Handout #2
Analysis of Poverty and Vulnerability

Objectives of this class:
(1) Acquire the tools necessary to prepare a country poverty and vulnerability assessment for the World Bank or to assist a country in developing a PRSP (Poverty Reduction Strategy Paper) for debt reduction.
(2) Construct and measure an indicator of well-being that is both rigorous and simple to use by policymakers. Use this indicator to compare poverty between groups, countries and regions, over time, and before and after a policy change.

Issues:
(1) How to measure welfare? Choice of a welfare indicator.
(2) How to separate poor from non-poor? Choice of a poverty line.
(3) How to describe poverty? Poverty profile and correlates of poverty.
(4) How to specify a poverty indicator? Choice of an index.
(5) How to understand poverty? Identification of partial correlates and determinants
(6) How to characterize and analyze the dynamics of poverty? Chronic and transitory.
(7) How to characterize the geography of poverty? Poverty maps.
(8) How to reduce poverty? The roles of growth, quality of growth, and targeted policy interventions.

I. Measuring welfare: Choice of a welfare indicator $y$ (Ravallion, EJ 1996; World Bank, 2006)

1.1. What indicator ($y$) to use to measure welfare? Income vs expenditure:
Total consumption expenditure per capita during the period.
- Advantage over income: easier to measure; more stable due to smoothing (with savings, credit, insurance), and closer to permanent income (= welfare).
- Limitations:
  - Generally not available for individuals but for households.
  - Large measurement errors: recalls, diaries, periodicity (infrequent purchases).
  - Varies with tastes: difficult to use for inter-personal comparisons.
  - How to measure the consumption of durables? Depreciation and opportunity cost of capital.
  - Households are differentially able to smooth consumption → Measurement biases by ability to smooth consumption.

1.2. Need adjust $y$ for
- Changes in prices for comparisons over time: what deflators to calculate real expenditures (CPI)?
- Spatial price differences for country/regional comparisons: PPP-adjusted $c$ across countries; CPI-adjusted across regions or urban/rural.
- Need include all commodities consumed, both bought and home produced: valued at what price?
- Need account in $y$ for the imputed value of public goods and services received (e.g., free or subsidized health care, school lunches, public education). (e.g., Ghana: poverty fell according to WB Poverty Assessment; poverty rose according to NGO. Decline in access to public goods not measured by income poverty in WB report.)

1.3. Household vs individual
- Calculate per capita consumption:
  1.3.1. Adult equivalence scales, to take into account differences in demographic composition for comparison across households.
  Example: age-adjusted family size $n*$ = $\sum_{k} w_k n_k$, $w_k = 1$ male adult, $w_k <1$ other members,
  where $n_k$ and $w_k$ are number of members and weight of demographic category $k$.
  These weights can be established by regression of consumption on demographic structure of the household (Deaton).

1.3.2. Need allow for the existence of economies of scale in consumption in calculating per capita welfare due to household-level public goods (housing, durables, heating, electricity) versus private goods (food, child education).
- Per capita consumption: $y^*$ = $\frac{C_f}{n} + \frac{p_{0h}}{n^*} C_h$
- $C_h$ = consumption expenditure on housing, heating, durables (quasi-public goods)
- $p_{0h}$ = initial prices of housing (food price as numéraire).
- $n^*$ = number of household members in adult equivalent.
- $\beta$ = degree of “privateness” of the good: $\beta = 0$ pure public good, $\beta = 1$ pure private good.

1.4. Specific types of poverty
- Can also characterize food poverty (calorie consumption relative to threshold), housing poverty, education poverty (illiteracy), health poverty.

1.5. Data availability
- Living Standard Measurement Surveys (LSMS): cross-section, repeated surveys, panel data.
- Household income and expenditure surveys.
- Population census (5-10% release of individual records): housing.
- Demographic and Health Surveys (DHS): housing, ownership of assets and durables.
- Qualitative data: participatory assessments (welfare categories).
- Note: Household survey data underestimate income and expenditures compared to national accounts.

