

Working with supply-side data

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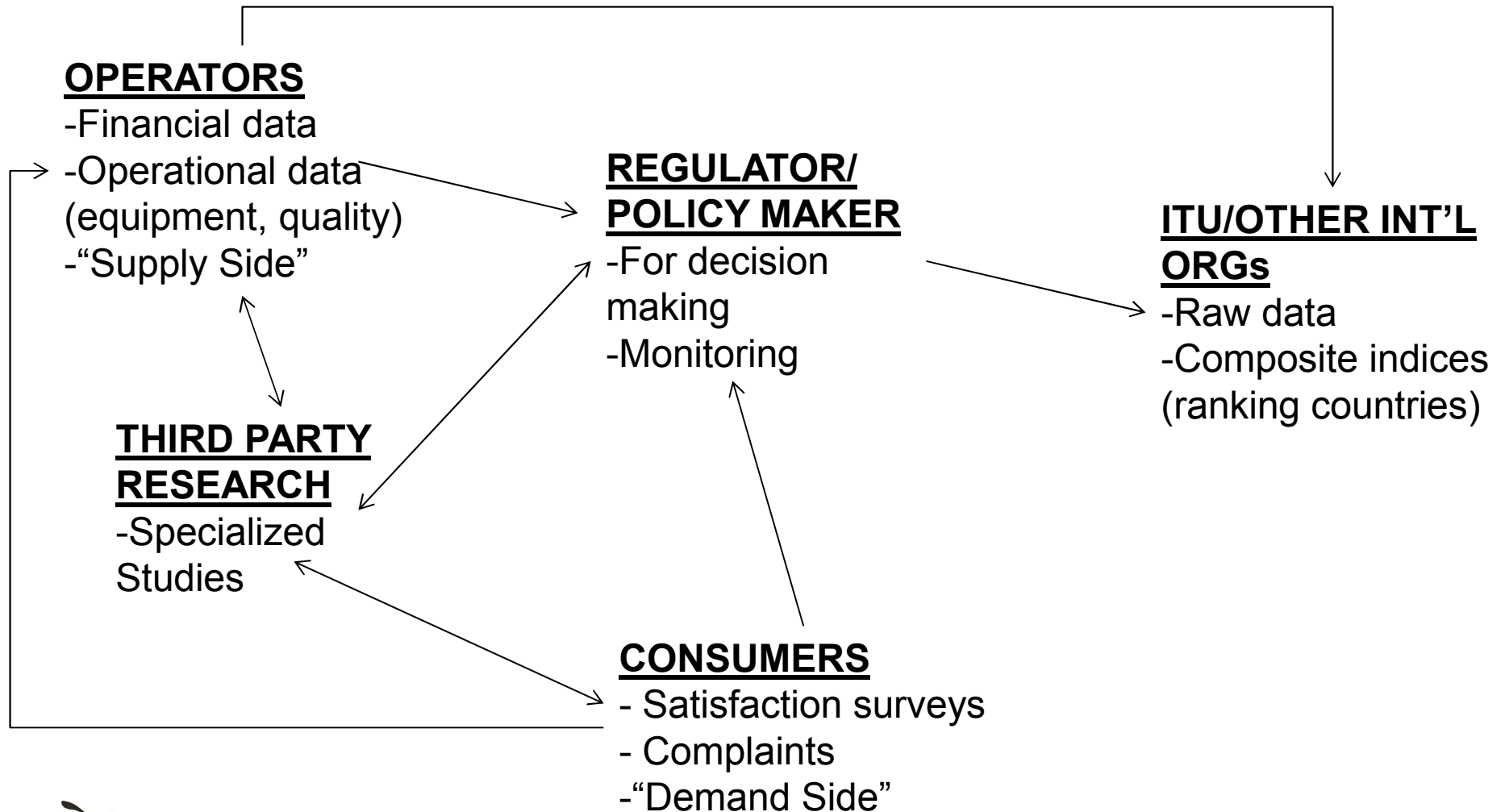
CPRsouth6 tutorials, Bangkok, December 7, 2011



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Data on the sector comes from multiple sources. Identify methods and definitions of each



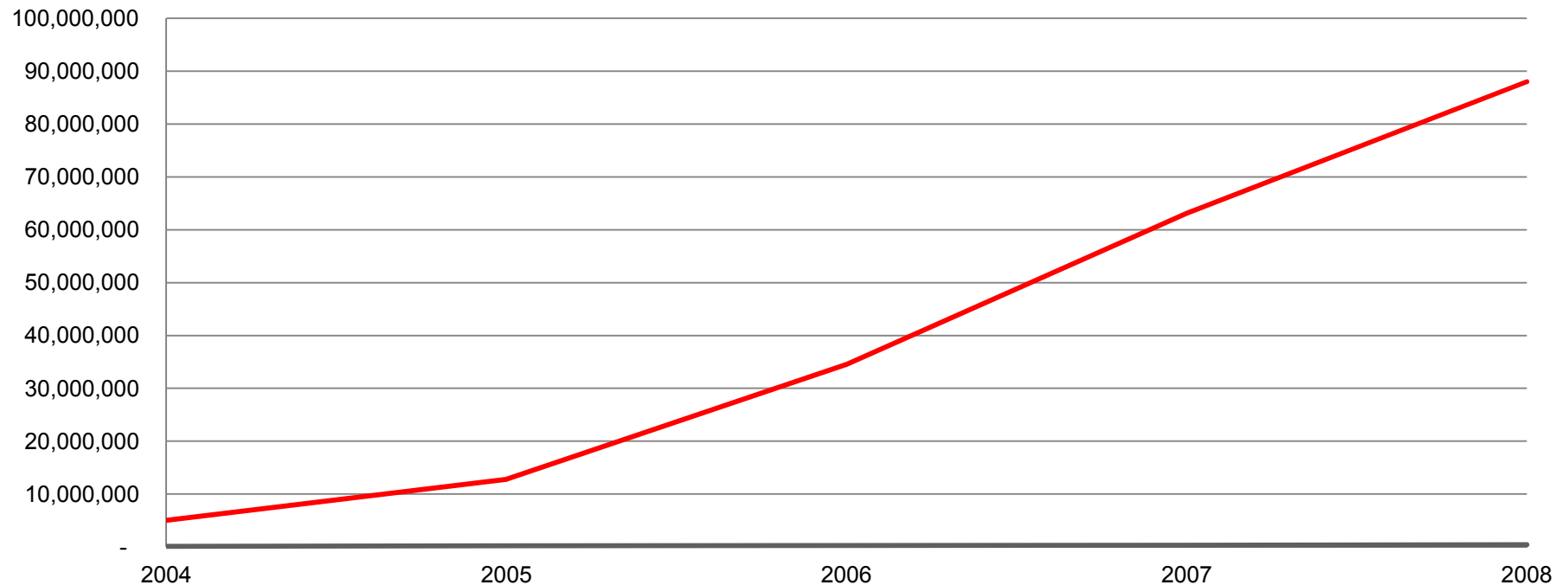
How do you know reforms have been successful in your country?

