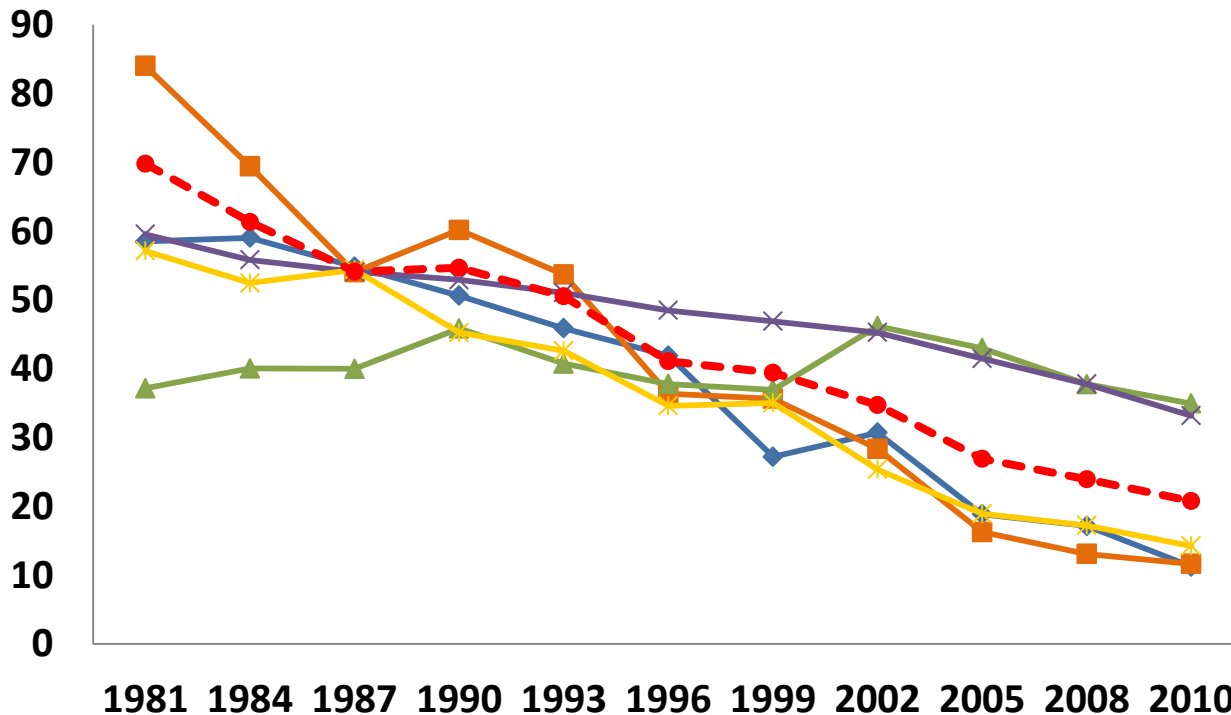# Poverty in Asia: A Deeper Look

Guanghua Wan

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Asia's Poverty Reduction

Poverty rate (%)

Number of poor (millions)	1981	2010
Central and West Asia	67	25
East Asia	835	156
Pacific	2	3
South Asia	495	473
Southeast Asia	189	77
Developing Asia	1587	733

Legend: Central and West Asia, East Asia, Pacific, South Asia, Southeast Asia, Developing Asia

Asia's Poverty Story

- **Conventional story: Asia and the Pacific will eradicate extreme poverty before 2030**

- **But the $1.25 extreme poverty line has little relevance to Asia's poor— it must be revised**

- **What about vulnerability to poverty?**

- **And food insecurity?**

=> a different ending ...
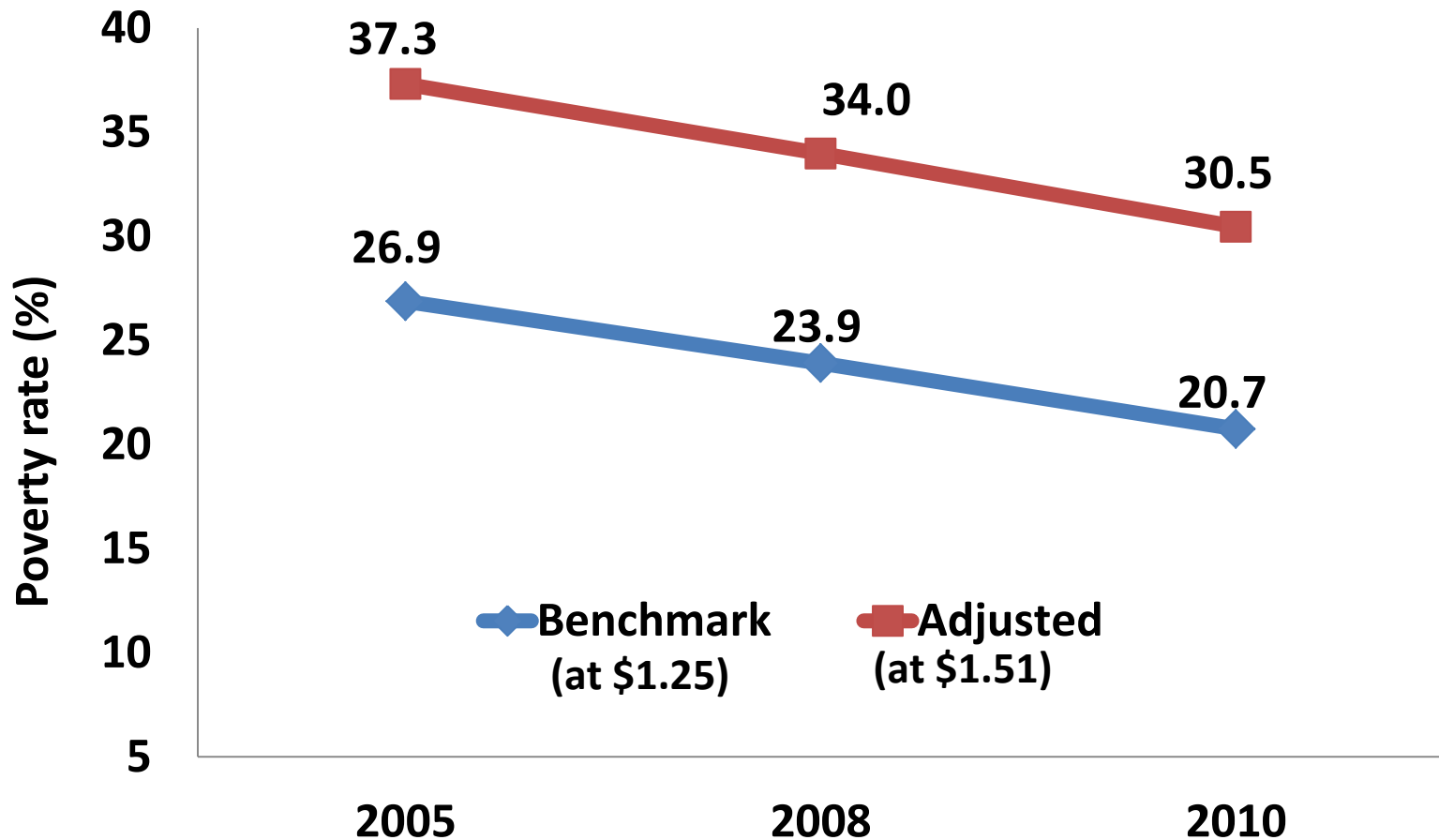
Issue 1: Asian Poverty Line

- **The $1.25 poverty line is inadequate because it is:**

  - ➢ **the average of 15 national poverty lines from the poorest countries, 13 of from Africa and only Tajikistan and Nepal from Asia;**

  - ➢ **based on 1988-2005 data. But basic needs change over time and consumption structure differs from region to region, particularly for fast growing Asia.**

- **Thus, there is a need to estimate/update a regional poverty line for Asia.**

Asian Poverty Line

- **Use the method similar to that derived the $1.25 poverty line, but with updated national poverty lines from Asia only.**