II. Separating poor from non-poor: Choice of a poverty line $z$

2.1. Absolute poverty line: Calorie-based procedure
Absolute or extreme poverty or indigence: $z_{abs}$ = cost of recommended minimum food caloric intake (2,000 calories per person per day).
- “Normal” poverty line: $z = \text{income level necessary to consume the recommended minimum food caloric intake (Figure 1)}$

Figure 1. Nutrition-based poverty line
2.2. Relative poverty line (a measure of inequality)
Fixed % of population declared poor.
Poverty relative to mean income: \( z = k\overline{T} \), constant percentage of mean expenditure or income \( T \).
e.g., Atkinson for Europe, \( k = 0.5 \); hardcore poverty, \( k = 0.33 \).

2.3. International comparisons (World Bank: World Development Indicators):
\( z = 1 \) PPP-adjusted$/day per capita (also 2PPPS/day).
PPP income = income/PPP exchange rate
PPP exchange rate = number of LCU to buy the same amount of quality adjusted goods and services as 1$ in the United States. Useful for international comparisons.

2.4. Locally defined (subjective) poverty line, based on lifestyle (used in most individual country analyses): minimum income needed to “make ends meet”.

Note: What is important is to use a consistent \( z \) in making comparisons across time or across population groups (countries). Can use more than one definition of poverty line and look at consistency in orderings.

III. Describing poverty: Poverty profile (Figure 2) and correlates of poverty

3.1. Poverty profile
Rank individuals/households in the population by income/consumption level \( y_{i} = \) income (or consumption expenditure) of individual with income rank \( i \).
\( z = \) poverty line
\( n = \) population size
\( q = \) number of individuals below poverty line.

3.2. Correlates of poverty: Who are the poor? Where do they live? What do they do? How do they live?
Average characteristics of poor versus non-poor. Typically: demographic characteristics (age, gender, ethnicity, family size, dependency ratio), asset position (land, education, social capital), activity (choice of crops, type of employment), location (rural-urban, region, neighborhood effects e.g., what other households in the same social network do), access to public services (health, school, social protection programs), access to market (distance, financial services).

3.3. Change over time in the correlates of poverty using two successive surveys: Are the poor changing?

IV. Choice of a poverty indicator
All poverty indicators are based on the distribution of income \( (y) \) truncated at \( z \).
General desirable properties of a welfare index:
- Monotonicity (Sen). A decrease in \( y \) of a poor person should increase the index.
- Transfer (Sen). An \( y \) transfer from a poorer poor to a richer poor should increase the index.
- Transfer sensitivity. The rise in the index declines as the \( y \) transfer from poor to rich is taken from a richer poor.
Specific desirable properties of a poverty index:
- Population symmetry. If two identical populations are pooled, the index should not change.
- Proportion of poor. If the share of poor increases, the index should increase.
- Focus (Sen). The index is independent of the \( z \) level of people above \( z \).
- Decomposability. If the poverty of a subgroup increases, the index increases.