- What is good performance?
 - Increased access (connectivity: ownership and use)
 - Increased choice
 - Decreasing prices (or a range of prices)
 - Increased quality (price-quality bundles)
- What is the principal means?
 - Investment
- How does one know?
 - Indicators

CONNECTIVITY

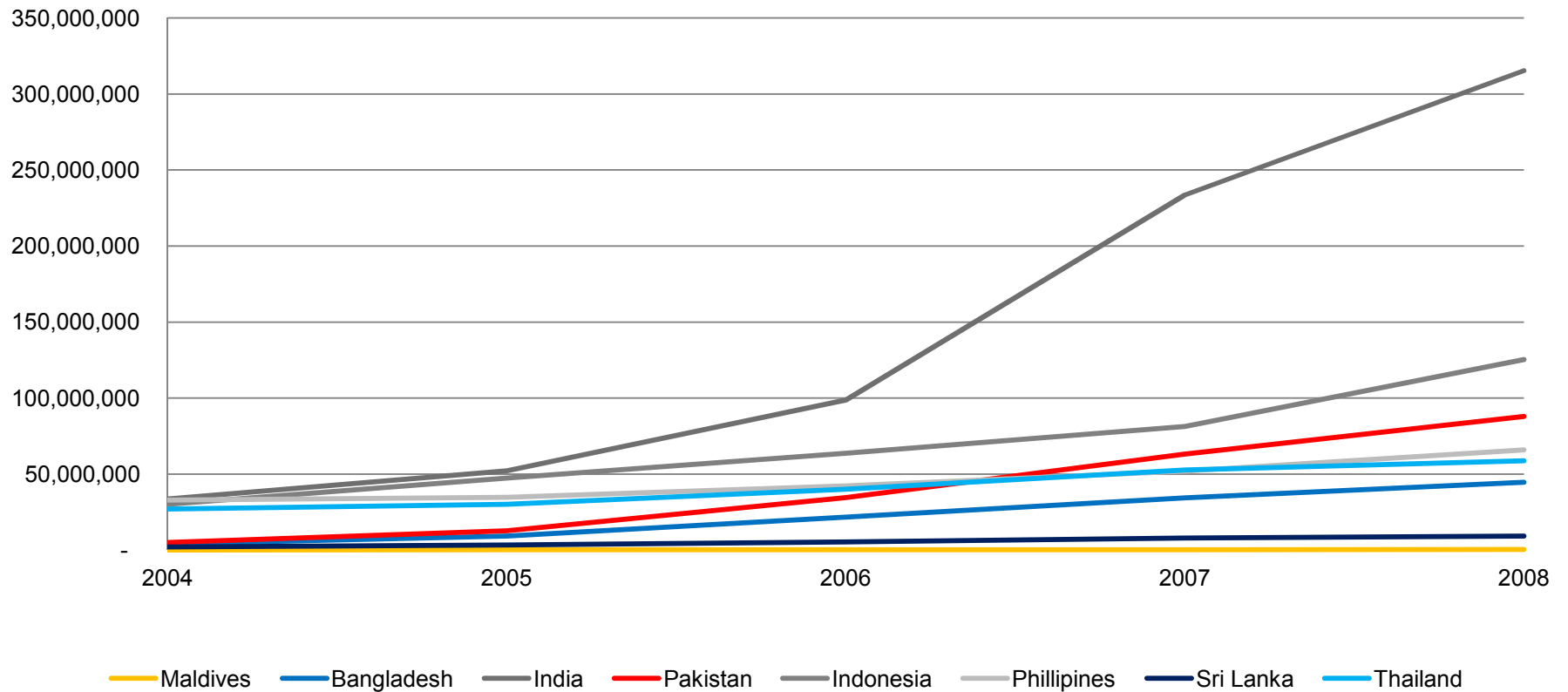
Is connectivity increasing?