- **Asian Poverty Line = $1.51/day (in 2005 PPPs).**

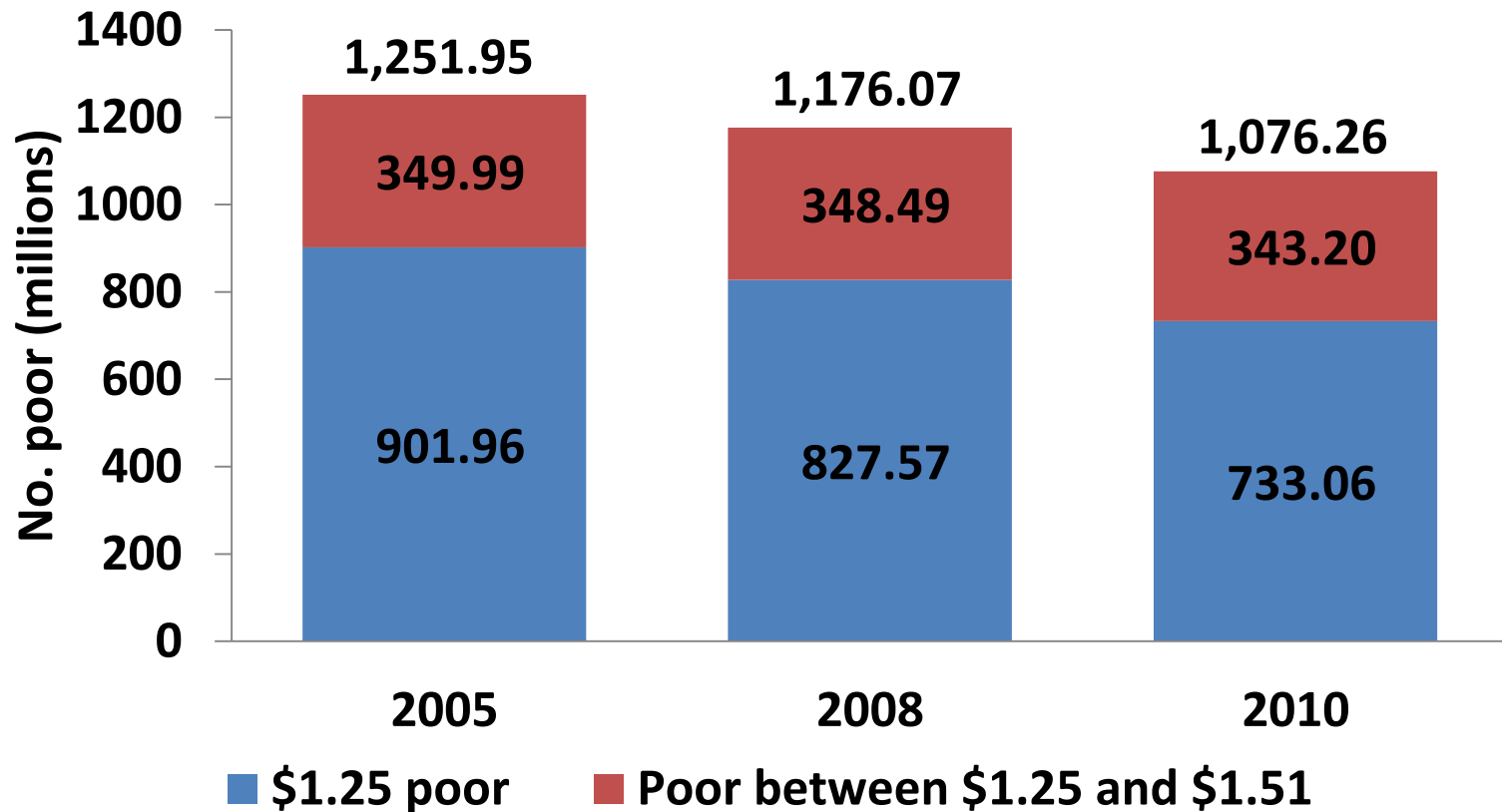# Asian Poverty Line: Key Findings

Poverty rates (%) in Asia ($1.51 vs benchmark $1.25 poverty lines)
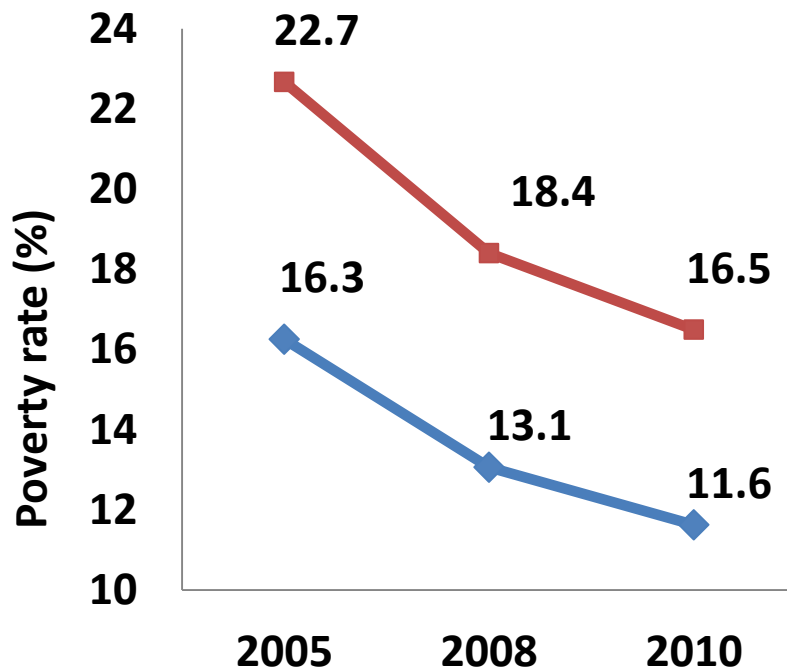
Asian Poverty Line: Key Findings

Number of poor (millions) in Asia under the $1.25 and $1.51 poverty lines

Top number = the poor at $1.51 poverty line

No. poor (millions)

	2005	2008	2010
Total	1,251.95	1,176.07	1,076.26
Poor between $1.25 and $1.51	349.99	348.49	343.20
$1.25 poor	901.96	827.57	733.06

■ $1.25 poor   ■ Poor between $1.25 and $1.51

Sources: ADB estimates.

Asian Poverty Line: Key Findings

Poverty Rates (PRC)

Benchmark (at $1.25): 2005 = 16.3, 2008 = 13.1, 2010 = 11.6
Adjusted (at $1.51): 2005 = 22.7, 2008 = 18.4, 2010 = 16.5

Number of poor (PRC)

2005: 295.57 — $1.25 poor 211.85, Poor between $1.25 and $1.51 = 83.71
2008: 243.71 — $1.25 poor 173.00, Poor between $1.25 and $1.51 = 70.71
2010: 220.67 — $1.25 poor 155.51, Poor between $1.25 and $1.51 = 65.16

Sources: ADB estimates.

Asian Poverty Line: Key Findings

Poverty Rates (INDIA)

Poverty rate (%)

- 55.8
- 52.3
- 47.7
- 40.8
- 37.4
- 32.7

2005   2008   2010

Benchmark (at $1.25)   Adjusted (at $1.51)

Number of poor (INDIA)

No. of poor (millions)

- 636.93
- 622.61
- 584.33
- 170.64
- 177.58
- 184.24
- 466.30
- 445.02
- 400.08

2005   2008   2010

$1.25 poor   Poor between $1.25 and $1.51

Sources: ADB estimates.

Asian Poverty Line: Key Findings

Poverty Rates (INDONESIA)

Poverty rate (%)

- 32.9 (2005, Adjusted)
- 34.6 (2008, Adjusted)
- 28.0 (2010, Adjusted)
- 21.4 (2005, Benchmark)
- 22.6 (2008, Benchmark)
- 18.1 (2010, Benchmark)

2005   2008   2010

◆ Benchmark (at $1.25)   ■ Adjusted (at $1.51)

Number of poor (INDONESIA)

No. of poor (millions)

Year	$1.25 poor	Poor between $1.25 and $1.51	Total
2005	48.73	26.13	74.86
2008	53.19	28.00	81.20
2010	43.32	23.84	67.16

■ $1.25 poor   ■ Poor between $1.25 and $1.51

Sources: ADB estimates.
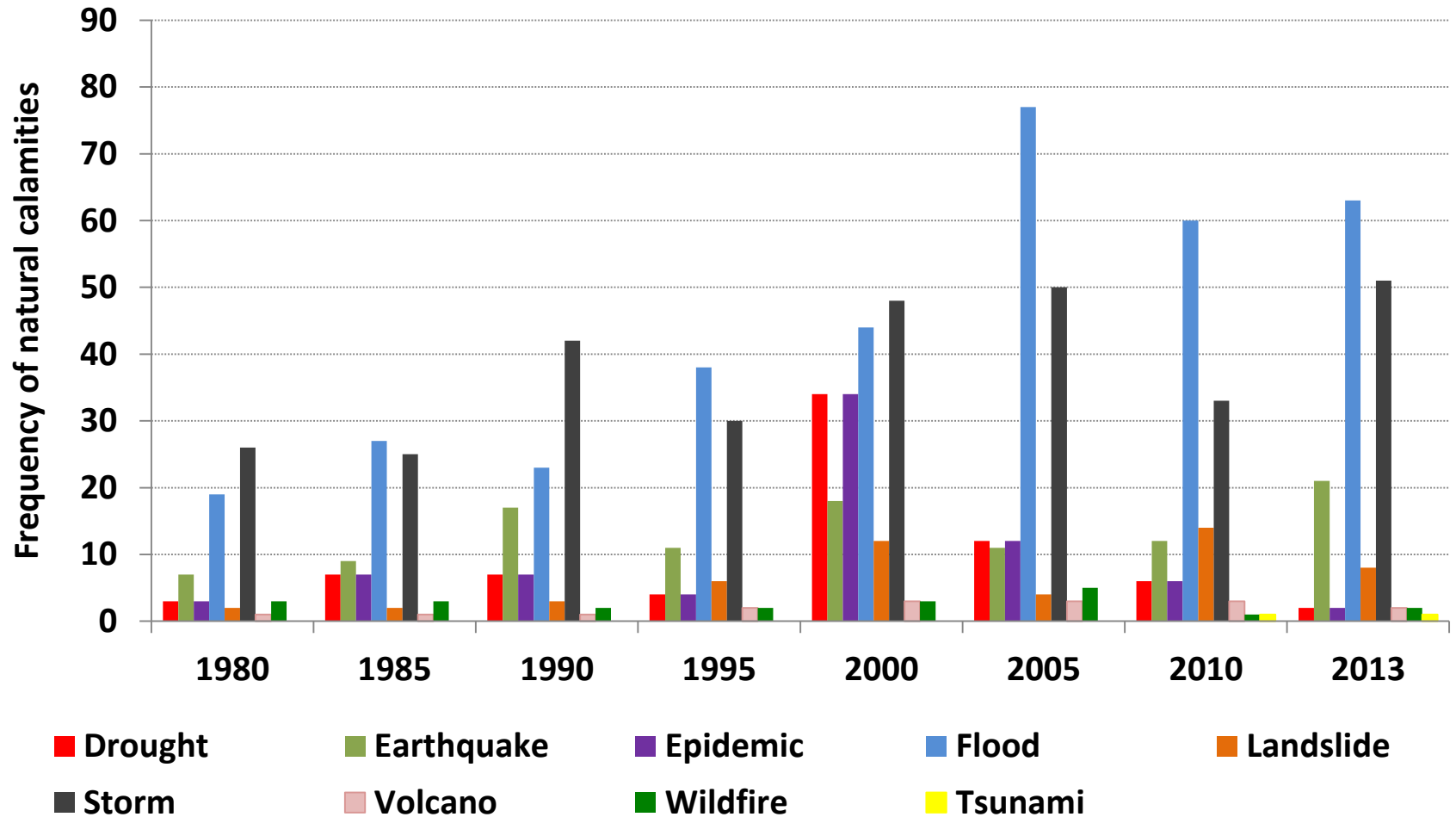
Issue 2: Vulnerability

- **Vulnerability due to shocks affects household's welfare, particularly that of the poor; But the $1.25 poverty line does not consider shocks;**

- **Those living above $1.25 with risks are not necessarily better off than those receiving $1.25 but with certainty;**

- **A vulnerability-adjusted poverty line (considering risks) which has the same welfare as $1.25 with certainty can be derived as:**
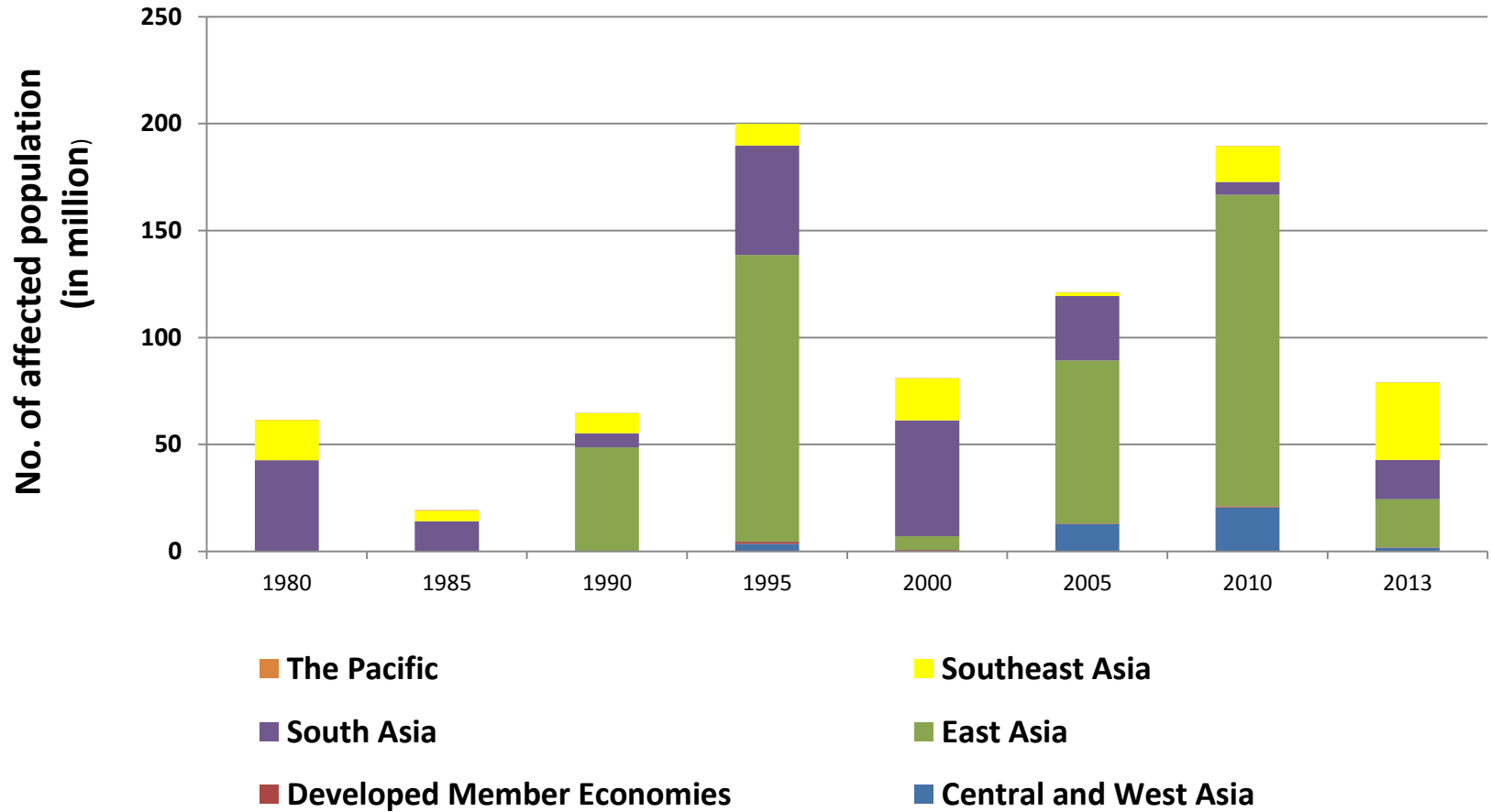
$$z_0 \left[1 - \delta(1-\delta)\frac{\sigma^2}{2} \right]^{-1/(1-\delta)}.$$