4.1. Members of the \( P_{\alpha} \) class: Incidence, depth, and severity (Foster-Geer-Thorbecke (FGT) index)
i) General index: \( P_{\alpha} = \frac{1}{n} \sum_{i=1}^{n} \left( \frac{z - y_{i}}{z} \right)^{\alpha} \).
ii) If \( \alpha = 0 \), \( P_{0} = \frac{q}{n} \) headcount ratio or incidence of poverty: % of poor in the population.
   \( (P_{0} \) does not satisfy the monotonicity and transfers axioms. It does not tell us how poor the poor are. Yet, it is the most widely used poverty index.)
iii) If \( \alpha = 1 \), \( P_{1} = \frac{1}{n} \sum_{i=1}^{n} \left( \frac{z - y_{i}}{z} \right) \) poverty gap index or depth of poverty, where
   \( \sum_{i=1}^{n} \left( \frac{z - y_{i}}{z} \right) = \) total income deficit of the poor = cost to eliminate poverty with perfect targeting,
   \( nz = \) cost of eliminating poverty without targeting.
   \( P_{1} = \frac{\sum_{i=1}^{n} \left( \frac{z - y_{i}}{z} \right)}{nz} \) Targeted welfare budget
   \( P_{1} = \frac{1}{n} \sum_{i=1}^{n} \left( \frac{z - y_{i}}{z} \right) \) Untargeted welfare budget
   Hence \( 1 - P_{1} = \) Gain from targeting.
   \( (P_{1} \) does not satisfy the transfer axiom. It does not measure inequality among the poor.)
iv) If \( \alpha = 2 \), \( P_{2} = \frac{1}{n} \sum_{i=1}^{n} \left( \frac{z - y_{i}}{z} \right)^{2} \) severity of poverty index.
   \( (P_{2} \) satisfies the monotonicity and transfers axioms. It measures inequality among the poor. But
interpretation problematic: \( $^{2}\). Use only to characterize change.)
v) If \( \alpha = \infty \), \( P_{\infty} = \) Rawls poverty index. The higher \( \alpha \), the more weight given to the income position of the poorest.

Policy question: How to target a given welfare budget \( B \) to minimize \( P_{\alpha}, P_{2}, \) and \( P_{\infty} \)?
For \( P_{\alpha} \): start spending \( B \) on the least poor first (e.g., to meet MDG at minimum cost).
For \( P_{2} \): no rule.
For \( P_{\infty} \): start spending \( B \) on the poorest first.

4.2. Average exit time from poverty (Morduch). How many years \( t \) does it take for a poor person with income \( y_{i} \) to reach the poverty line \( z \) if income grows at the annual rate \( g \)? In continuous time, \( y_{i} e^{gt} = z \), or in discrete time, \( y_{i} (1 + g)^{t} = z \). Hence, exit time out of poverty is:
\[ t = \frac{\ln z - \ln y_{i}}{g} \]

For the whole population of poor, the average exit time is:
\[ T_{g} = \frac{1}{N} \sum_{i=1}^{N} t_{i} = \frac{1}{N} \sum_{i=1}^{N} \frac{\ln z - \ln y_{i}}{g} \]
This index is:
Decomposable into population-weighted subsets of the population of
Sensitive to redistribution among the poor;
In meaningful units (as opposed to P_head), namely years.

4.3. Sen-Shorrocks-Thon index: combines incidence of poverty (how many poor?), poverty gap (how poor are they?), and inequality of poverty gaps in the population (how much inequality among the poor?):
\[ P_{SS} = P_0P^1(1 + G') \] where \( P^1 \) is the poverty gap for the poor only, and \( G' \) the Gini coefficient for the poverty gaps in the whole population.

4.4. Robustness of a poverty profile over a range of \( z \): Poverty comparisons without a poverty line
Comparing two situations (A and B), if the poverty profile for A always dominates the profile for B, there is lower incidence of poverty in A, whatever the poverty line. If this is the case, then there is also a lower \( P^1 \) and \( P_0 \) in A compared to B.

Note: We may have lower and upper limits for the poverty line. In which case, all is needed is that the poverty profiles do not cross over that range to assert a robust poverty ranking irrespective of the choice of poverty line.

4.5. Comparing population sub-groups: Relative risk
Relative risk of poverty of rural vs. urban: \((P_0^e - P_0^a)/P_0^a = (.47 - .77)/.77 = .63 \) (Madagascar) \( \rightarrow \) A person in the rural population is 63% more likely to be poor than a person in the urban population.