Pakistan Mobile SIMs: 2004 - 2008

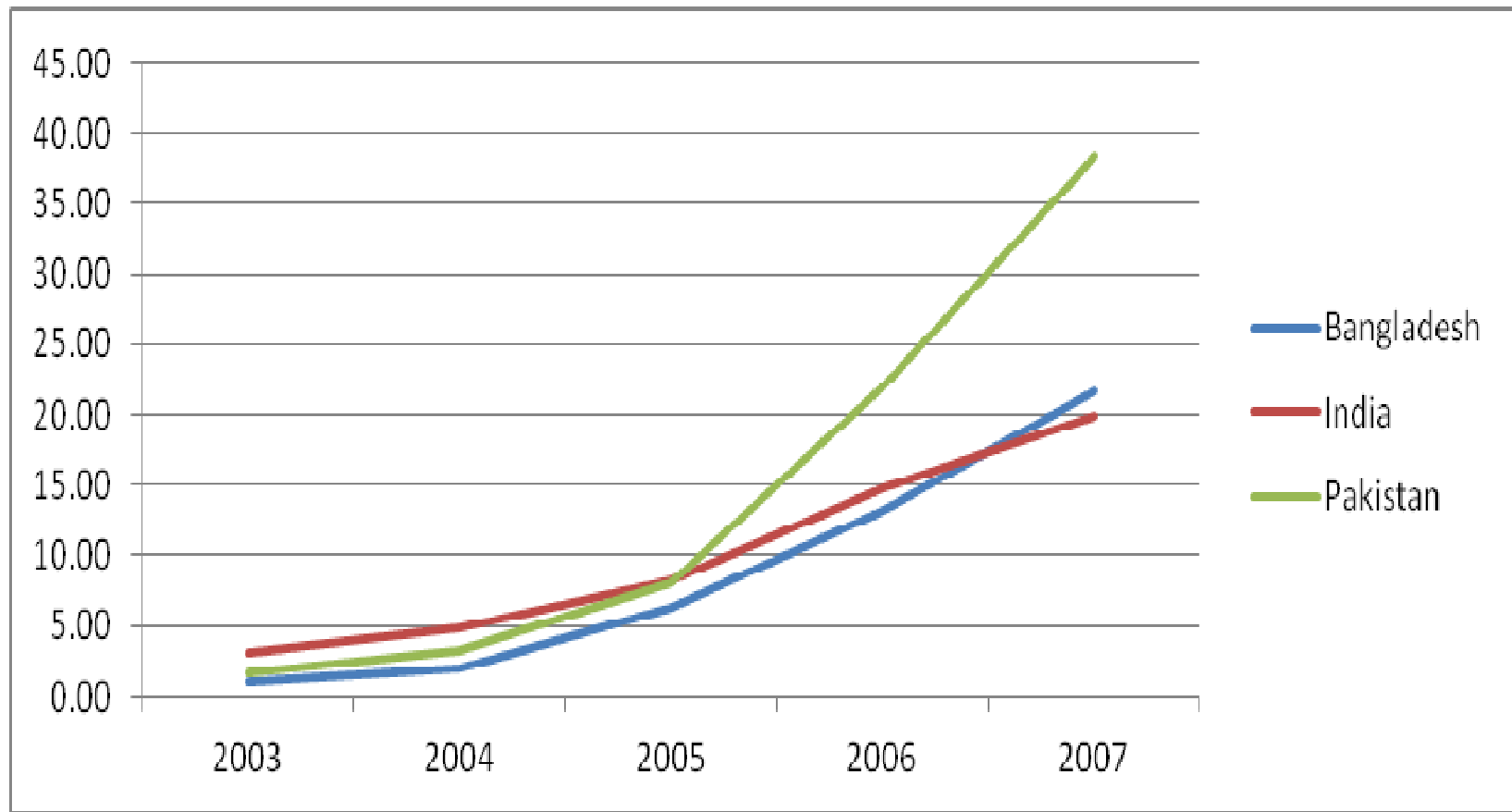


But PK is in middle of pack when compared

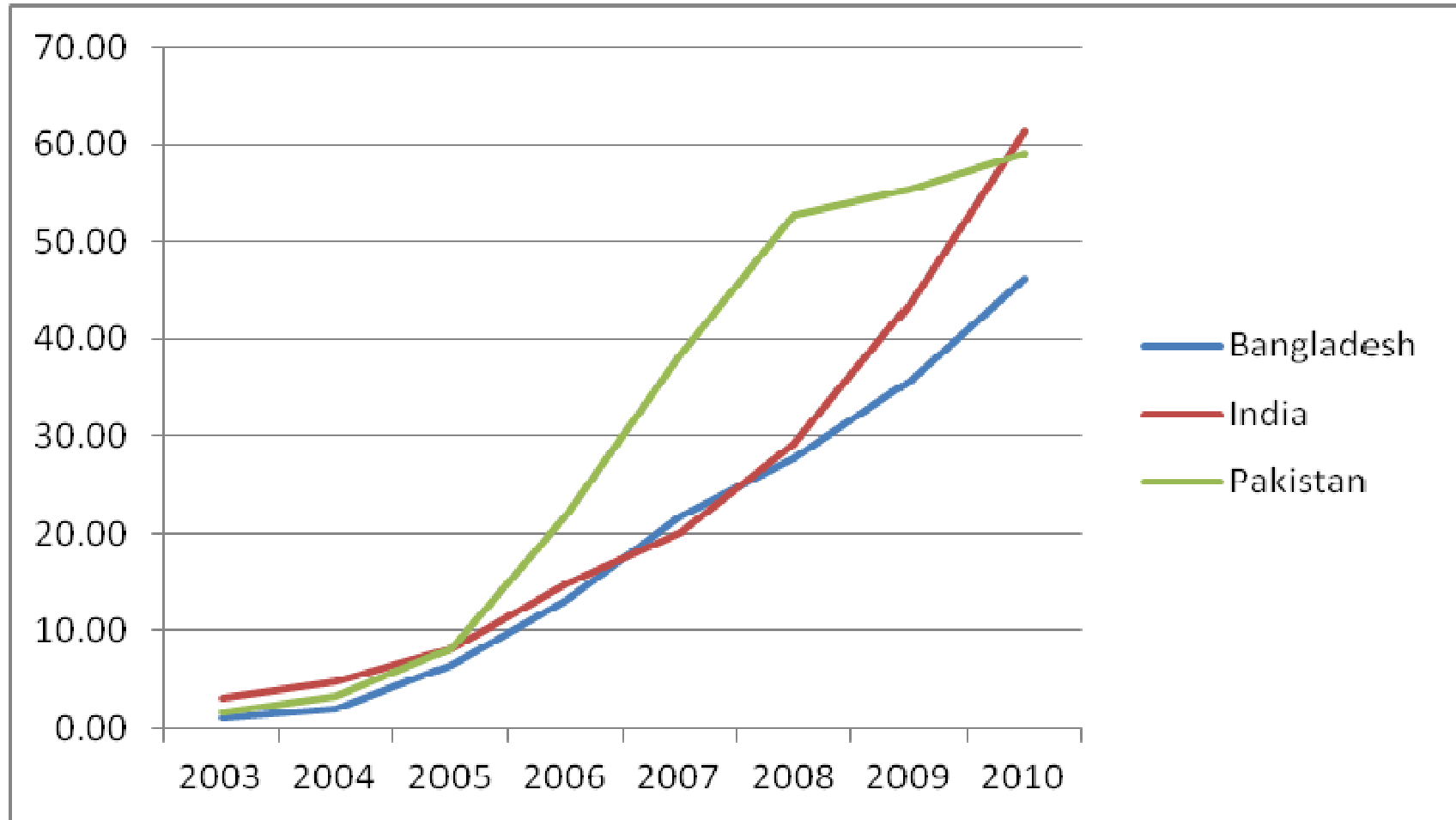
Mobile SIMs: 2004 - 2008



Telecom data change: Most recent SIM/100 data matter . . .



Who is actually ahead?



Aided by multiple millions of SIMs deregistered in PK & SIM tax of USD 12+ in BD

Are the data comparable? E.g., How do you reconcile different financial years?

- Many countries Jan – Dec (calendar year)
 - E.g., Sri Lanka
- But many others differ
 - India: Apr – Mar
 - Pakistan : Jul – June
- So “total fixed access paths in 2008” reported by IN not comparable with PK
- Having quarterly data eliminates problem to a great extent
- Especially important if benchmarks are used for mainstream regulatory work such as interconnection or retail tariff regulation

Prerequisites for comparison

- Internationally accepted definitions and procedures
- Make sure that the definitions are adhered to
 - ITU has mobile broadband definition; use is inconsistent
 - “*Mobile broadband subscribers* refer to subscribers to mobile cellular networks with access to data communications (e.g. the Internet) at broadband speeds (here defined as greater than or equal to 256 kbit/s in one or both directions) such as WCDMA, HSDPA, CDMA2000 1xEV-DO, CDMA 2000 1xEV-DV etc, irrespective of the device used to access the Internet (handheld computer, laptop or mobile cellular telephone etc). These services are typically referred to as 3G or 3.5G and include: Wideband CDMA (W-CDMA), an IMT-2000 3G mobile network technology, based on CDMA”

Sources of internationally accepted definitions

- ITU (2010) *Definitions of World Telecommunication/ICT Indicators*, Geneva: ITU
- Partnership on Measuring ICT for Development (2010), *Core ICT Indicators 2010*, Geneva: ITU

Useful Indicators to measure connectivity

FIXED

- Number of fixed lines
- Number of fixed wireline phones
- Number of fixed wireless phones
- Total fixed line subscribers per 100 inhabitants

MOBILE

- Number of mobile SIM cards
- Number of mobile SIM cards – prepaid
- Number of mobile SIM cards – postpaid
- Total mobile SIMs per 100 inhabitants

