations in shelter and in food (7%)
- 8.1 % of households multidimensional poor (12 % monetary poor households)
- As opposed to what results for monetary poverty, education is relatively weakly correlated with multidimensional poverty (consequence of free accommodation for low-educated)
- Coverage of the monetary poor by social welfare is dramatically low (15%); slightly better with multidimensional poor (22 %)
- Leakage of social benefits to the non-poor is huge: 85 %

CONCLUSION

- An investigation on how using expense priorities to improve on multidimensional poverty methodology
- Helps removing many methodological arbitrary choices
- A special survey in Seychelles
- Conditional econometric models of priorities
- Encouraging results

- To do:
  - - Axiomatics
  - - Estimates