4.6. Change over time in poverty status of sub-groups in the population
Use the \( P \) indicators by sub-group for each period

4.7. Decomposition of poverty indices

4.7.1. Decomposition of \( P_\alpha \) by population groups (decomposability axiom)
Let \( j = 1, ..., k \) exclusive population groups with index \( P_\alpha^j \)
\[ P_\alpha = \sum_{j=1}^{k} \frac{1}{n} m_j \left( \frac{1}{z} \sum_{i} y_i - \frac{1}{z} \sum_{i} y_i \right) \]
where \( m_j = \frac{n_j}{n} \) population share of group \( j \).
Percentage contribution of group \( j \) to the total poverty index = \( 100 \times \frac{m_j P_\alpha^j}{P_\alpha} \).

4.7.2. Decomposition of the change in the aggregate poverty index \( P_\alpha \) between two periods \((0, t)\) into change due to size of group and change due to intra-group poverty, with \( k \) groups:
\[ \Delta P_\alpha = P_\alpha^t - P_\alpha^0 = \sum_{j=1}^{k} \Delta m_j P_\alpha^j = \sum_{j=1}^{k} m_j P_\alpha^j \Delta m_j + \sum_{j=1}^{k} \Delta P_\alpha^j \Delta m_j \]
where:
First term = change in poverty internal to each group.
Second term = change in relative size of each group.
Third term = cross effect.

V. Multiple correlates of poverty: measuring partial correlations
Income regression: \( \text{Ln} = f(\text{correlates}) \)
Income regressions: Probit or linear probability on poor \( \rightarrow \) \( \text{Pr(poor}=1) = f(\text{correlates}) \).
Correlates = household characteristics, asset endowments, context (local opportunities, exogenous neighborhood effects (characteristics of others in the same social network)). Context variables can be constructed using GIS information (distance to market, topography, distance to others, etc.).

Note: If some of the RHS variables are not exogenous, then we identify partial correlations, not causalities.

VI. Dynamics of poverty and vulnerability: Transitory and chronic poverty

6.1. \( \Delta P_0 \) does not tell us how many people escaped from poverty or became poor during the period.
For example, we could have \( \Delta P_0 = 0 \), and yet many may have entered/leaf poverty during the period.
We observe that there is high mobility in and out of poverty.

6.2. Need distinguish between categories of poor on the basis of the dynamics of poverty:

i) Never poor: on average above \( z \), and never in poverty.
ii) Transient poor/Temporarily poor: on average above \( z \), but sometimes in poverty.
iii) Chronic poor: on average below the poverty line, but sometimes out of poverty.
iv) Persistent poor: always in poverty.

6.3. Indicators of intertemporal poverty: observations over \( T \) periods

6.3.1. For an individual \( i \)
Poverty indicator for individual \( i \) at time \( t \) = \( P_\alpha^t \). For example: \( P_\alpha^t = \left( \frac{z - \bar{y}_t}{z} \right)^2 \)
Intertemporal total poverty indicator during period \((1,T)\) for individual \( i \) is defined as the sum of \( P_\alpha^t \) over time: \( P_i = \sum_{t=1}^{T} P_\alpha^t \).

Chronic poverty indicator for individual \( i \) during period \((1,T)\) is defined as the poverty indicator if all \( y_o \) were equal to their average \( \bar{y}_t = \frac{1}{T} \sum_{t=1}^{T} y_o \):
\[ C_i = \left( \frac{z - \bar{y}_t}{z} \right)^2 \]
Transitory poverty indicator for individual \( i \) during period \((1,T)\) is defined as the difference between total and chronic poverty:
\( T_i = P_i - C_i \)
6.3.2. For the whole population with \( N \) individuals

Inter-temporal total, chronic, and transitory poverty for the population are:

\[
P = \frac{1}{N} \sum_{i=1}^{N} P_i, \quad C = \frac{1}{N} \sum_{i=1}^{N} C_i, \quad T = P - C
\]

Note 1: Measurement errors increase transitory poverty (noise around \( T \)).
Note 2: Longer time between surveys decreases transitory and chronic poverty.

