Simple Poverty Progress Indices for Bangladesh, Haiti, India, Mexico, Pakistan, and the Philippines

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Goal: Measure Clients' Poverty Status

1. *Objective:*
   - **Quantitative, expenditure-based**
   - **LSMS-type data**
2. *Accurate* **(strong link with poverty)**
3. *Practical* **(accepted and used):**
   - **Few, inexpensive-to-collect indicators**
   - **Simple enough to compute on paper, in the field, in real time (no software required)**
4. *Applicable* **(for all, not just microfinance)**

Goal: Give Managers a Decision Tool

1. Use score to:
   - Target services (classify individuals)
   - Report poverty rates (e.g., for USAID)
   - Track changes in poverty over time
2. 'Practicality' matters more than accuracy:
   - For programs, not journals
   - Users resist change; if unused, why bother?
   - KISS (Keep Scoring Simple):
     - Minimize 'extra' work
     - Show users how scoring works
     - Choose 'common-sense' indicators
     - Adjust based on users' feedback

Approaches

1. **Microfinance practitioners (housing indices):**
   - **Common-sense indicators and weights**
   - **Easy-to-use, and well accepted**
   - **Not linked to expenditure, unknown accuracy**
2. **Academics (poverty map, proxy means test):**
   - **Regression with LSMS expenditure data**
   - **Focus on complex statistics, ignore accuracy**
   - **Scorecard rarely presented, let alone used**
3. **Scoring Industry:**
   - **Use data, regression, *and* expertise**
   - **Simple statistics (but not taught in school)**
   - **Focus on results, thanks to profit incentive**

CASH-POR Housing Index

Indicator	Values			Points
1. Size of house?	Small	Medium	Big	
	0	2	4	
2. Structural condition?	Dilapidated	Average	Good	
	0	2	6	
3. Quality of walls?	Poor	Average	Good	
	0	2	6	
4. Quality of roof?	Thatch/leaves	Tin/Iron sheets	Permanent roof	
	0	2	6	
Source: "Overcoming the Obstancles of Identifying the Poorest Families", 2000, Simanowitz, Nkuna, and Kasim.				Total:

- If score is 10, is the person poor?
- Are all people with scores of 0 poor?
- There are few thatch roofs on brick walls

Egypt Regression (Datt & Jolliffe, 2005)

TABLE 2

BASIC AND AUGMENTED MODELS, LOG PER CAPITA CONSUMPTION—OLS, GOVERNORATE-LEVEL FIXED EFFECTS

		Rural Model (N = 1,326)				Urban Model (N = 1,122)			
		Basic Model		Augmented Model		Basic Model		Augmented Model	
Variable	Description	Coefficient	t-Ratio	Coefficient	t-Ratio	Coefficient	t-Ratio	Coefficient	t-Ratio
Upper	Upper Egypt	.147	2.91	.045	.43	−.145	−2.65	−.082	−1.82
Household characteristics:									
Hhsize	Household size	−.142	−8.83	−.156	−9.54	−.306	−12.51	−.245	−9.05
Hhsize2	Household size, squared	.004	5.23	.004	5.63	.015	9.98	.014	9.84
Hhage	Household head: age in years	.015	2.58	.012	1.97	.019	2.31	.010	3.91
Hhage2	Household head: age+ squared	.000	−1.95	.000	−1.69	.000	−1.65		
Femhead	Dummy: female-headed household	−.069	−1.77			−.114	−2.13	−.113	−2.11
Avgsch	Household average years of schooling	.041	10.51			.053	10.7	.054	10.73
Hhpedu	Household head's parent: primary school	.052	2.11	.068	2.61	.080	3.33	.079	3.27
Sppedu	Spouse's parent: primary school	.056	2.04						
Lowned	Log: owned cultivated land	.146	5.22	.253	6.98	.090	1.67		
Secsch	Distance to secondary school	.032	2.29						
H_post	Distance to hospital post/hospital	−.036	−3.06	−.022	−1.56				
Interaction effects:									
Hhsize × avgsch				.004	3.18				
Hhsize × sppedu				−.020	−2.47				
Hhsize × hhage								−.001	−2.38
Hhsize × lowned								.010	2.38
Hhage × avgsch				.000	2.82				
Hhage × sppedu				.005	4.25				
Hhage × lowned				−.001	−3.15			.001	1.92
Avgsch × lowned				−.006	−2.84				
Hhpedu × sppedu				−.041	−2.04				
Sppedu × h_post				.024	1.46				
Lowned × h_post				−.007	−1.52				
Intercept		4.876	23.88	5.196	23.79	5.352	15.35	5.246	23.68
R^2		.37		.38		.48		.48	