BROADBAND

- Number of broadband connections per 100 inhabitants

ICT

- Number of mobile users
- Number of Internet users

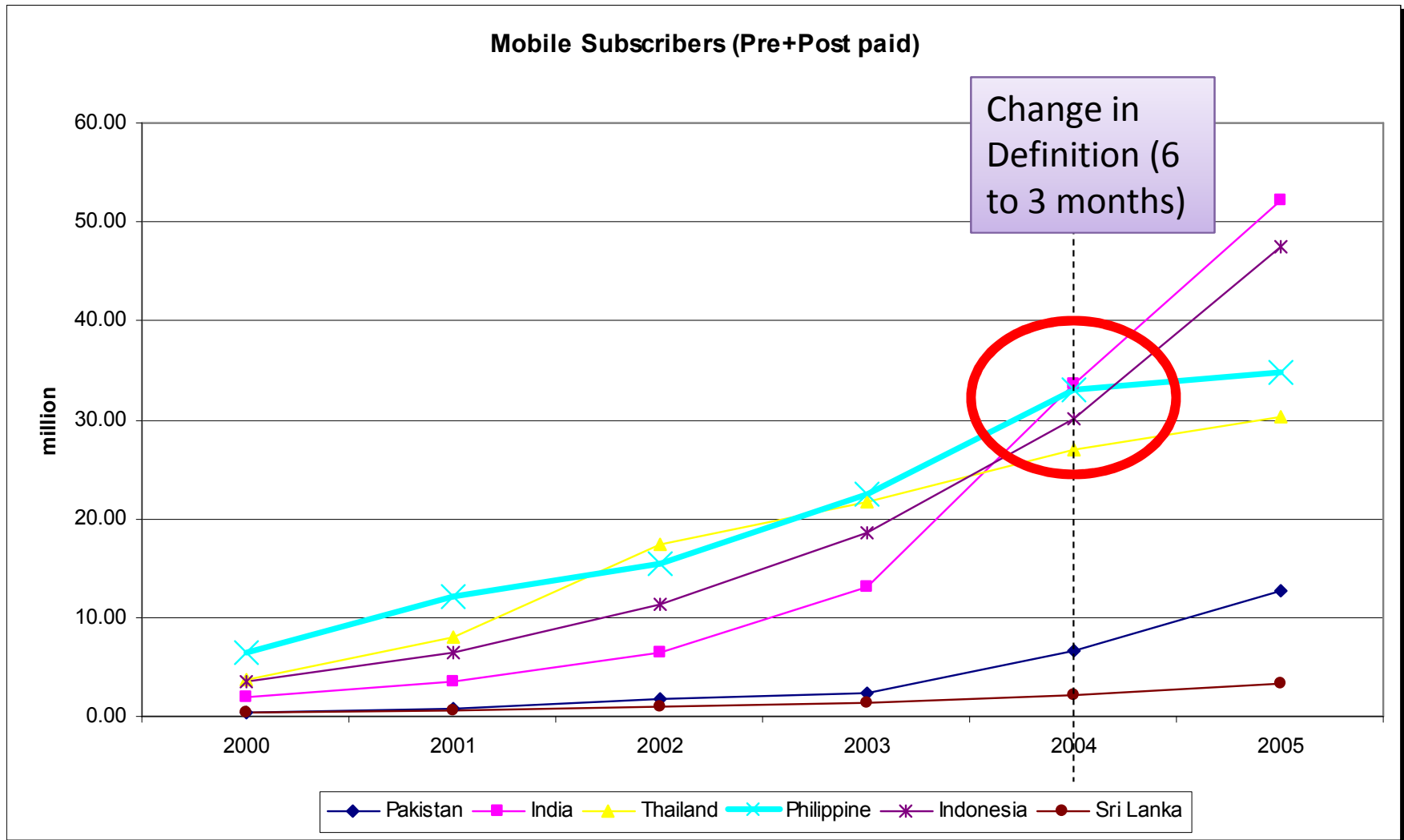
IN-COUNTRY ACCESS GROWTH

- Backbone map for a country
- Mobile coverage map per operator
- Base station map per operator

Mobile users? Subscribers? SIMs?

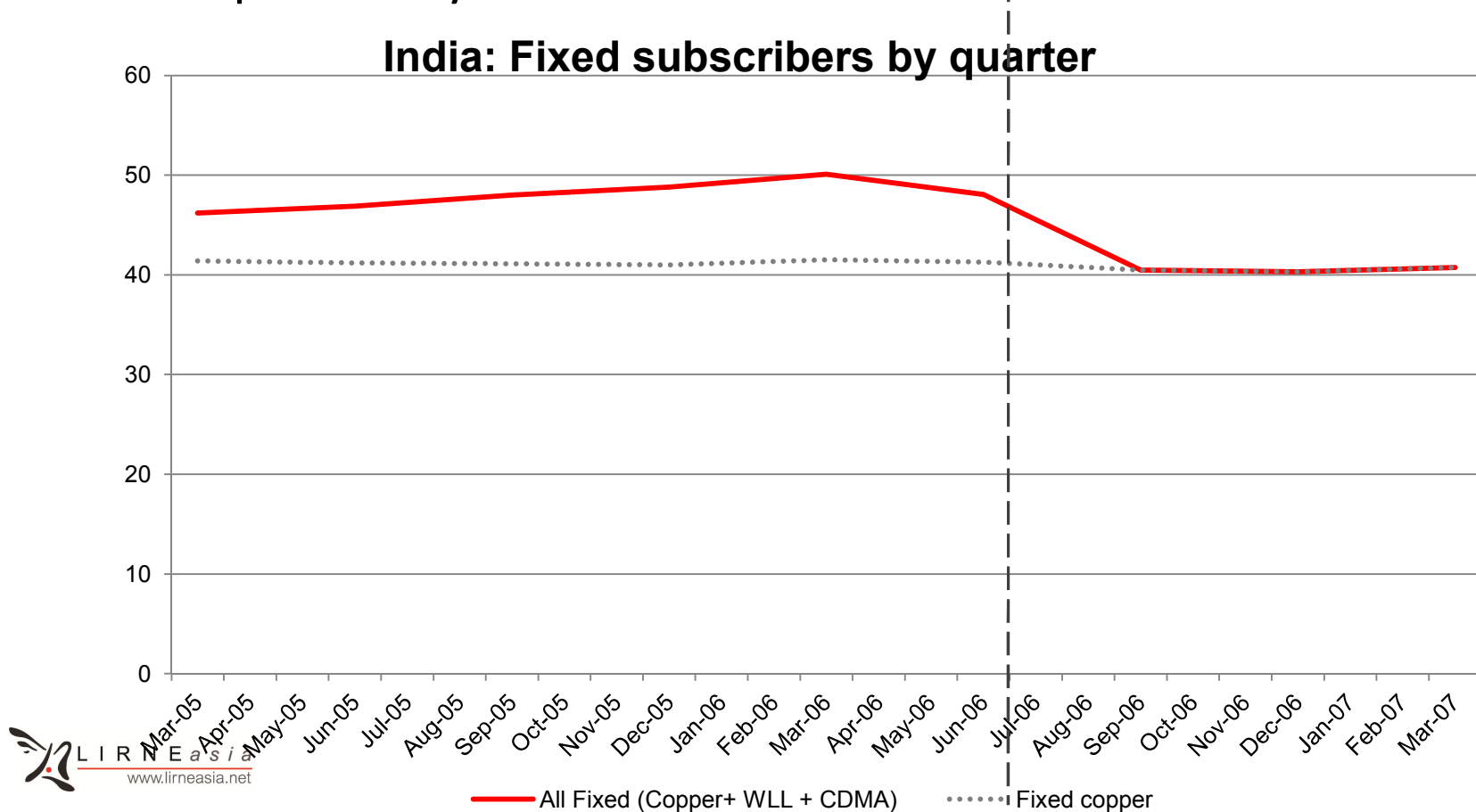
- One phone, used by many.
 - How do you measure # of users?
- One person, owning multiple SIM cards
 - How do you count subscribers?
- Nearly always, operators only count SIMs issued
 - Not number of people who are customers
 - Nor number of users of those SIMs
- Can we count subscribers?
 - Under strict SIM registration rules
- ITU has finally stopped saying user

Are the SIMs that are counted active? If not, how long have they been inactive?