Natural Calamities in Asia

Legend: Drought, Earthquake, Epidemic, Flood, Landslide, Storm, Volcano, Wildfire, Tsunami

Asians Affected by Natural Calamities

Asians Affected by Flooding

Coastal Flooding

450
400
350
300
250
200
150
100
50
0

303 M
410 M

3
83
63
154

4
115
92
198

2010   2025

Inland Flooding

400
350
300
250
200
150
100
50
0

245 M
341 M

8
33
63
141

11
46
91
192

2010   2025
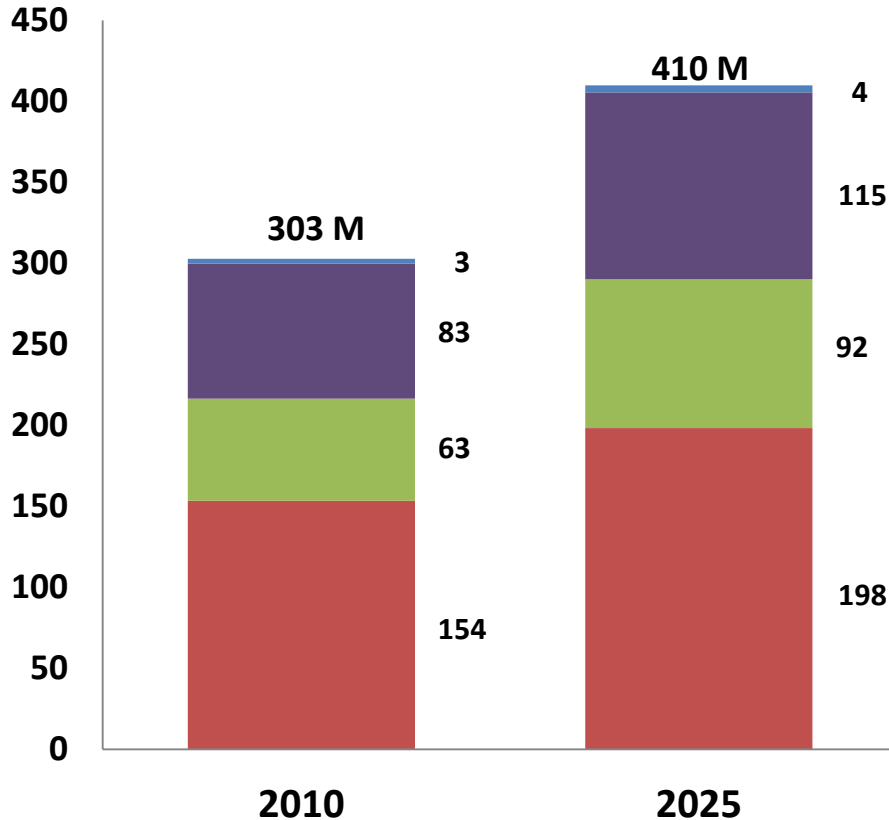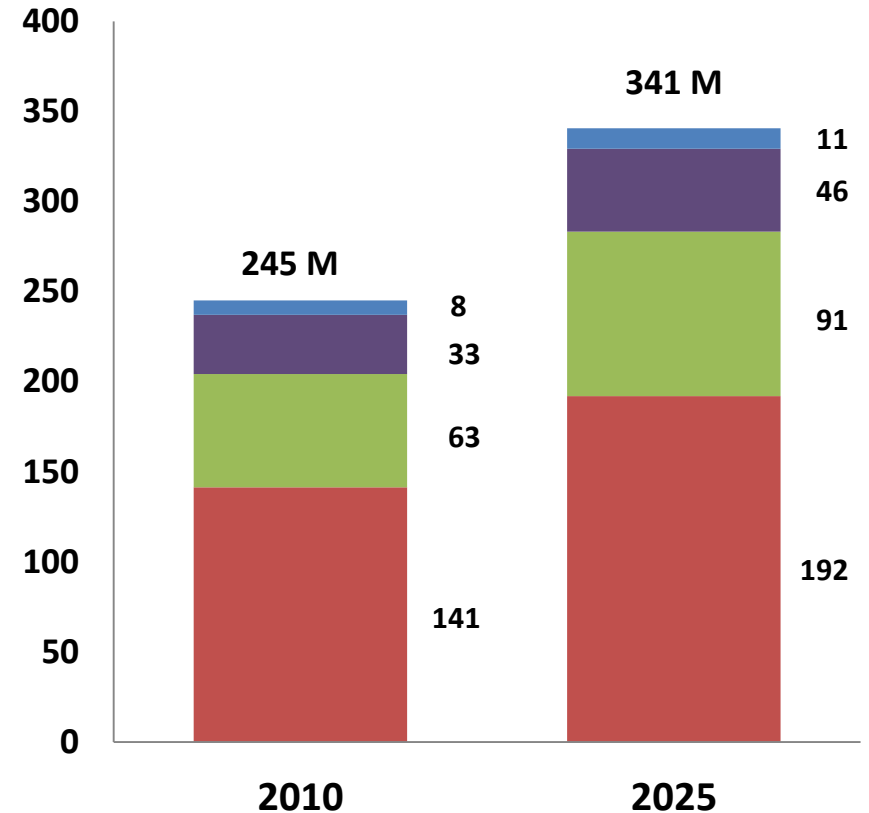
■ East Asia   ■ South Asia   ■ Southeast Asia   ■ Central and West Asia

Economic Loss due to Floods (in 2000 $ billion)

Sub-regions	1980	1990	2000	2010
East and North-East Asia	4.6	8.3	14.4	27
South-East Asia	2.4	3.9	6.4	10.7
South and South-West Asia	4.5	6.9	11.2	20.6
North and Central Asia	1.2	1.4	1	1.6
Pacific	0.4	0.5	0.7	0.9
Total	13.1	21	33.7	60.8

Poverty and Vulnerability: Key Findings

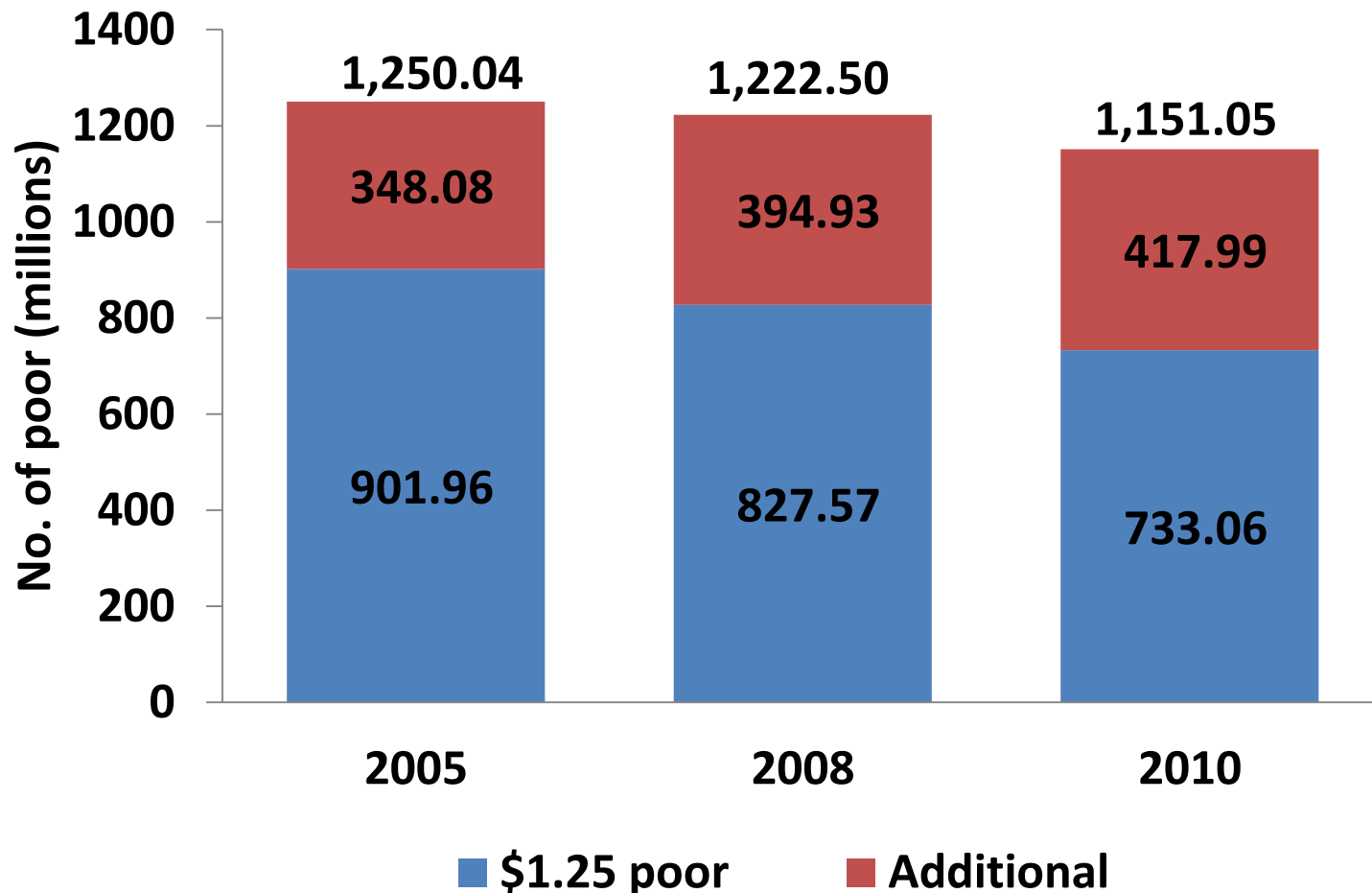**Poverty rates (%) in Asia, with vulnerability considered**
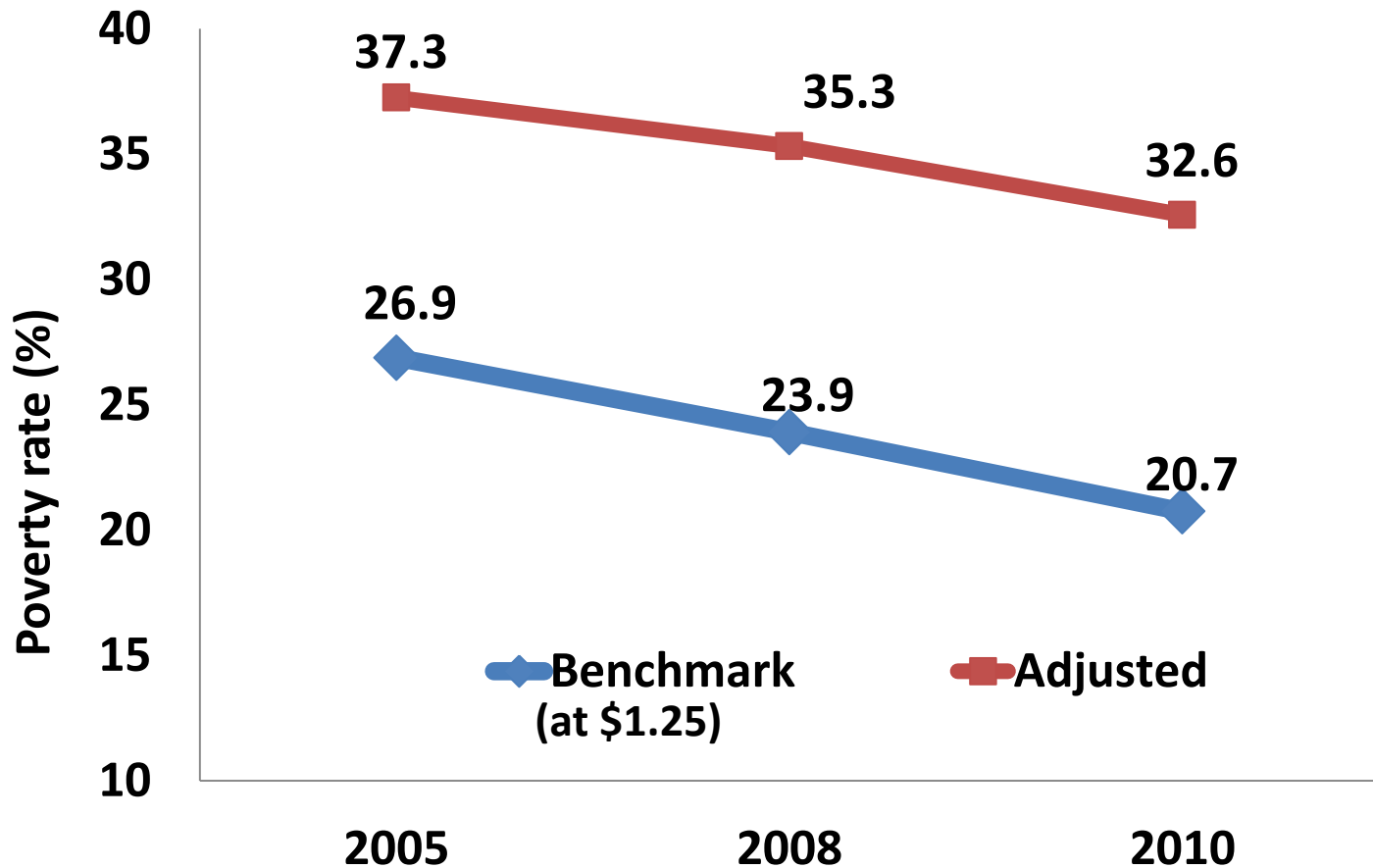
Poverty and Vulnerability: Key Findings