Note. Dummies for governorates and missing observations are suppressed from the output. The urban sample consists of 57 primary sampling units (PSUs); the rural sample has 68 PSUs. OLS = ordinary least squares.

How Indicators Are Selected

'Practicality', not just accuracy

Regression w/LSMS-type data + 'expert': After stepwise, pick best predictors that are also:

- **Common sense**
- **Objective**
- **Verifiable**
- **Quick**
- **Liable to change over time**
- **Strongly linked with poverty**

Indicator Selection (cont.)

Exclude:

- Expenditure amount, asset value
- Ratio, square, interaction, logarithm
- Continuous or subjective

Include:

- Presence/absence of assets
- Categories
- Objective
- Variety
- Liable to change over time

Example Indicators

- Number of children ages 0–14
- School attendance
- Type of floor
- Type of toilet
- Source of water
- Land ownership
- Cooking fuel
- TV ownership
- Radio ownership
- New shoes in past 6 months

Point Selection (cont.)

1. Transform logit coefficients so that:
   - All points are zero or positive integers
   - Lowest score (most likely poor) is 0
   - Highest score (least likely poor) is 100
2. This transformation reduces accuracy a little but promotes acceptance
3. Programs can download scorecard & use
4. Field workers compute scores on paper, in field, in real time; no need for software

Overview of PPIs

Country	Poverty line (person/day)	% poor	Survey	# HH	Indicators tested
Bangladesh	$1 (PPP)	44	’00 HIES	7,440	>600
Haiti	$1 (PPP)	56	’01 ECVH	7,168	>250
India	$1 (PPP)	46	’03 SES	41,013	>400
Mexico	P31 rural, P45 urban	48	’02 ENIGH	17,167	>2,000
Pakistan	Rs25	40	’01 PIHS	15,503	>400
Philippines	P36	31	’01 APIS	38,014	>500

Bangladesh PPI

Indicator	Attributes					Points
1. What type of latrine does the household use?			Open field	Kacha (temporary or permanent) or pit Pacca	Sanitary or water-seal Pacca	
			0	7	12	
2. How many household members are 11 years old or younger?	4 or more	3	2	1	0	
	0	7	12	17	26	
3. Does any household member work for a daily wage?				Yes	No	
				0	7	
4. How many rooms does the house have (excluding ones used for business)?			1	2 or 3	4 or more	
			0	3	9	
5. Do all children ages 6 to 17 attend school?			No	No children ages 6 to 17	Yes	
			0	4	6	
6. Does the household own a television set?				No	Yes	
				0	11	
7. How many hectares of cultivable land does the household own?		Less than 0.34	0.34 to 0.99	1 to 1.99	2 or more	
		0	3	4	9	
8. What is the main construction material of the walls of the house?		Hemp/hay/bamboo or mud brick		C.I. sheet/wood	Brick/cement	
		0		5	7	
9. Does the household own drawing room furniture?				No	Yes	
				0	9	
10. Does the house have a separate kitchen?				No	Yes	
				0	4	
Source: Calculations by Microfinance Risk Management, L.L.C., based on 2000 HIES.					Total:	

Haiti PPI

Indicator	Attributes					Points
1. How many people in the household are 14 years old or younger?	4 or more	3	2	1	0	
	0	3	8	11	19	
2. Do all children of ages 6 to 14 attend school?			No	Yes	No children 6-14	
			0	3	3	
3. Where does the household reside?				Not Port-a-Prince	Port-a-Prince	
				0	15	
4. Does the household own a radio/cassette player?				No	Yes	
				0	7	
5. What are the dwelling's floors made of?			Earth	Concrete or other	Ceramic or wood planks	
			0	4	12	
6. In the past 12 months, did the household receive any money or gifts remitted from abroad?				No	Yes	
				0	7	
7. Does any household member have salaried employment?				No	Yes	
				0	12	
8. How many plots of agricultural land, forest land, pasture land, or gardens does the household use?		None	1	2 or 3	4 or more	
		2	0	5	11	
9. What is the dwelling's roof made of?			Straw, palm leaves, or other	Iron	Concrete	
			0	4	9	
10. Does the household own any pigs?				No	Yes	
				0	5	
					Total:	