Is WLL/CDMA fixed or mobile?

- ITU + many countries: fixed
- India: previously said fixed. Since Jun 2006 counts under mobile.



Do we know penetration by locality?

- “120% mobile penetration in Delhi”
 - What does this mean?
 - How do we know?
- “Indian rural teledensity is ~15%”
 - SIM/subscriber debate
 - Fixed/mobile debate
 - Owning more than one phone/SIM debate

What are the incentives of those reporting data?

- India: amount of spectrum based on # of subscribers
 - Under/over report?

WSIS target 10: bringing ICTs within reach of a majority of the world's population

- Four indicators:
 - Mobile subscriptions
 - Mobile use
 - Internet use by household
 - Internet use by individuals
 - [Note: 3 more business indicators added later (since WDTR 2010)]
- Data collected and reported for all
- Our Focus: Indicator 4 (Internet Use by Individuals)
 - Can the method for estimating be improved?

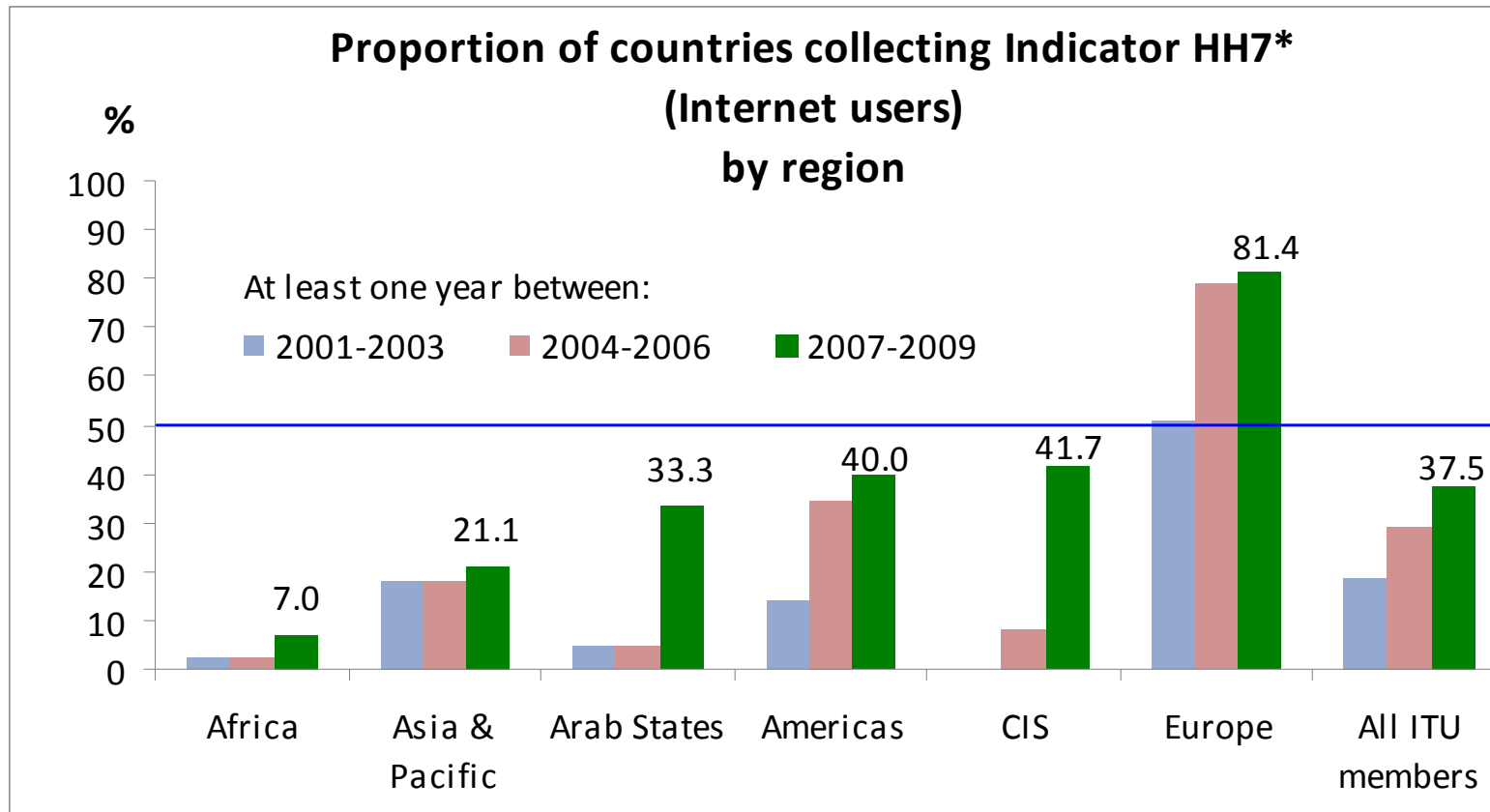
Focus of this section

THE IDEAL WAY TO MEASURE

Demand-side surveys (household and individual), carried out by NSO

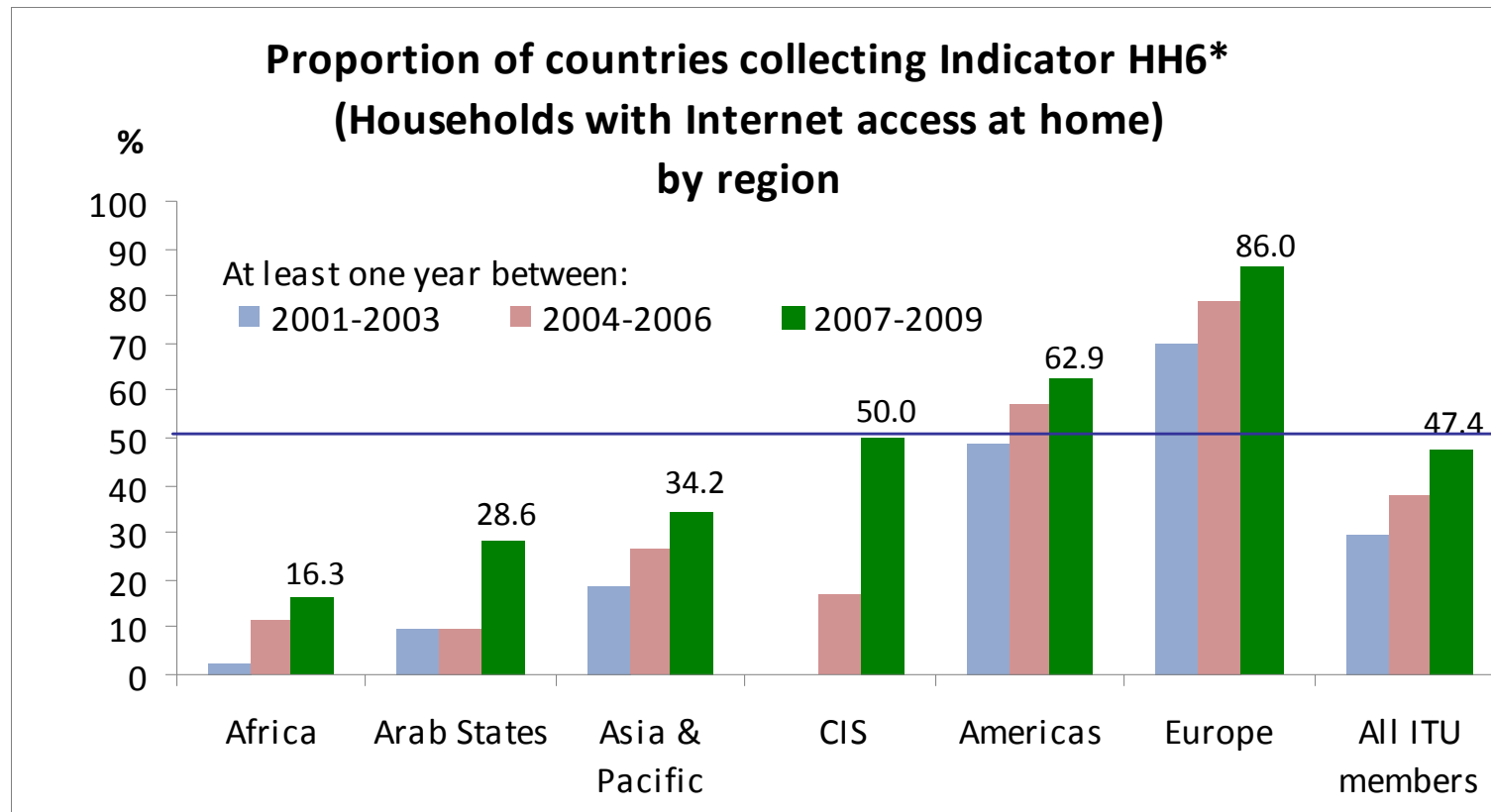
- Best method – collect HH7 through surveys
 - HH7: Proportion of Individuals who use the internet (from any location) in the last 12 months
 - Special survey, using ITU model questionnaire or other
 - Include question in multi-purpose household survey, HHIES (HH income-expenditure survey), ALS (Agriculture & Labor survey) or similar
- Second best - collect HH6 through survey
 - HH6: proportion of households with internet access
 - Through official survey
 - Use this to estimate number of individual users

Not all countries collect use data through surveys. But an increasing number do



Source: ITU World Telecommunication/ICT Indicators database.

Slightly more countries collect household access data through surveys & they are increasing



Source: ITU World Telecommunication/ICT Indicators database.