Number of poor (millions) in Asia, with vulnerability considered

No. of poor (millions)

	2005	2008	2010
Total	1,250.04	1,222.50	1,151.05
Additional	348.08	394.93	417.99
$1.25 poor	901.96	827.57	733.06

Legend: ■ $1.25 poor   ■ Additional

Poverty and Vulnerability:
Key Findings

Poverty Rates (PRC)

31.8
30.3
28.7

16.3
13.1
11.6

Poverty rate (%)

5 10 15 20 25 30 35

2005   2008   2010

◆— Benchmark (at $1.25)   ■— Adjusted

Number of poor (PRC)

414.39
401.53
384.05

202.53
228.53
228.54

211.85
173.00
155.51

No. of poor (millions)

0 50 100 150 200 250 300 350 400 450

2005   2008   2010
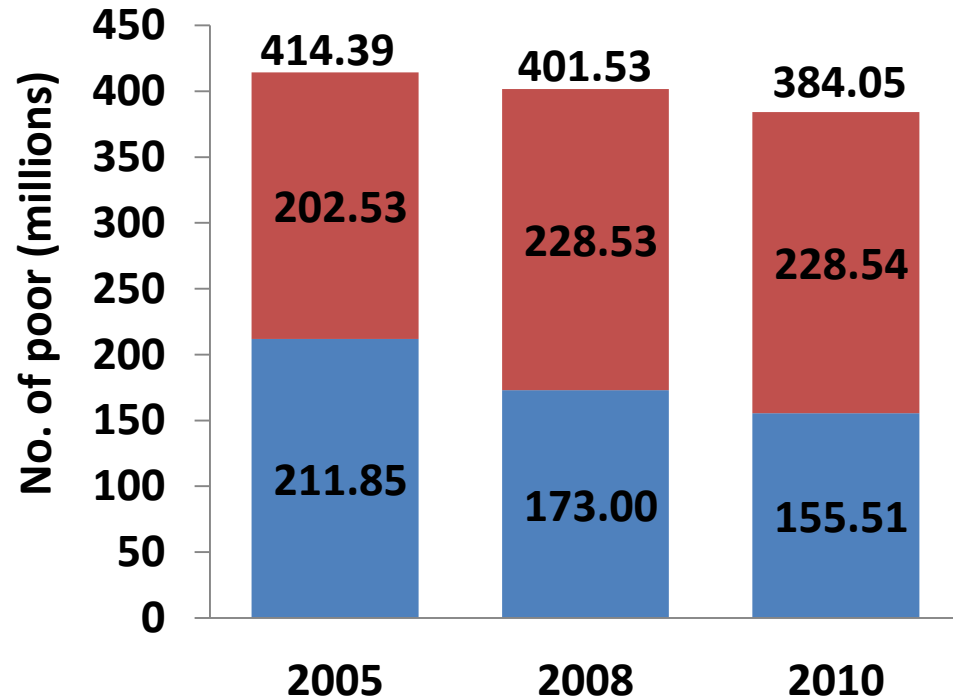
■ $1.25 poor   ■ Additional

Poverty and Vulnerability:
Key Findings

Poverty Rates (INDIA)

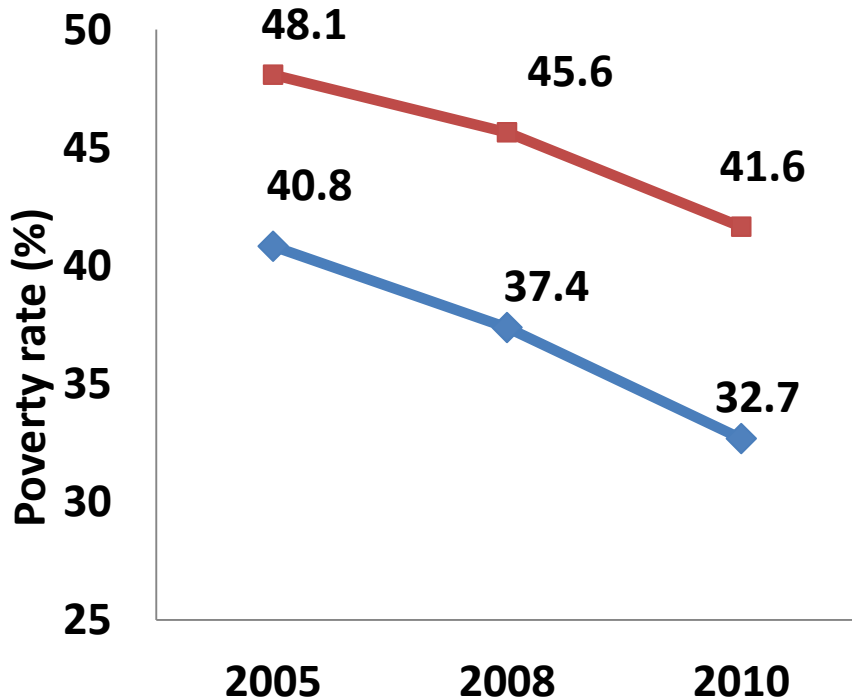Benchmark (at $1.25) values: 40.8 (2005), 37.4 (2008), 32.7 (2010)
Adjusted values: 48.1 (2005), 45.6 (2008), 41.6 (2010)
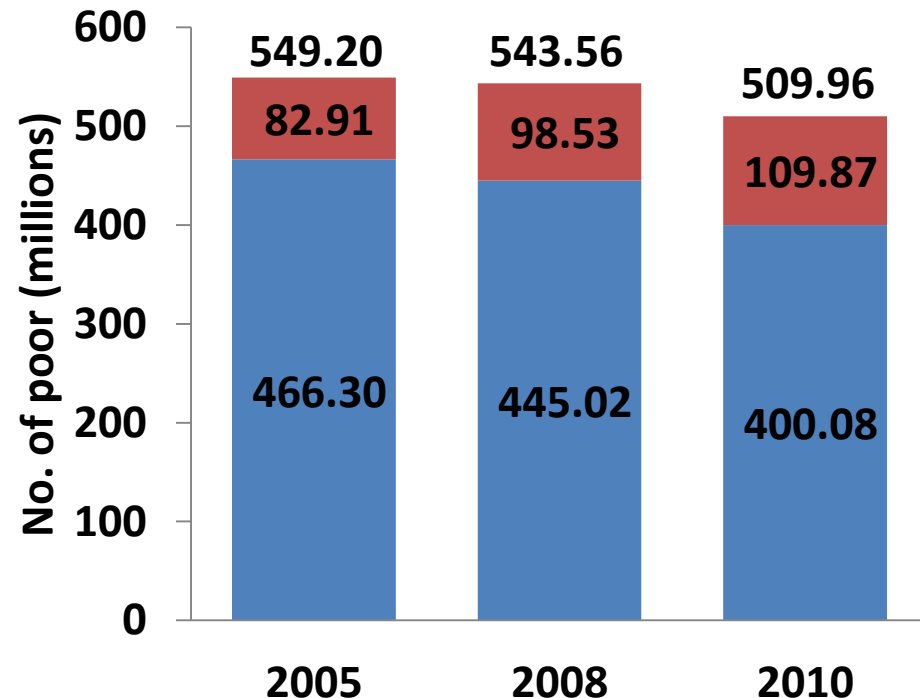
Poverty rate (%)

Legend: ◆ Benchmark (at $1.25) ■ Adjusted

Number of poor (INDIA)

No. of poor (millions)

2005: 549.20 total — 82.91 Additional, 466.30 $1.25 poor
2008: 543.56 total — 98.53 Additional, 445.02 $1.25 poor
2010: 509.96 total — 109.87 Additional, 400.08 $1.25 poor

Legend: ■ $1.25 poor ■ Additional

Poverty and Vulnerability:
Key Findings

Poverty Rates (INDONESIA)

- 29.6
- 30.9
- 27.1
- 21.4
- 22.6
- 18.1

Poverty rate (%)