India PPI

Indicator			Values			Points
1. How many children aged 0 to 17 are in the household?	≥4	3	2	1	Zero	
	0	7	13	19	29	
2. How many children aged 6 to 17 attend school?			There are no children	Not all attend	All attend	
			0	5	6	
3. What is the household's primary energy source for cooking?			Firewood and chips, charcoal, dung cake, or no cooking arrangement	Electricity, coke, or coal	LPG, Kerosene, gobar gas, others, or unknown	
			0	4	11	
4. Does the household own a television?				No	Yes	
				0	5	
5. How many hectares of land does the household own?		Rural, <=0.4 ha.	Rural, >0.4 and <=1	Rural, >1 ha.	Urban, any amount	
		0	2	3	8	
6. What is the principal occupation of the household?	Agricultural labourers	Operators and labourers, bricklayers, and construction workers	Cultivators, farmers, fishers, hunters, loggers, or unknown	Sales workers, service workers, and transport-equipment operators	Professional, technical, clerical, administrative, managerial, executive, and teachers	
	0	5	8	10	12	
7. How many almirah/dressing tables does the household own?			0	1	2 or more	
			0	2	8	
8. Does the household own a scooter or motorcycle?				No	Yes	
				0	11	
9. Is the residence all pucca (burnt bricks, stone, cement, concrete, jackboard/cement-plastered reeds, timber, tiles, galvanised tin or asbestos cement sheets)?				Not all pucca	All pucca	
				0	5	
10. Does the household own a pressure cooker or pressure pan?				No	Yes	
				0	7	
Source: Calculations based on Schedule 1.0 of the 59th Round (2003) of India's Socio-Economic Survey (NSSO, 2005).					Total:	

Mexico PPI

Pregunta				Respuesta		Puntos
1. ¿Qué combustible utiliza para cocinar?				Leña	Gas	
				0	10	
2. ¿Esta vivienda cuenta con una regadera?				No	Sí	
				0	5	
3. ¿De qué material es la mayor parte de los pisos de la vivienda?			Tierra	Cemento o firme	Madera, loseta o mosiaco	
			0	4	9	
4. En los últimos tres meses, ¿Compró calzado para una persona de 17 años o más?				No	Sí	
				0	4	
5. En los últimos tres meses, ¿Compró prendas de vestir para una persona de 17 años o más?				No	Sí	
				0	4	
6. ¿Cuántos miembros del hogar son de edades de 0 a 17 años?	Cuatro o más	Tres	Dos	Uno	Cero	
	0	10	13	21	27	
7. ¿Cuenta con teléfono fijo o teléfono celular?				No	Sí	
				0	6	
8. ¿Cuántos miembros del hogar son "obreros o empleados"?			Cero	Uno	Dos o mas	
			0	3	6	
9. ¿Cuenta con automóvil, camioneta, etc.?				No	Sí	
				0	5	
10. ¿Cuenta con un horno de microondas?				No	Sí	
				0	6	
11. En la semana pasada, ¿Consumió en el hogar refrescos embotellados de cola o sabores?				No	Sí	
				0	5	
12. En la semana pasada, ¿Consumió en el hogar carne de res o ternera en cualquier forma?				No	Sí	
				0	3	
13. En la semana pasada, ¿Consumió en el hogar leche en cualquier forma?				No	Sí	
				0	2	
14. El los últimos 3 meses, ¿Viajó alguien del hogar por colectivo pesero?				No	Sí	
				0	4	
15. ¿Cuenta con una batidora?				No	Sí	
				0	4	
Fuente: Cálculos basados en ENIGH 2002 por Microfinance Risk Management, L.L.C.					Total:	