**IN THE ABSENCE OF SURVEY DATA,
ESTIMATE BASED ON SUPPLY-SIDE
DATA**

Various methods can be used to estimate the number of Internet users

- **Internet Users = multiplier x Internet Subs (supply side)**

Where

- The multiplier = a number used to reflect that each subscription is used by more than one individual (e.g. at kiosks)
- Internet subscriptions = Internet subscription of all types (speeds, technologies etc.)
 - Wired, wireless etc.
- Above is then cross checked with other evidence (e.g. if HH access data available, Users > HH access number must be true, etc.)

But counting total subscriptions (specially wireless) is not straightforward

- Difficulties in counting wireless Internet subscriptions
 - Over-counting (counting all “Internet-capable” SIMs, irrespective of use)
 - Under-counting (being able to only count SIMs that have subscribed to a data package; SIMs with only voice packages may use Internet, but operators cannot count; impossible for pre-paid)
- General difficulty with multiple ownership (one user with fixed and many SIM connections) leading to questionable multipliers
- Therefore, **for now**, rely on fixed Internet subscriptions only

Difficult to find rationale for current multipliers

Country	GNI per capita (Atlas Method) Ranking	Population (000s) (from ITU data)	Fixed Internet Subscriptions (000s), 2009	Fixed Internet Subs per 100 inhabitants 2009	Internet Users (000s), 2009, current method	Internet users per 100 inhabitants 2009 (current method)	Current multiplier
Russia	77	140,864	88,068	62.52	50	3.55	1.42
Mauritius	88	1,288	224	174.61	10	78.46
Liberia	211	3,609	2,000	55.41	10	2.74
Liechtenstein	1	35,151	5,000	14.22	10	70.31
Cote d'Ivoire	167	20,000	18	0.09	968	4.84	53.78
Sudan	160	40,091	44	0.11	4,200	10.48	95.24
Iraq	146	31,000	3	0.01	325	1.05	104.84
Uganda	193	33,333	30	0.09	3,200	9.6	106.67
Kenya	180	42,000	8	0.02	3,996	9.51	475.65
Afghanistan	202	28,169	2	0.01	1,000	3.55	500