2005   2008   2010

→ Benchmark (at $1.25)   → Adjusted

Number of poor (INDONESIA)

- 67.18
- 72.49
- 64.94
- 18.45
- 19.30
- 21.61
- 48.73
- 53.19
- 43.32

No. of poor (millions)

2005   2008   2010

■ $1.25 poor   ■ Additional

Sources: ADB estimates.
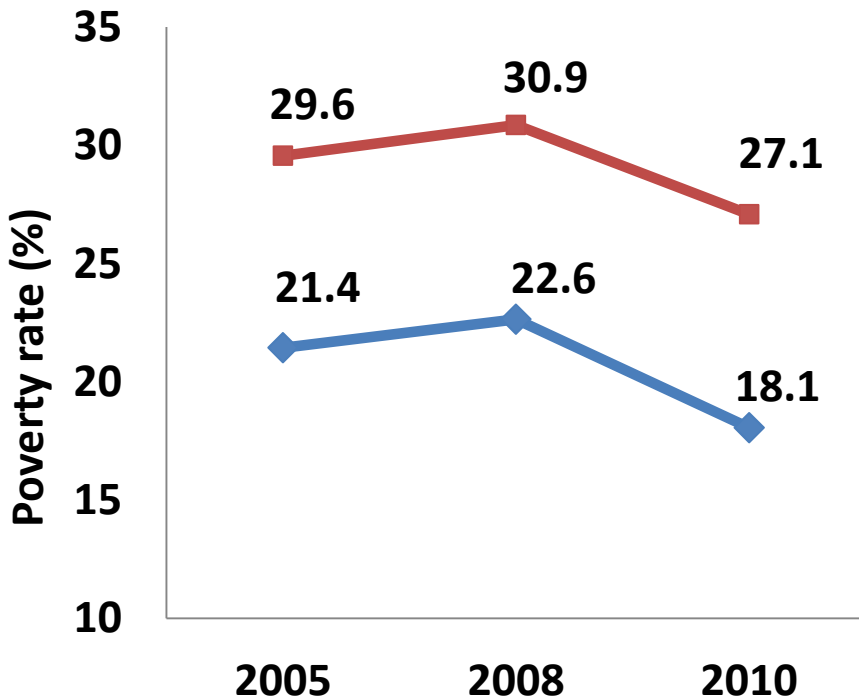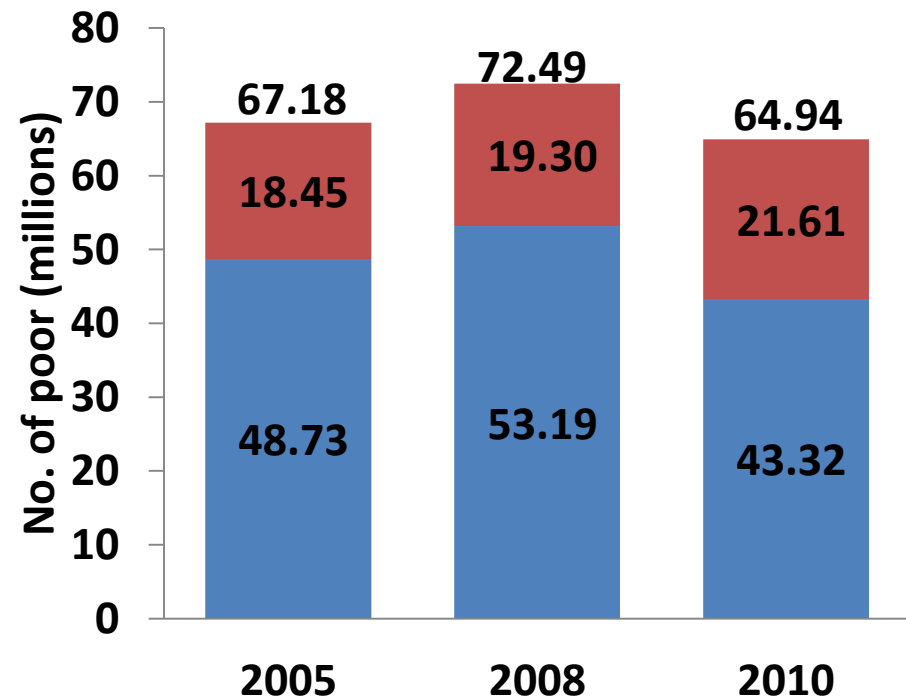
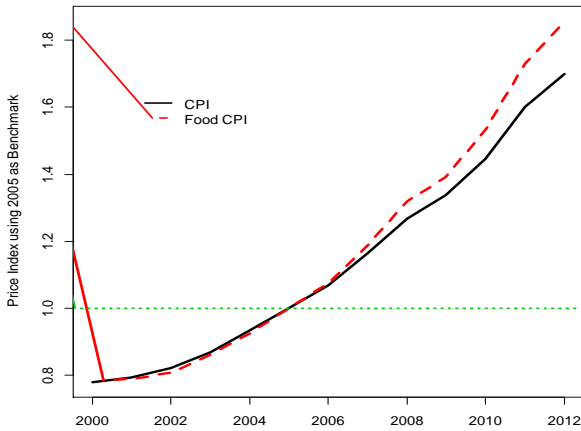# Issue 3: Poverty and Food Insecurity

- **Food insecurity is often reflected in rising food prices.**

- **To maintain the same living standard for the poor, the $1.25 poverty line must be adjusted by food CPIs when they are higher than general CPIs.**

Food CPI vs General CPI
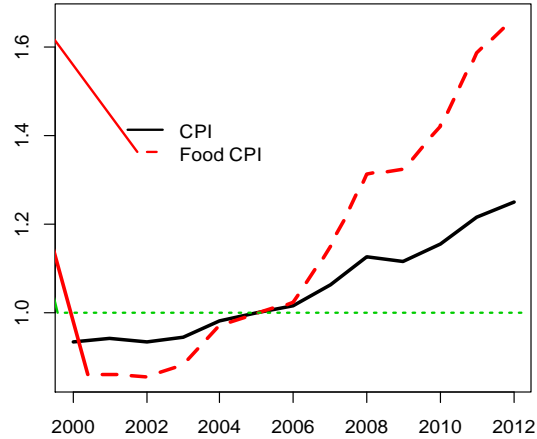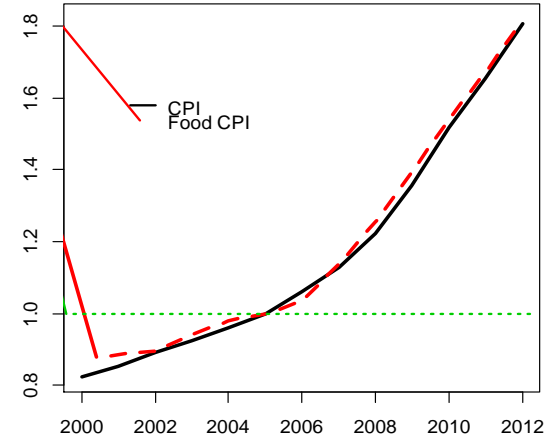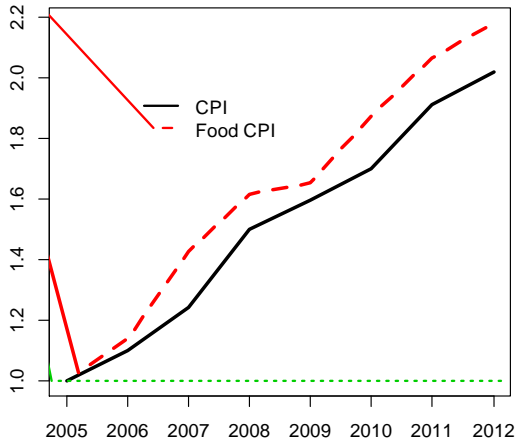
Source: FAO

Poverty and Food Insecurity: Key Findings

Poverty rates (%) in Asia, with food insecurity considered

Poverty rate (%)

26.9

27.5

23.9

24.7

20.7

Benchmark (at $1.25)

Adjusted

2005   2008   2010
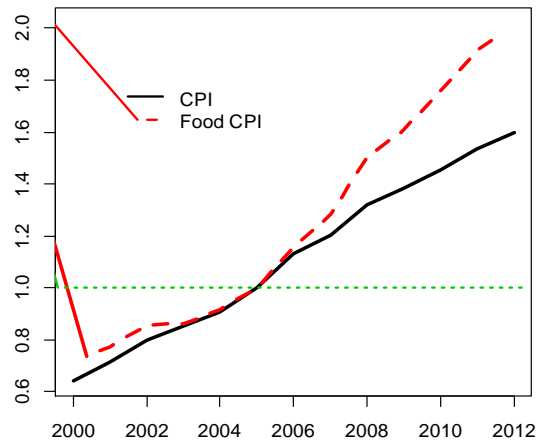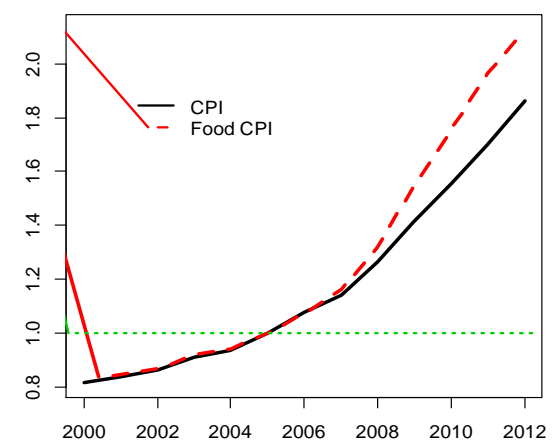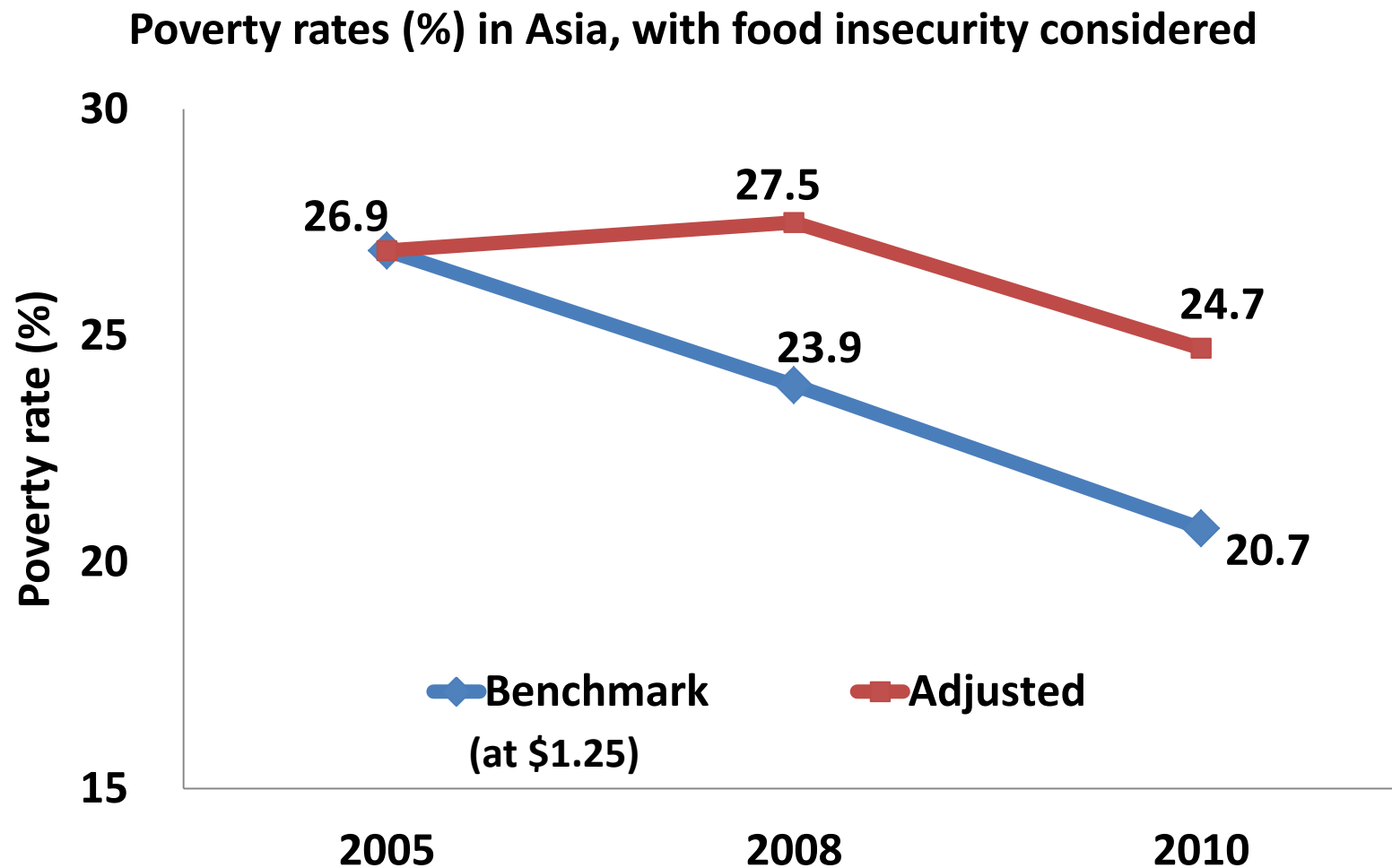
Poverty and Food Insecurity: Key Findings