Example (Jalan and Ravallion, JDS 2000): South-West rural China, 1985-90. % of households:
- Never poor: 41%
- Transient poor: 36%
- Chronic poor: 18%
- Persistent poor: 5%

Hence, \( P_i \) for period is 23%, but 59% of the households were in poverty at a time in the period.

6.4. Types of economic shocks:

Shocks to income: illness, unemployment.
Shocks to assets: disease animals, landslide hurricane, expropriation.
Shocks to context: prices (coffee), economic crisis (transition, debt crisis, devaluation).

Idiosyncratic shocks: disease animals, landslide hurricane, expropriation.
Covariate shocks: disease animals, landslide hurricane, expropriation.
Idiosyncratic shocks can be insured locally (e.g., through mutual insurance) but not covariate shocks.

6.5. Responses to shocks

**Ex-ante risk management** (choice of activities, change in context (migration, lobbying)). Risk management decreases the variance of income but generally also decreases the expected level of income. Exposure to uninsured risks lowers expected incomes and increases poverty.

**Ex-post risk coping** (loans, sale of liquid assets, public assistance (safety nets, transfers), mutual insurance)

Vulnerability to shocks: can create irreversibilities due to asset decapitalization, e.g., sale of productive assets, kids out of school, infant malnutrition, homelessness. Can create poverty traps or sharp convexities in asset re-accumulation, making escape from poverty impossible or very difficult.

6.6. Are there poverty traps?

Introduce concept of an income threshold for irreversibility. Below threshold, household becomes captive of poverty (vicious circle of poverty).

6.7. Determinants of transient and chronic poverty

Chronic poverty (level of income): assets, context, household characteristics.
Transient poverty (risk coping ability): liquid assets, access to credit, social capital for mutual insurance.

Hence, different policy instruments are needed to reduce chronic and transient poverty.

6.8. Indicator of vulnerability to poverty: ex-ante probability of falling into poverty

Vulnerable if: \( \text{Pr}(\text{Poor next period}) > 50\% \)

Explain vulnerability: Causal analysis of vulnerability indicator.

6.9. Dynamics of poverty: duration models

Use panel data over several years (e.g., Poland, 1993-96) (Okrasa, 1999).
Hazard rate entry = \( \text{Pr} \) of falling into poverty at time \( t \) after \( t \) years not in poverty
Hazard rate exit = \( \text{Pr} \) of rising out of poverty at time \( t \) after \( t \) years in poverty.
Survival function out of poverty = \( \text{Pr} \) of household remaining out of poverty after \( t \) years not in poverty
Survival function in poverty = \( \text{Pr} \) of household remaining in poverty after \( t \) years in poverty.
Hazard function = \( \text{Pr} \)

Household characteristics (age of head, education, type of household, gender, marital status)
Location (rural, large town)
Sector of employment (public, private)
Socio-economic status (employees, farmers, self-employed, welfare recipients, pensioners)
Financial assets (savings account) and transfers (private, public)
Year poverty spell began
Social benefits: family allowances, unemployment benefits, other.

Results: Hazard function
Effects of household-risk factors on poverty mobility (entry and exit)

<table>
<thead>
<tr>
<th>Poland, 1993-96</th>
<th>\textbf{Probability of exit from poverty}</th>
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<tbody>
<tr>
<td></td>
<td>\textbf{High}</td>
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<tr>
<td><strong>High poverty mobility</strong></td>
<td>Single</td>
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<tr>
<td></td>
<td>Married w/out children</td>
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<td></td>
<td>Has savings account</td>
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<td>Participate to transfer network</td>
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<tr>
<td><strong>Low poverty persistence</strong></td>
<td>University degree</td>
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<tr>
<td></td>
<td>Single</td>
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<td>Employees</td>
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<tr>
<td><strong>Low poverty mobility</strong></td>
<td>Self-employed</td>
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<td></td>
<td>Pensioners</td>
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</tbody>
</table>

6.10. Other issues
Economic mobility (transition matrices): long term change in poverty status, for example across income quintiles:
- % who remain in same income category.
- % who move up or down by one or more quintiles.
Inter-generational transmission of poverty: inheritance of poverty (low education, ill-health, lack of social capital) = inter-generational poverty trap.
Intra-household poverty (role of gender): large component of total poverty.