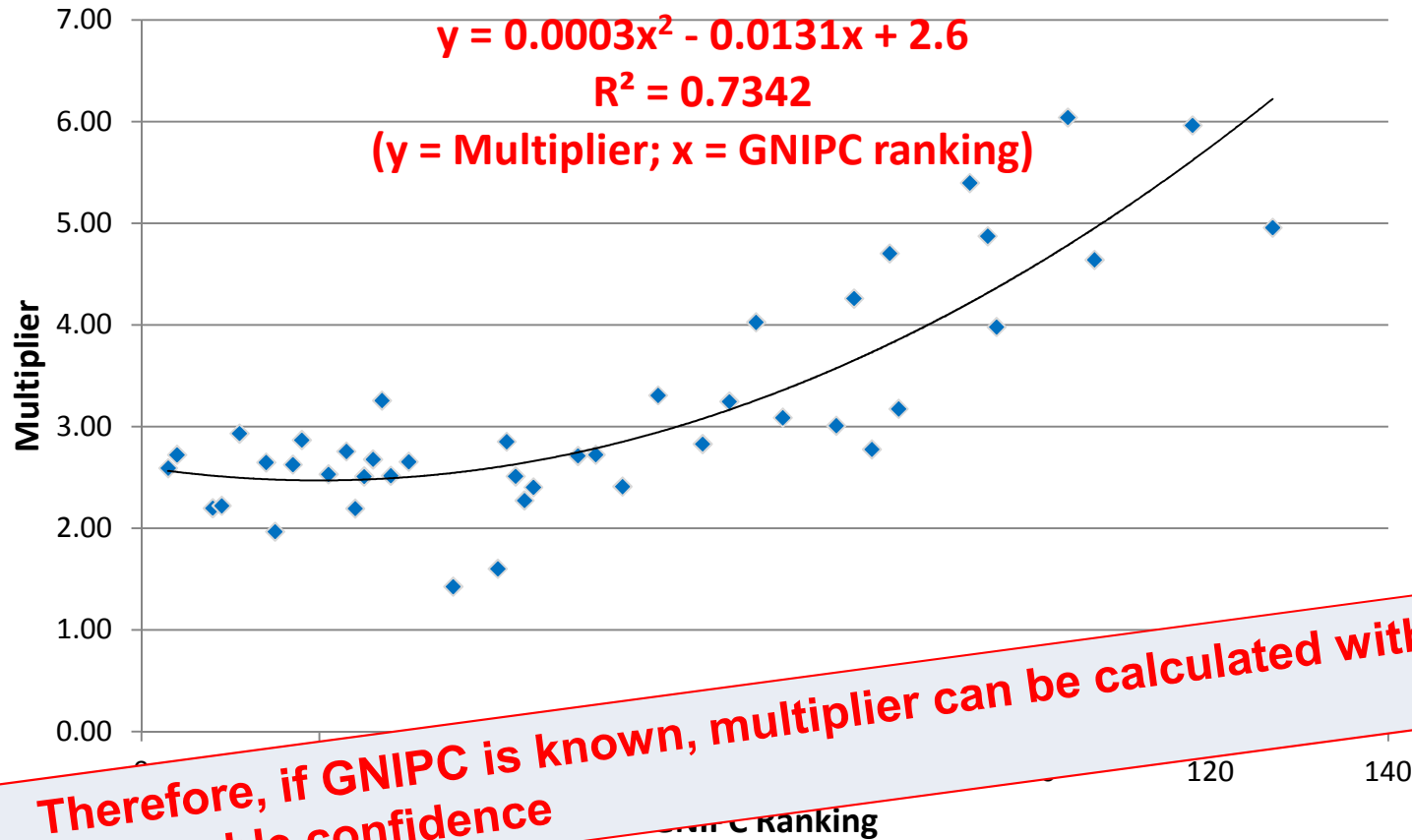
- Huge variance in Multipliers: 0.68 (Russia) to 500 (Afghanistan)
- “Similar” countries with very different multipliers
 - Afghanistan - 2,000 fixed subscriptions; 202nd GNI ranking; Multiplier=500
 - Burundi - 5,000 fixed subscriptions; 213th GNI ranking; Multiplier=13

**PROPOSED MODEST
IMPROVEMENT: A “MORE
RATIONAL” WAY TO DETERMINE
THE MULTIPLIER**

Hypothesis: Multiplier (M) is inversely correlated to income

- More people in developing countries likely to access the Internet at tele-kiosks, schools, places of work
 - All with one subscription → multiple users features
 - $M > 1$ and large
- In more developed countries, most households likely to have internet access at home
 - $M > 1$, but smaller than low income countries
- In developed countries, one user can have many subscriptions (mobile phone, even two fixed broadband etc.)
 - M positive, but could be $M < 1$

Using available data (mostly high income countries), hypothesis appears valid



Recommendation: Step 1: If survey is available,
use it since survey results are first best

- If survey from current year is not available,
use previous year's data with adjustment
 - Adjust by average growth for country grouping
(e.g., middle income countries etc.)

Step2: If survey data not available, use formula to calculate multiplier and use multiplier as a ceiling

- Formula: $y = 0.0003x^2 - 0.0131x + 2.6$
Where
 - $y = M$, the multiplier
 - x is GNI per capita ranking
- As more and more countries (specially low income countries) conduct surveys, formula can be fine-tuned → better estimates for everyone
 - Current data yields $M > 1$
- Most recent available data to be used always
- If current multiplier $>$ formula-derived one
 - Use formula derived multiplier to calculate num. of users
- If current multiplier $<$ formula-derived one
 - Use current multiplier to calculate num. of users

Results: minor adjustments in a few high income countries

Country	GNI per capita (Atlas Method) Ranking	Current Internet Users (000s) 2009	Current Multiplier	Multiplier using new methodology	Internet users with new methodology	Variance of number of Internet users (000)	Actual Survey Results where available	Internet Users that can be reported (000s)
Monaco	1	23	1.84	2.59	32.34	9		23.0
Liechtenstein	2	23	1.38	2.58	43.01	20		23.0
Norway	3	4,431	2.59	2.56	4,383.93	-47	4,431.0	4,431.0
Luxembourg	4	425	2.72	2.55	398.49	-26	425.0	425.0
Bermuda	7	54	1.42	2.52	95.65	42		54.0
Denmark	8	4,751	2.20	2.52	5,437.86	687	4,751.0	4,751.0
Switzerland	9	5,480	1.98	2.51	6,950.24	1,470	6,158.0	6,158.0
Kuwait	10	1,100	3.89	2.50	707.50	-393		707.5
San Marino	12	17	2.62	2.49	16.17	-1		16.2
United Arab Emirates	13	3,778	2.68	2.48	3,495.23	-283		3,430.8
Netherlands	14	14,872	2.65	2.48	13,914.66	-958	14,872.0	14,872.0
Sweden	15	8,398	1.97	2.47	10,560.05	2,162	8,398.0	8,398.0
United States	17	239,894	2.93	2.47	202,036.99	-37,857	215,208.0	215,208.0
Austria	18	6,144	2.87	2.46	5,276.17	-867	6,144.0	6,144.0
Belgium	21	8,113	2.53	2.46	7,882.30	-231	8,113.0	8,113.0
Ireland	23	3,043	2.76	2.46	2,715.75	-327	3,043.0	3,043.0
France	24	44,625	2.19	2.46	50,047.75	5,422	44,625.0	44,625.0
Australia	25	15,757	2.50	2.46	15,513.75	-243	15,809.0	15,809.0
Iceland	26	302	2.67	2.46	278.03	-24	302.0	302.0
Germany	27	65,124	3.26	2.47	49,354.00	-15,770	65,124.0	65,124.0
Canada	28	26,225	2.45	2.47	26,475.45	251	26,960.0	26,960.0