Number of poor (millions) in Asia , with food insecurity considered

Sources: ADB estimates.

Poverty and Food Insecurity: Key Findings

Poverty Rates (PRC)

Benchmark (at $1.25) — Adjusted

2005: 16.3
2008: 17.4 (Adjusted), 13.1 (Benchmark)
2010: 17.0 (Adjusted), 11.6 (Benchmark)
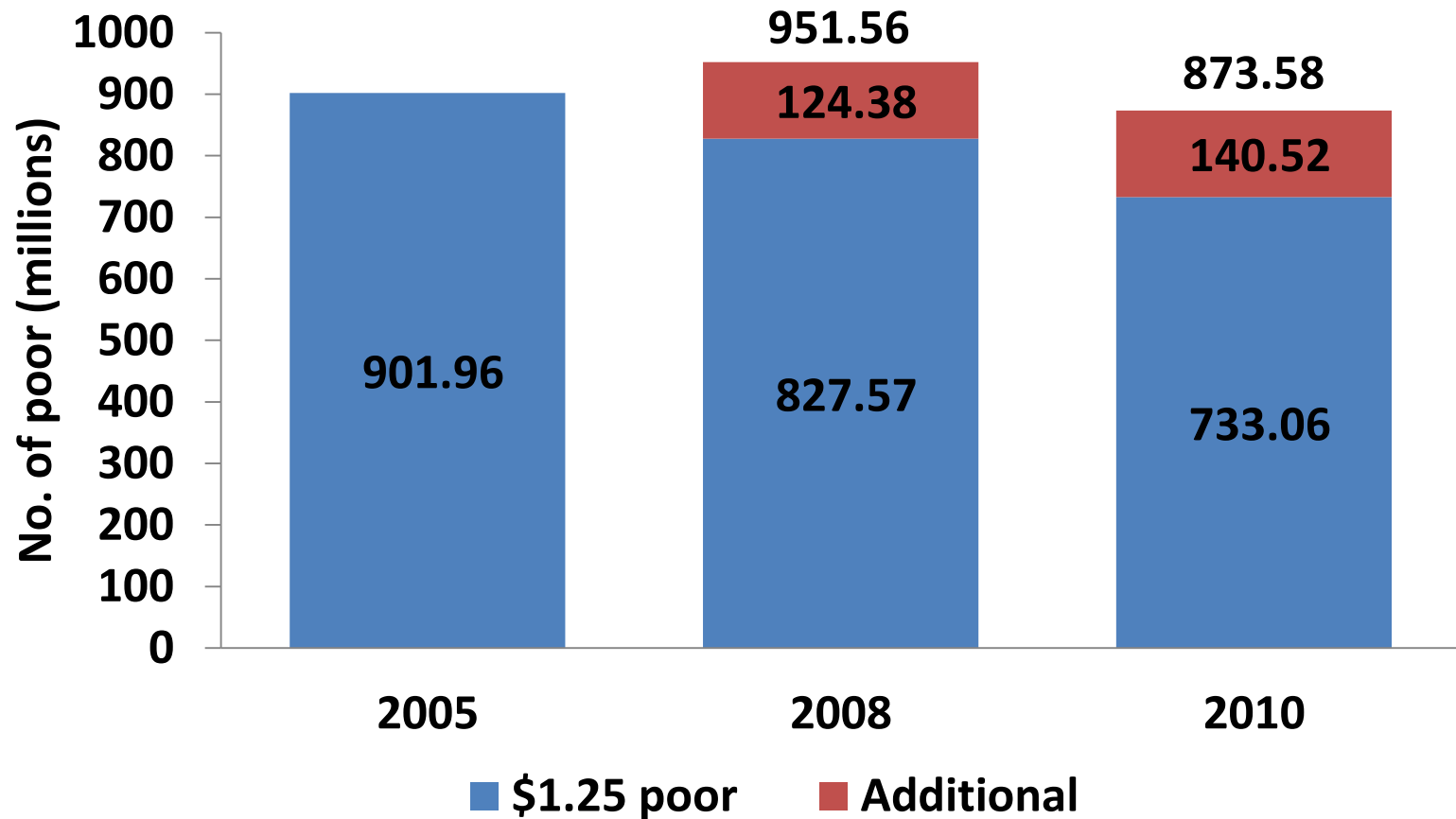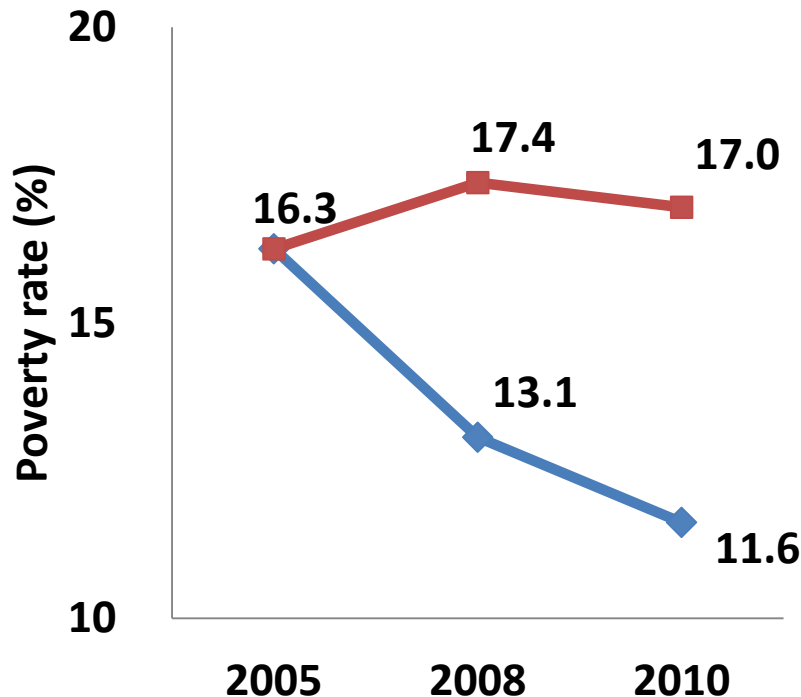
Number of poor (PRC)

$1.25 poor — Additional
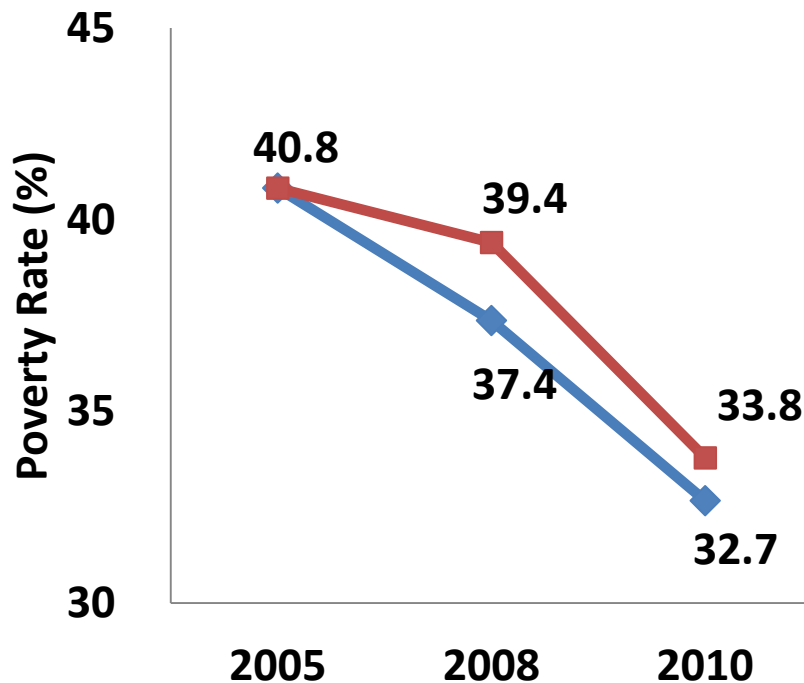
2005: 211.85
2008: 230.12 (57.12 Additional, 173.00 $1.25 poor)
2010: 226.90 (71.38 Additional, 155.51 $1.25 poor)

Poverty and Food Insecurity: Key Findings

Poverty Rates (INDIA)

Poverty Rate (%)

- 40.8
- 39.4
- 37.4
- 33.8
- 32.7

2005   2008   2010

Benchmark (at $1.25)   Adjusted

Number of poor (INDIA)

No. of poor (millions)

- 466.30
- 469.28
- 24.26
- 445.02
- 413.76
- 13.68
- 400.08

2005   2008   2010

$1.25 poor   Additional

Sources: ADB estimates.