VII. The geography of poverty: construction of poverty maps (see poverty map for Brazil)

Two approaches

7.1. Combine household survey data with small area data (parsimonious approach)

Step 1: Use household survey data to explain the incidence of poverty ($P_i$) in each small area $a$, $B_{ia}$, covered by the survey as a function of the average area characteristics ($X_a$) that explain poverty and that are available for every small area in the country:

$$B_{ia} = f(X_a)$$

Step 2: Use this relation to predict $B_{ia}$ for all small areas in the country for which there is information on the $X_a$ variables (e.g., municipal or locality data).

Step 3: Map the predicted $B_{ia}$ for each small area using GIS.

7.2. Combine household survey data with household-level population census data (WB approach; P&J Lanjouw)

Step 1: Use household survey data (e.g., LSMS) to explain the probability of being in poverty at the individual ($i$) level:

$$\text{Prob}(f_{X_i} = 1 \text{ if poor, } 0 \text{ if non-poor}) = f(X_i)$$

$X_i$ are individual-level determinants of poverty that are available both in the household survey (intensive data) and in the census data (extensive data), e.g., individual and household characteristics, activities, context). These variables can be endogenous since they are used for predictive purposes.

Step 2: Use the population census information on every individual in the country to predict this individual’s probability of being in poverty using the $f(.)$ function estimated with the household survey:

$$P_{X_i} = f(X_i)$$

Average the poverty predictions over individuals in “small areas” (e.g., census tract, municipality) to reduce the variance. This gives poverty predictions $P_{ia}$ for groups $a$ (e.g., of no less than 5,000 individuals to have reasonable accuracy). Calculate $\text{Var}(P_{ia})$ to place confidence intervals.

Step 3: Map the predicted $P_{ia}$ for each small area using GIS.

VIII. Reducing poverty: The growth-poverty relation

Controversy on the elasticity ($E$) of income of poor with respect to aggregate income

8.1. “Growth is good”: $E = 1$

$$\frac{\Delta Y}{Y}_{\text{poor}} = E \frac{\Delta Y}{Y}_{\text{rich}}.$$ But, if $y = 10$ and $Y = 100$, and $E = 10\%$, then $\Delta y = 1$ and $\Delta Y = 10$. Of the 11 aggregate income gain, 9% goes to the poor and 91% to the rich. Is growth “good for the poor”?

- UNDP (Poverty Center): Pro-poor growth if $E > 1$. But in this case China’s growth that took 500 million people out of poverty but increased inequality was not pro-poor.

8.2. $E$ depends on quality of growth

$⇒$ Squire and Walton (WDR 1990): labor-intensive growth, targeted transfers, safety nets.
$⇒$ Vinod Thomas (WB, Economist October 7, 2000): $E$ depends on: level and distribution in access to education, health, good governance (corruption, rule of law, political freedoms), environmental quality.
$⇒$ de Janvry and Sadoulet (RIW, 2000): $E$ in Latin America depends on:
  $⇒$ Initial inequality in the distribution of income: low $E$ if high inequality.
  $⇒$ Initial level of poverty: low $E$ if high initial; level
  $⇒$ Level of secondary education: low $E$ if low level of education
  $⇒$ Stage of economic cycle: low $E$ under ISI, large negative $E$ during recession, high $E$ in post-debt crisis growth.
  $⇒$ Composition of growth: large if service sector growth (labor intensive).
  $⇒$ Inequality: ratchet effect: increases during recession, but does not fall with growth.