Pakistan PPI

	Indicator	Attributes			Points
1.	Do all children of ages 6 to 17 attend school?	No	Yes	No children this age	
		0	10	21	
2.	In the past two weeks, did anyone in the household eat any chicken?		No	Yes	
			0	6	
3.	What is the household's main source of drinking water?		Hand pump	Any other source	
			0	3	
4.	In the past two weeks, did anyone in the household eat any curd or yoghurt?		No	Yes	
			0	5	
5.	Does the household own a refrigerator or freezer?		No	Yes	
			0	7	
6.	In the past month, did anyone in the household spend anything on telephone, telegraph, postal, fax, e-mail, internet, etc.?		No	Yes	
			0	8	
7.	In the past two weeks, did anyone in the household eat any mutton?		No	Yes	
			0	6	
8.	What type of toilet is used by the household?	All others	Flush connect to pit	Flush connected to public sewerage	
		0	3	7	
9.	In the past two weeks, did anyone in the household eat any Desi ghee?		No	Yes	
			0	10	
10.	In the past two weeks, did anyone in the household eat any tomatoes?		No	Yes	
			0	5	
11.	In the past year, did anyone in the household buy a Burka, Chadar, Ajrak, etc.?		No	Yes	
			0	6	
12.	In the past month, did anyone in the household use any shampoo?		No	Yes	
			0	4	
13.	In the past two weeks, did anyone in the household eat any eggs?		No	Yes	
			0	2	
14.	In the past month, did anyone in the household use any gas from a cylinder?		No	Yes	
			0	6	
15.	In the past two weeks, did anyone in the household eat any apples?		No	Yes	
			0	5	

Source: Calculations by Microfinance Risk Management, L.L.C. based on the 2001 PIHS. Total:

Philippines PPI

Indicator	Values				Points
1. Does the family own a gas stove or gas range?			No	Yes	
			0	13	
2. How many people in the family are aged 0 to 17?	≥5	3 or 4	1 or 2	Zero	
	0	6	15	26	
3. How many television sets does the family own?		Zero	1	≥2	
		0	9	20	
4. What are the house's outer walls made of?			Light (cogon, nipa, or sawali, bamboo, anahaw)	Strong (iron, aluminum, tile, concrete, brick, stone, wood, asbestos)	
			0	4	
5. Do any family members have salaried employment?			No	Yes	
			0	7	
6. How many radios does the family own?		Zero	1	≥2	
		0	3	12	
7. Does the family own a sala set?			No	Yes	
			0	8	
8. What is the house's roof made of?			Light (Salvaged, makeshift, cogon, nipa, or anahaw)	Strong (Galvanized iron, aluminum tile, concrete, brick, stone, or asbestos)	
			0	2	
9. What kind of toilet facility does the family have in the house?			None, open pit, closed pit, or other	Water sealed	
			0	3	
10. Do all children in the family of ages 6 to 11 go to school?		No	Yes	No children ages 6-11	
		0	2	4	
Source: Calculations based on the 2002 APIS.				Total:	

Day-to-Day Use of PPI

- Photocopy, go to field, ask/observe questions
- Circle responses, add up points
- Apply simple score-based policy, e.g.:
  - Score ≤ x, qualify
  - Score > y, disqualify
- Put scorecard in client file, and perhaps record score and/or indicator values in database
- Reward field agents and branches based on:
  - Portfolio poverty rate
  - Changes in portfolio poverty rate

Scores and Poverty Likelihoods

- **No score (not even 0 or 100) gives certainty of being poor or non-poor (always margin of error)**
- **Use survey data to convert scores to** *poverty likelihoods* **(probability poor for a given score)**
- **India example:**
  - **94 of 95 in survey w/scores 0–4 were poor, so poverty likelihood for 0–4 is 94÷95=98.8%**
  - **167 of 2,720 in survey w/scores 50–100 were poor, so poverty likelihood for 50–100 is 167÷2,720=6.1%**