Poverty and Food Insecurity: Key Findings

Poverty Rates (INDONESIA)

Poverty Rate (%)

- 30.5 (2008)
- 28.0 (2010)
- 21.4 (2005)
- 22.6 (2008)
- 18.1 (2010)

Benchmark (at $1.25)   Adjusted

Number of poor (INDONESIA)

No. of poor (millions)

Year	$1.25 poor	Additional	Total
2005	48.73		
2008	53.19	18.54	71.74
2010	43.32	23.86	67.18

$1.25 poor   Additional

Re-assessed Poverty No. (millions)

No. of poor (millions)

	2005	2008	2010
Total	1,633.89	1,783.88	1,750.42
FOOD INSECURITY + VULNERABILITY	381.9	607.8	674.2
$1.51	349.99	348.49	343.20
$1.25	901.96	827.57	733.06

■ $1.25   ■ $1.51   ■ FOOD INSECURITY + VULNERABILITY

Sources: ADB estimates.
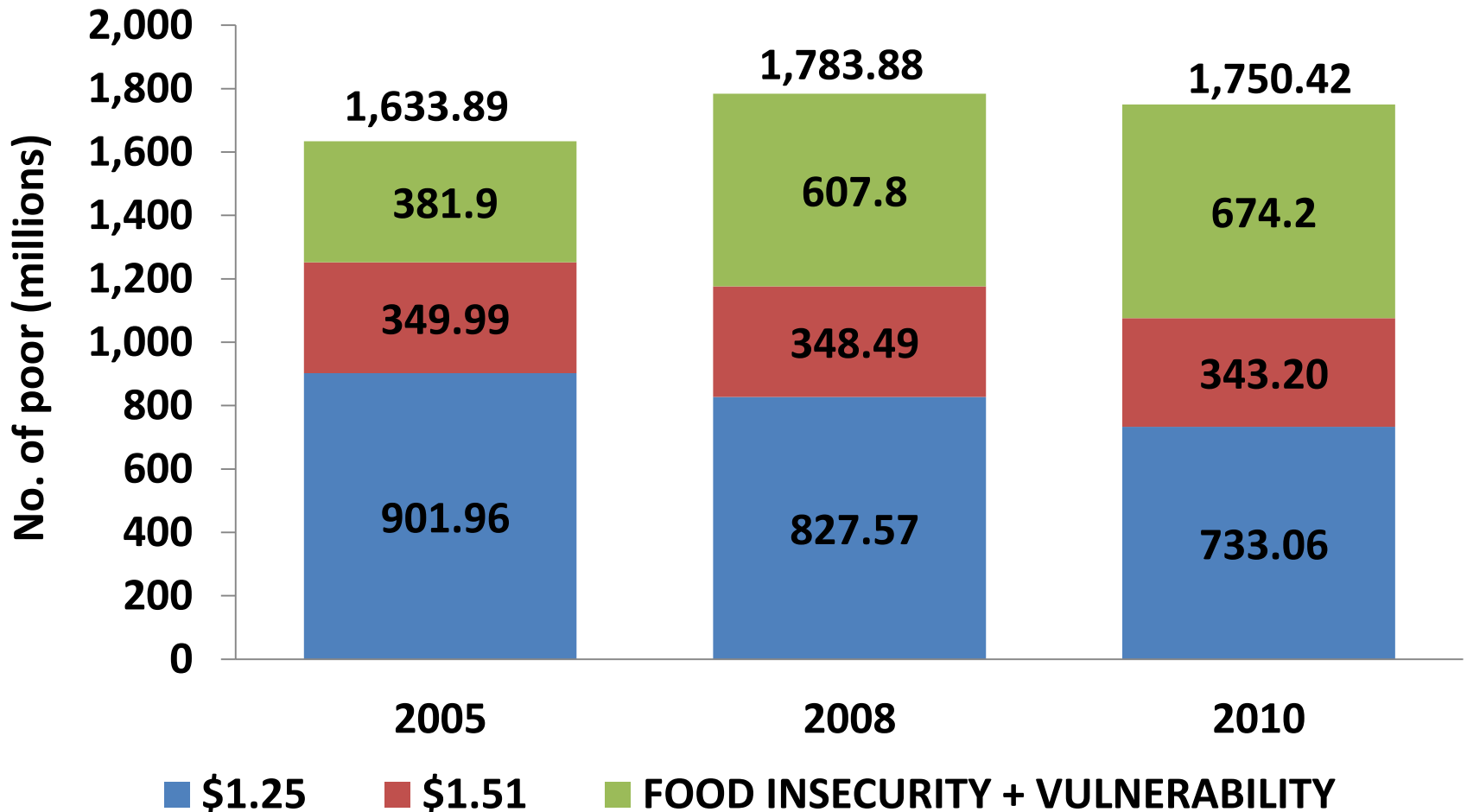
Poverty Rate Projections (%)

Y-axis: **Poverty rate (%)** — 0 to 45

2015 — Total: 41.2
- $1.25: 12.7
- $1.51: 8.7
- FOOD INSECURITY + VULNERABILITY: 19.8

2020 — Total: 31.7
- $1.25: 5.8
- $1.51: 5.9
- FOOD INSECURITY + VULNERABILITY: 20.0

2025 — Total: 24.2
- $1.25: 2.5
- $1.51: 2.7
- FOOD INSECURITY + VULNERABILITY: 19.0

2030 — Total: 17.1
- $1.25: 1.4
- $1.51: 1.1
- FOOD INSECURITY + VULNERABILITY: 14.6

Legend: ■ $1.25 ■ $1.51 ■ FOOD INSECURITY + VULNERABILITY
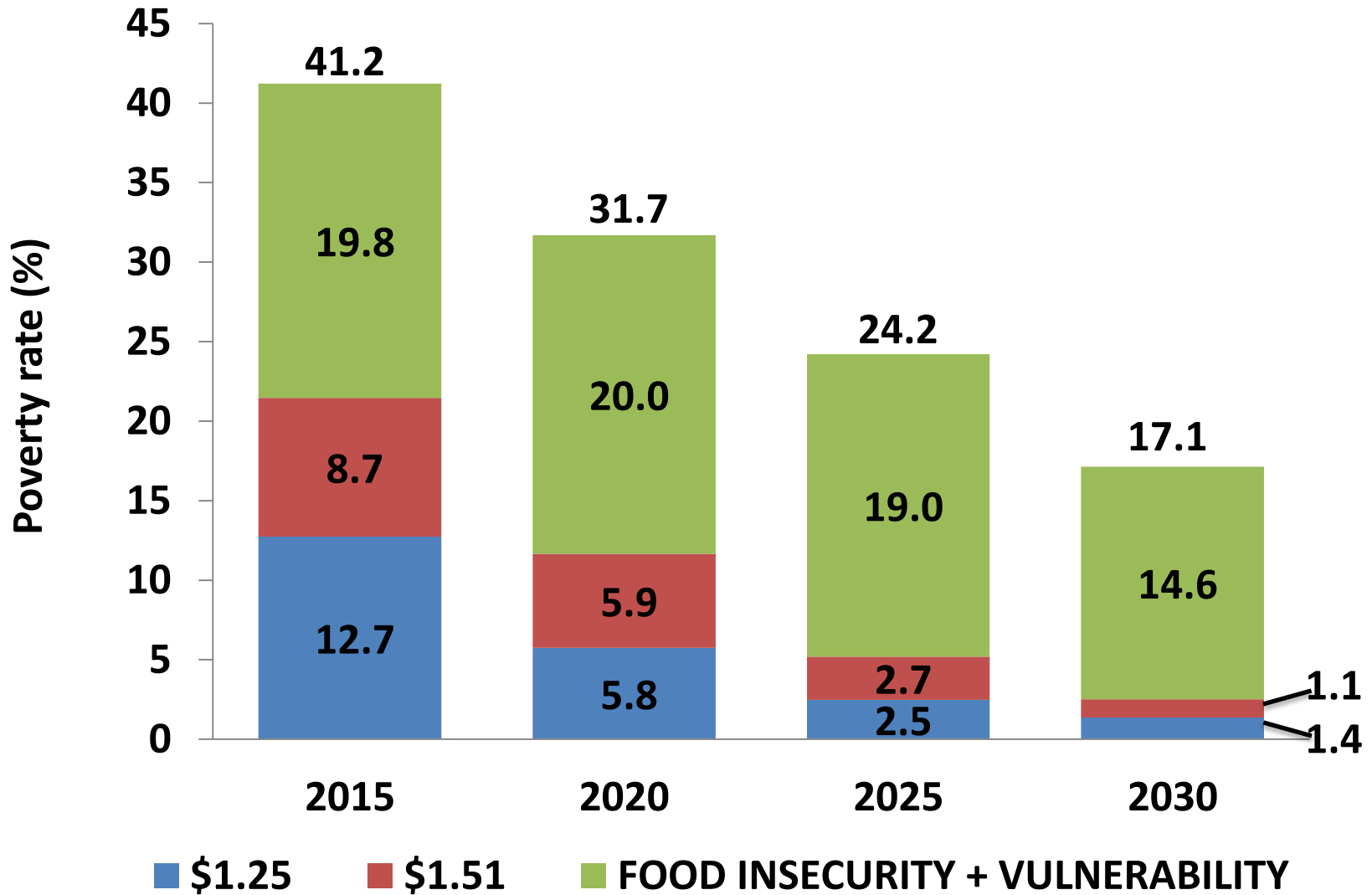
Poverty No. Projections (Millions)

No. of poor (millions)

	2015	2020	2025	2030
Total	1,531.92	1,229.69	973.03	708.43
FOOD INSECURITY + VULNERABILITY	734.2	777.0	764.1	604.5
$1.51	324.23	229.51	109.16	47.43
$1.25	473.49	223.15	99.77	56.46

Legend: ■ $1.25   ■ $1.51   ■ FOOD INSECURITY + VULNERABILITY
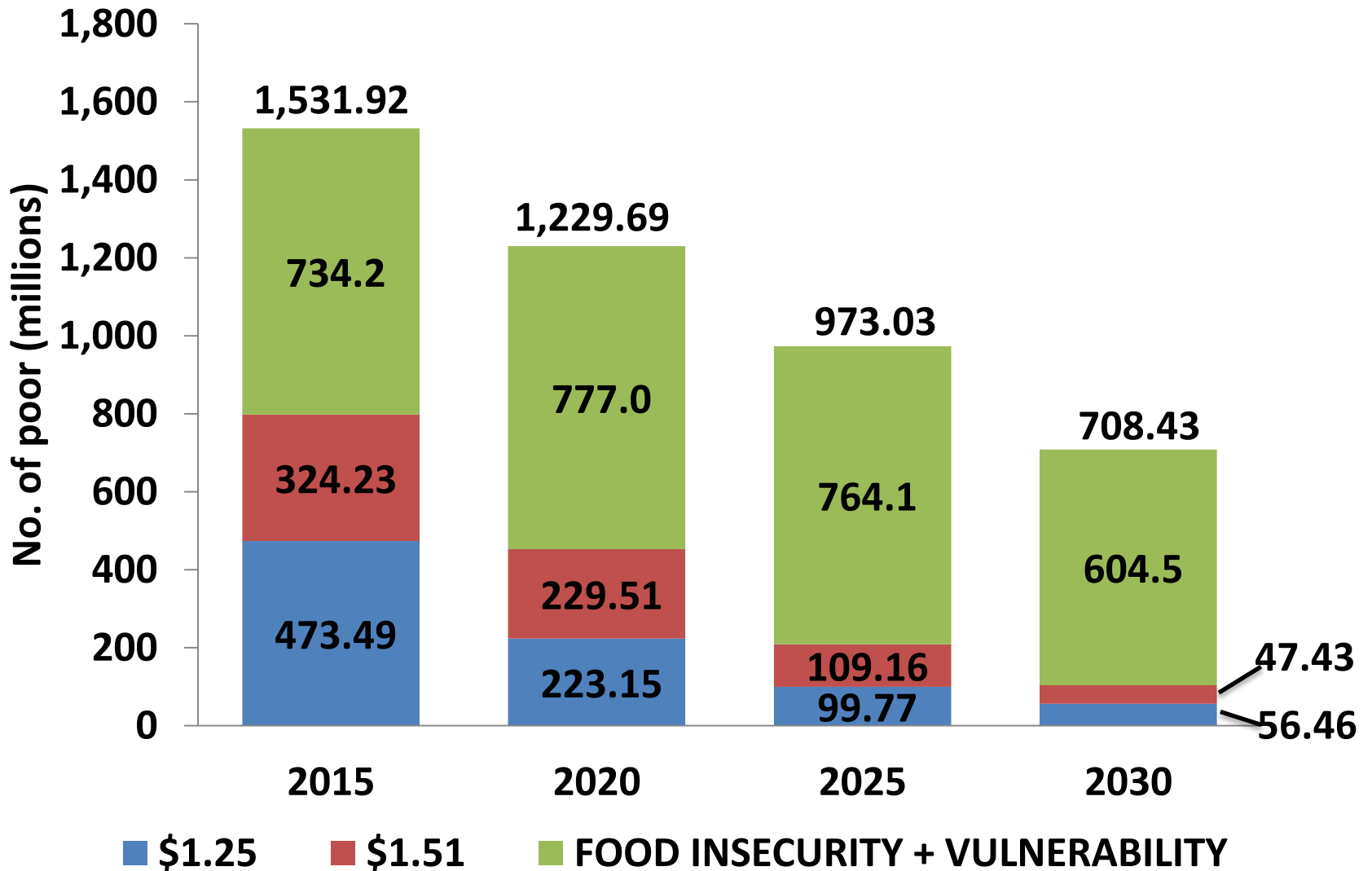
Major Conclusion/Messages