$⇒$ What growth is good for the rural poor?
$⇒$ Growth of agriculture (Ravallion for China), services (India)
$⇒$ Decentralized industrial growth (local clusters, distance to an employment center): regional development and participation of the poor to local employment and investment opportunities.

### Decomposition of the P-class of poverty measures, Buenos Aires 1908 and 1989 (debt crisis)

<table>
<thead>
<tr>
<th>Educational level</th>
<th>P0</th>
<th>P1</th>
<th>P2</th>
<th>mj Population share</th>
<th>Contributions to national poverty: mjPUP</th>
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<th>P1</th>
<th>P2</th>
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- 5 -

9/4/08
Patterns of poverty, Cote d’Ivoire, 1985-1988 (debt and coffee/cocoa crises)
(Christian Grootaert)

<table>
<thead>
<tr>
<th>Year</th>
<th>City</th>
<th>P0</th>
<th>Contributions (%)</th>
<th>Relative risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>Abidjan</td>
<td>0.03</td>
<td>2</td>
<td>-782</td>
</tr>
<tr>
<td></td>
<td>Other cities</td>
<td>0.24</td>
<td>17</td>
<td>-27</td>
</tr>
<tr>
<td></td>
<td>East Forest (food)</td>
<td>0.48</td>
<td>37</td>
<td>-37</td>
</tr>
<tr>
<td></td>
<td>West Forest (coffee)</td>
<td>0.18</td>
<td>8</td>
<td>-69</td>
</tr>
<tr>
<td></td>
<td>Sanannah (food)</td>
<td>0.50</td>
<td>36</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Total Cote d’Ivoire</td>
<td>0.30</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>City</th>
<th>P0</th>
<th>Contributions (%)</th>
<th>Relative risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>Abidjan</td>
<td>0.14</td>
<td>5</td>
<td>-230</td>
</tr>
<tr>
<td></td>
<td>Other cities</td>
<td>0.41</td>
<td>19</td>
<td>-12</td>
</tr>
<tr>
<td></td>
<td>East Forest (food)</td>
<td>0.49</td>
<td>26</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>West Forest (coffee)</td>
<td>0.55</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Sanannah (food)</td>
<td>0.65</td>
<td>31</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Total Cote d’Ivoire</td>
<td>0.46</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>

Brazil poverty map (Peter Lanjouw, WDR 2008)

<table>
<thead>
<tr>
<th>Travel time to nearest city of 100000</th>
<th>Agro Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>Medium</td>
</tr>
<tr>
<td>less than 4h</td>
<td>32,516,218</td>
</tr>
<tr>
<td>between 4h - 8h</td>
<td>5,345,851</td>
</tr>
<tr>
<td>more than 8h</td>
<td>3,117,659</td>
</tr>
<tr>
<td>Total</td>
<td>40,979,729</td>
</tr>
</tbody>
</table>

| Poor people | less than 4h | 3,917,943 | 6,518,762 | 8,710,262 | 19,146,966 |
|             | between 4h - 8h | 1,137,817 | 2,125,271 | 2,052,317 | 5,315,405  |
|             | more than 8h   | 910,946   | 1,082,753 | 1,689,842 | 3,683,541  |
| Total       | 5,966,706     | 9,726,786 | 12,331,421 | 28,024,913 |

| Poverty rate | less than 4h | 12.0 | 15.8 | 13.5 | 13.9 |
|              | between 4h - 8h | 21.3 | 30.2 | 27.8 | 26.9 |
|              | more than 8h   | 29.2 | 31.0 | 29.9 | 30.0 |
| Total        | 14.6 | 18.8 | 16.0 | 16.5 |

Where are the poor, by distance to a major city and by agricultural potential?
Most of the poor are in high potential regions and close to cities.
But the highest poverty rate is among people in medium-low agricultural potential and in remote areas.
Target the best areas for poverty reduction; target marginal areas for extreme poverty.