India: Poverty Likelihoods

Score	Poverty likelihood for people with score in range (%)	% of people <=score who are poor	% of people >score who are non-poor
0-4	98.7	98.7	54.1
5-9	97.0	97.5	55.2
10-14	95.3	96.2	57.7
15-19	90.9	93.6	61.9
20-24	80.7	88.8	66.9
25-29	72.5	83.9	72.9
30-34	61.7	78.2	80.4
35-39	42.5	71.5	85.9
40-44	32.9	66.4	90.5
45-49	21.1	61.5	93.8
50-54	13.3	57.5	96.1
55-59	10.0	54.3	98.4
60-64	3.3	51.7	99.2
65-69	1.5	49.7	99.5
70-74	0.6	48.3	99.6
75-79	0.1	47.3	99.4
80-84	0.6	46.7	99.5
85-89	0.7	46.5	100.0
90-94	0.0	46.4	100.0
95-100	0.0	46.4	N/A
Total:	46.4		

Surveyed cases weighted to represent all India.

Source: Calculations by Microfinance Risk Management, L.L.C. based on Schedule 1.0 of the 59th Round (2003) of India's Socio-Economic Survey by the National Sample-Survey Organisation

Setting Cut-Off for Targeting

- **Set by programs, not consultant nor USAID:**
  - **— Based on values and mission**
  - **— Balance 'benefit' of covering poor versus 'cost' of leaking to non-poor**
  - **— PPI makes explicit the leakage to non-poor that is always inevitably there**
- **India: If target cut-off score is 24, 88% will be poor (if random sample of population)**
- **Choice of target cut-off score does *not* define the poverty line**

Portfolio Poverty Rates

The share of all clients who are poor is the average of their poverty likelihoods.

Indian example, portfolio of 3 clients, 1/1/06

Client	Score 1/1/06	Poverty likelihood (%)
A	20	80.7
B	30	61.7
C	40	32.9
	Average:	58.4

USAID will mandate reporting this.

Accuracy

- **Test method: 'Out-of-sample bootstrap':**
  - **Use part of data to build PPI**
  - **Test 10,000 samples from other part**
- **Portfolio poverty rates (90% confidence):**
  - **Bangladesh: +/– 1.5 percentage points**
  - **India: +/– 1.7 percentage points**
  - **Haiti: +/– 1.9 percentage points**
- **Individual poverty likelihoods (90% confidence) are generally about +/– 5 to 10 percentage points**

Poverty Progress (or Regress)

Change (*not impact*) in portfolio poverty rates.

Indian example, 3 clients, 1/1/06 to 1/1/07

	Score		Poverty likelihood (%)	
Client	1/1/06	1/1/07	1/1/06	1/1/07
A	20	25	80.7	72.5
B	30	35	61.7	42.5
C	40	60	32.9	3.3
		Average:	58.4	39.4

- 19.0% = 58.4 – 39.4 of all clients left poverty
- 32.5% = 19.0 ÷ 58.4 of poor clients left poverty

Scoring Policy

Programs set their own policy cut-offs based on:

- **Their mission and values**
- **Benefits/costs of classification outcomes**

True poverty status	Poverty segment: Poor	Poverty segment: Non-poor
Poor	**A.** Truly poor correctly classified in poor segment	**B.** Truly poor incorrectly classified in non-poor segment
Non-poor	**C.** Truly non-poor incorrectly classified in poor segment	**D.** Truly non-poor correctly classified in non-poor segment

India: Classification Outcomes

Score	A. Truly poor correctly classified in poor segment	B. Truly poor incorrectly classified in non-poor segment	C. Truly non-poor incorrectly classified in poor segment	D. Truly non-poor correctly classified in non-poor segment
0-4	94	4,523	1	5,339
5-9	298	4,320	7	5,333
10-14	719	3,899	28	5,312
15-19	1,385	3,233	95	5,245
20-24	2,103	2,515	266	5,074
25-29	2,840	1,778	547	4,793
30-34	3,559	1,059	994	4,347
35-39	4,005	613	1,598	3,742
40-44	4,285	333	2,169	3,171
45-49	4,450	167	2,787	2,553
50-54	4,537	81	3,351	1,989
55-59	4,594	24	3,863	1,477
60-64	4,609	9	4,299	1,041
65-69	4,615	3	4,667	673
70-74	4,616	1	4,933	407
75-79	4,617	1	5,140	200
80-84	4,617	0	5,266	75
85-89	4,618	0	5,321	19
90-94	4,618	0	5,337	4
95-100	4,618	0	5,340	0
Total:	4,618		5,340	

Surveyed cases weighted to represent all India, in units of 100,000 people.