- **Our estimations show almost 50% of Asians were living in extreme poverty in 2010, instead of the 21% measured at $1.25**

- **By 2030, 708 million or 17% of Asia's population will remain in extreme poverty**

- **Beyond economic growth, addressing vulnerability to risks and food insecurity, must be a part of anti-poverty strategies**

Policy implications: food price increases

- Availability
- Affordability
- Supply stability

Policy implications: vulnerability

- Disaster risk reduction
- Climate change mitigation and adaptation
- Diversification of income sources
- Social assistance and protection
- Market-based instruments (e.g., disaster insurance, health insurance, crop insurance)

Technical Notes

1. Estimating the Asian poverty line

break-point: log(PCE) = 1.44
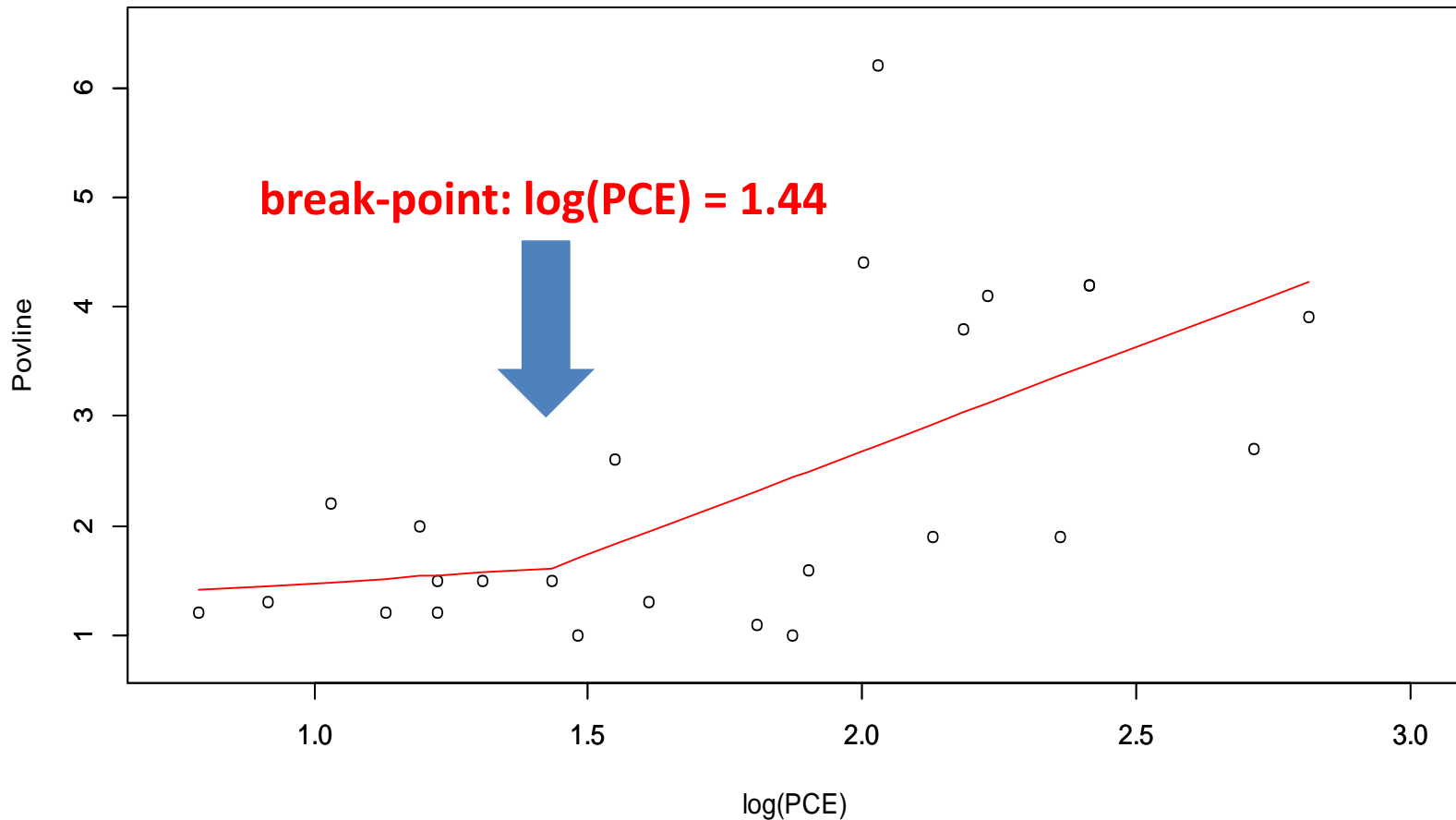
2. Vulnerability-adjusted poverty line

- The vulnerability adjusted poverty line is defined as:

$$z_2 = z_0 \left[1 - \delta(1 - \delta) \frac{\sigma_R^2}{2} \right]^{-1/(1-\delta)},$$

where z_0 is the unadjusted poverty line, δ is the coefficient of relative risk aversion and σ_R^2 is the variance of the shocks or disturbance ε.

Estimating σ_R^2 or $V(\varepsilon_t)$:

- Step 1. For a country with grouped data in Povcal of the World Bank, ungroup the data to generate 100,000 observations, based on Shorrocks and Wan (2008);

- Step 2. Use the bottom 50,000 observations to estimate sample variance, to be denoted by $V(Y_t)$. The bottom 50,000 observations are used because the variance estimation is intended for the poor;

2. Vulnerability-adjusted poverty line

- Step 3. Let *Y* denote the bottom 50,000 observations, take logarithm of *Y* and compute the sample variance and mean of $log\ Y$, denoted by $V(logY)$ and E($logY$);

- Step 4. Draw a random sample of 100,000 observations, <u>*with replacement*</u>, from the 100,000 observations generated in step 1. Follow step 3 to compute alternative estimates of $V(logY)$ and $E(logY)$;

- Step 5. Repeat the last step 499 times to obtain a total of 499 additional estimates of $V(logY)$ and $E(logY)$;

- Step 6: Take simple averages of the 500 estimates of $V(logY)$ and $E(logY)$ from steps 3 and 5. This gives an improved estimates (smaller standard errors) of $V(logY)$ and E($logY$);

- Step 7. Repeat steps 1-6 for different years. These lead to estimates of $V(logY_t)$ and $E(logY_t)$, where *t* = 1 to *T*, *T* is the total number of years for which data are available for a particular country;

2. Vulnerability-adjusted poverty line

- **Step 8.** $V(logX)$ and E($logX$) **can now be computed :**

$$V(logX) = \left(\frac{1}{T^2}\right) \sum_{t=1}^{T} V(logY_t),$$

$$E(logX) = \left(\frac{1}{T}\right) \sum_{t=1}^{T} E(logY_t).$$

These enable estimation of $logE(X)$ **or** [*E(X)*]² **via:**

$$\frac{1}{2} V(logX) + E(logX) \approx logE(X),$$

$$E(X) = e^{logE(X)}.$$

And *V(X)* **can be recovered using:**

$$V(logX) \approx \frac{1}{[E(X)]^2} V(X).$$

- **Step 9.** $V(\varepsilon_t)$ **can be obtained using:**

$$V(\varepsilon_t) = \frac{V(Y_t) - V(X)}{V(X) + [E(X)]^2},$$

where $V(X)$ **and** $[E(X)]^2$ **are from step 8 and** $V(Y_t)$ **from step 2.**

3. Inequality-adjusted poverty line

- Sen's social welfare function in period 0 is:
$$W_0 = \mu_0(1 - G_0).$$
- There are N persons with income/consumption $X_i, \ i = 1, 2, \dots, N$

$$W_0 = \frac{\sum X_i}{N}(1 - G_0),$$
$$W^* = W_0 N = \sum X_i (1 - G_0).$$

- Thus, welfare W^* can be expressed as a sum of N terms. Assume one of the N persons lives exactly on the poverty line Z_0, the amount received by this person out of W^* is
$$Z_0(1 - G_0).$$

- To ensure this person maintains the same amount in period 1 with inequality G_1, it is necessary and sufficient to have
$$Z_0(1 - G_0) = Z_1(1 - G_1).$$

- Solve for Z_1: $\qquad Z_1 = Z_0 \frac{(1 - G_0)}{(1 - G_1)}.$

4. 1. Projecting the price ratio

$$\frac{FPI}{CPI}_t = \alpha + \lambda \frac{FPI}{CPI}_{t-1} + \beta_2 t + \beta_3 Dummy_{crisis} + \varepsilon_t$$

Unbalanced panel data of 2000-2012 from 17 Asian countries

Dependent Variable: FPI/CPI	Coefficient	Standard Error
One period lagged FPI/CPI	0.827***	0.047
Time Trend	0.005***	0.002
Constant	0.126***	0.059
Dummy for Food Crisis Year (2007-2008)	0.020**	0.010
Fixed effects are unreported		
Adjusted R-squared	0.84	
Degree of Freedom	180	

** significant at 5%; *** significant at 1%

4.2. Projecting variance (shocks)

$$\hat{\sigma}_{it} = \alpha_i + \lambda\hat{\sigma}_{it-1} + \beta\hat{\mu}_{it} + \varepsilon_{it},$$

Unbalanced panel of 1978-2012 from 24 Asian countries

Dependent Variable: Standard deviation $\hat{\sigma}_{it}$

	Coefficient	Standard Error
$\hat{\sigma}_{it-1}$	0.642***	0.016
Mean of the distribution $\hat{\mu}_{it}$	0.113***	0.005
Constant	-0.499***	0.024
Fixed effects are unreported		
Adjusted R-squared	0.94	
Degree of Freedom	1100	

*** significant at 1%.

4.3. Projecting the Gini

$$logGini_{it} = \alpha_i + \gamma_1 urb_{it} + \gamma_2 urb_{it}^2 + \gamma_3 t + \varepsilon_{it},$$

Unbalanced panel of 1978-2012 from 24 countries

Dependent: Log Gini

	Coefficients	Standard Error
Urbanization	0.017***	0.005
Squared urbanization	-1.57e-04**	6.61e-05
Time	0.001	0.001
Constant	0.30	2.63
Fixed effects are unreported		
Adjusted R-squared	0.62	
Degree of Freedom	229	

** significant at 5%, *** significant at 1%.