Total Net Benefit: Indian Example

Policy cut-off: If ≤34, count as 'poor'

Classification	People		Net benefit
A. Poor correct	3,559	x	+3
B. Poor incorrect	1,059	x	–2
C. Non-poor incorrect	994	x	–2
D. Non-poor correct	4,347	x	+1
	Total net benefit:		10,918

Policy cut-off: If ≤39, count as 'poor'

Classification	People		Net benefit
A. Poor correct	4,005	x	+3
B. Poor incorrect	613	x	–2
C. Non-poor incorrect	1,598	x	–2
D. Non-poor correct	3,742	x	+1
	Total net benefit:		11,335

Setting Cut-Offs

- **Cut-offs represent trade-offs between:**
  1. **Undercoverage (poor classified as non-poor)**
  2. **Leakage (non-poor classified as poor)**

- **Being intentional and explicit about these inevitable trade-offs is unusual but healthy**

- **Programs (not Congress) decide how policy depends on poverty. But programs still do not:**
  - **Choose poverty lines**
  - **Manipulate portfolio poverty rates**

Accuracy

1. Estimated portfolio poverty rate:
   - Bias, consistency, mean-squared error
   - Test w/data not used to build scorecard
2. Classification of individuals (concentrating poor in low scores, non-poor in high scores)
   - Best: Net benefit at specific cut-offs
   - # poor/non-poor classified right/wrong, by score
   - Global 'c' (area under ROC curve)

No scorecard is perfect (or even close).

Appropriate measure depends on scorecard purpose.

Compared w/others, GFUSA scorecards are accurate.

How Many Indicators?

GFUSA tested 5, 10, and 15

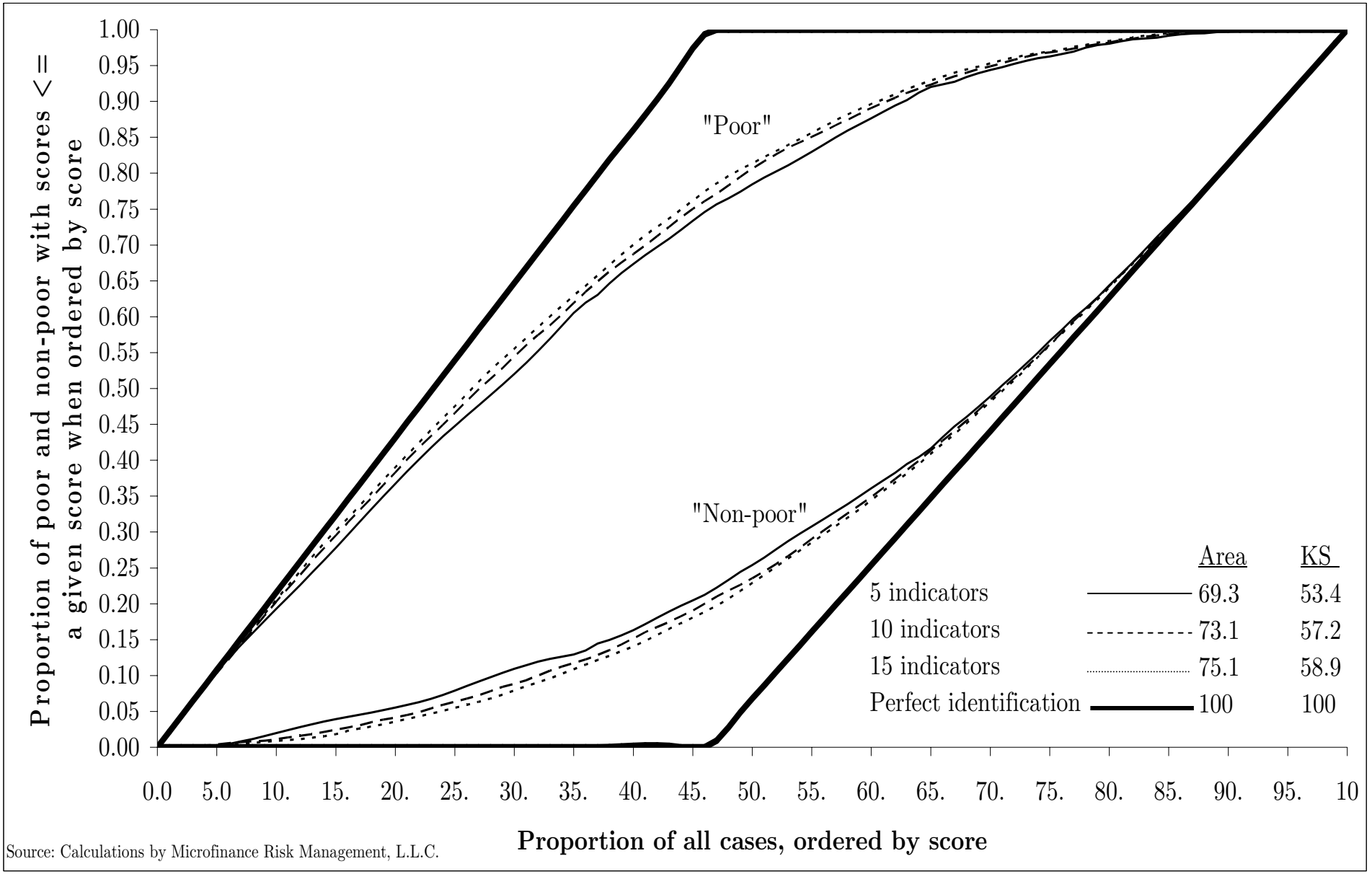
Costs of more indicators:

- **Longer interview**
- **Improves accuracy only a little ('flat max')**

Benefits of more indicators:

- **More sensitive to small changes over time**
- **Less sensitive to inaccurate data**
- **Smaller margin of error**

ROC for India: 5, 10, 15 indicators



Source: Calculations by Microfinance Risk Management, L.L.C.

What Regression Technique?

1. IRIS: Estimate expenditure
2. GFUSA: Estimate poverty likelihood
3. Hentschel: Expenditure, convert to likelihood

'Flat max':

- Diminishing returns to sophistication
- Regardless of methods or weights, most reasonable scorecards w/many indicators have similar accuracy
- Additional indicators add little new info.
- Poverty is relatively easy to score

Wainer (1976): 'It don't make no nevermind.'

Comparison of Techniques

Aspect:	**IRIS**	**Hentschel**	**GFUSA**
Product of estimation:	Expenditure	Expenditure converted to likelihood	Poverty likelihood
Statistical model	OLS	OLS	Logit
Objective link of scores to data:	Yes	Yes	Yes
Considers distance from poverty line:	Yes	Yes	No
Steps in computing score:	2	2	1
Risk of overfitting:	High	Medium	Low
Complexity:	Most	Medium	Least
Accuracy, portfolio poverty rate:	Biased	Good	Unbiased
Accuracy, classification of individuals:	Highest	High	Good
Indicator criterion:	Stepwise R^2	Stepwise R^2	Stepwise 'c'/ROC and 'expert'

Objectivity

Objective: **Scores linked to poverty via data**

All GFUSA scorecards are objective: Poverty likelihood = share of surveyed HH with score who were poor by an expenditure poverty line

How to 'certify' scorecards?

- **Not how indicators and weights are selected (data vs. 'expert', fancy vs. simple)**
- **What matters is linking scores (regardless of how derived) to survey data**
- **Basel II uses a similar criterion to qualify scorecards for credit-risk assessment**

Summary

- **GFUSA's PPIs are simple, easy-to-use, inexpensive, accurate, and objective**
- **Estimate likelihood that a person is poor:**
  - **Use policy cut-offs for targeting**
  - **Take average to get portfolio poverty rate**
  - **Track over time for progress out of poverty**
- **Put 'practicality' before accuracy (KISS):**
  - **One page, few indicators, simple weights**
  - **Field workers can compute scores on paper in real time (no software required)**
- **Useful for *any* program, not just microfinance**

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