Results: adjustments in many low-income countries; some significant

Country	GNI per capita (Atlas Method) Ranking	Current Internet Users (000s) 2009	Current Multiplier	Multiplier using new methodology	Internet users with new methodology	Variance of number of Internet users (000)	Actual Survey Results where available	Internet Users that can be reported (000s)
Mali	184	250	24.75	10.36	104.68	-145		104.7
Cambodia	185	78	4.33	10.46	188.33	110		78.0
Bangladesh	188	617	4.12	10.76	1,613.88	997		617.3
Burkina Faso	190	178	10.48	10.96	186.32	8		178.2
Guinea-Bissau	190	37	53.00	10.96	7.67	-29		7.7
Rwanda	193	450	3.04	11.27	1,665.07	1,215		450.0
Uganda	193	3,200	106.67	11.27	337.97	-2,862		338.0
Central African Rep.	195	23	9.04	11.47	28.68	6		22.6
Gambia	196	130	37.17	11.58	40.52	-90		40.5
Mozambique	196	613	45.37	11.58	156.29	-456		156.3
Nepal	196	626	6.05	11.58	1,198.20	572		625.8
Togo	196	356	5.98	11.58	689.98	334		356.3
Madagascar	200	320	38.55	12.00	99.60	-220		99.6
Afghanistan	202	1,000	500.00	12.22	24.43	-976		24.4
Niger	204	116	32.19	12.43	44.76	-71		44.8
Ethiopia	206	445	6.26	12.65	899.61	454		445.4
Eritrea	207	250	35.71	12.76	89.35	-161		89.3
Malawi	209	716	6.82	12.99	1,363.67	647		716.4
Liberia	211	20	1.33	13.21	198.20	178		20.0
Burundi	213	65	13.00	13.44	67.21	2		65.0

Result: overall 8% reduction in the number of Internet users across reporting countries; small increase in digital divide

- Brings down the numbers for many developing countries that used very high multipliers
 - E.g. Afghanistan (500 → 12.22); Kenya (475 → 9.98); Uganda (106 → 11.27)
- Small increase in the digital divide

	Internet users/100 (current methods), 2009	Internet users/100 (new method), 2009
Developed countries	65.46	61.92
Developing countries	20.64	15.57
Digital divide (Internet users)	3.17: 1	3.98:1

- But when wireless Internet subscriptions grow, and data are included in future iterations, an increase in the calculated total user numbers and a reduction in the digital divide can be expected (since new wireless users are expected to come disproportionately from developing countries)

Drawbacks of proposed method

- Does not account for wireless subscriptions
 - Should yield smaller multipliers over time as wireless is included in the future.
- Leaves out most unreliable (wireless subs) but still assumes fixed subscriptions data is reliable
 - Further tests required (next iteration)
- Nearly all data used to derive formula is from developed countries (few developing countries have conducted surveys)
 - Possibly skews the multiplier (mobile a lion's share of developing country Internet subscriptions)
 - Only solution is for more developing countries to conduct surveys
- Still only an estimate, albeit one grounded on plausible logic
 - Not a substitute for survey data
- Multipliers always greater than 1
 - Because wireless data is left out ?
 - And because double counting occurs when wireless is included?

PRICE & AFFORDABILITY

The OECD mobile and fixed baskets: a realistic method of price comparison

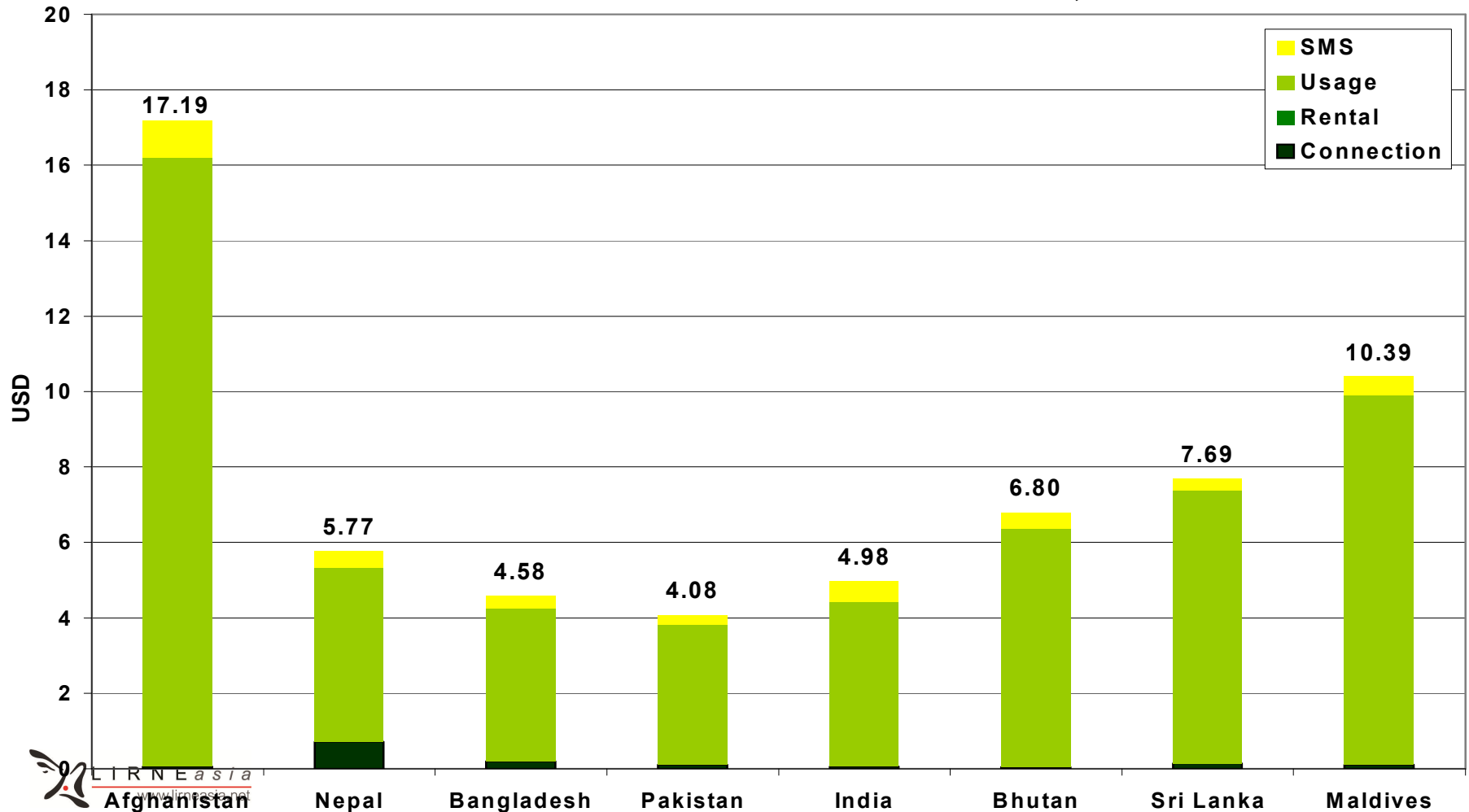
- ITU reported many micro-measures (till recently)
 - E.g., “price of a 3 minute on-net call”
- But in selecting an operator, consumers are likely to think about ALL costs
 - Connection charge, monthly charge, what’s given “free” (i.e. X SMSs per month and Y minutes per month included in package), cost of additional SMS or Cost of Minute
 - AND their own consumption patterns (e.g. total minutes of calling per month, more friends on the same network therefore...)
- The OECD includes basket many of the above and more (ITU finally agrees)

The OECD basket includes

- Average voice minutes used per month (including voice mail, free minutes given)
- SMS per month
- MMS per month
- All above separated by
 - On-net vs. off-net
 - Peak vs. off-peak

Calculated for low, medium and high users

SAARC Countries Medium User Price Basket, Feb 2009

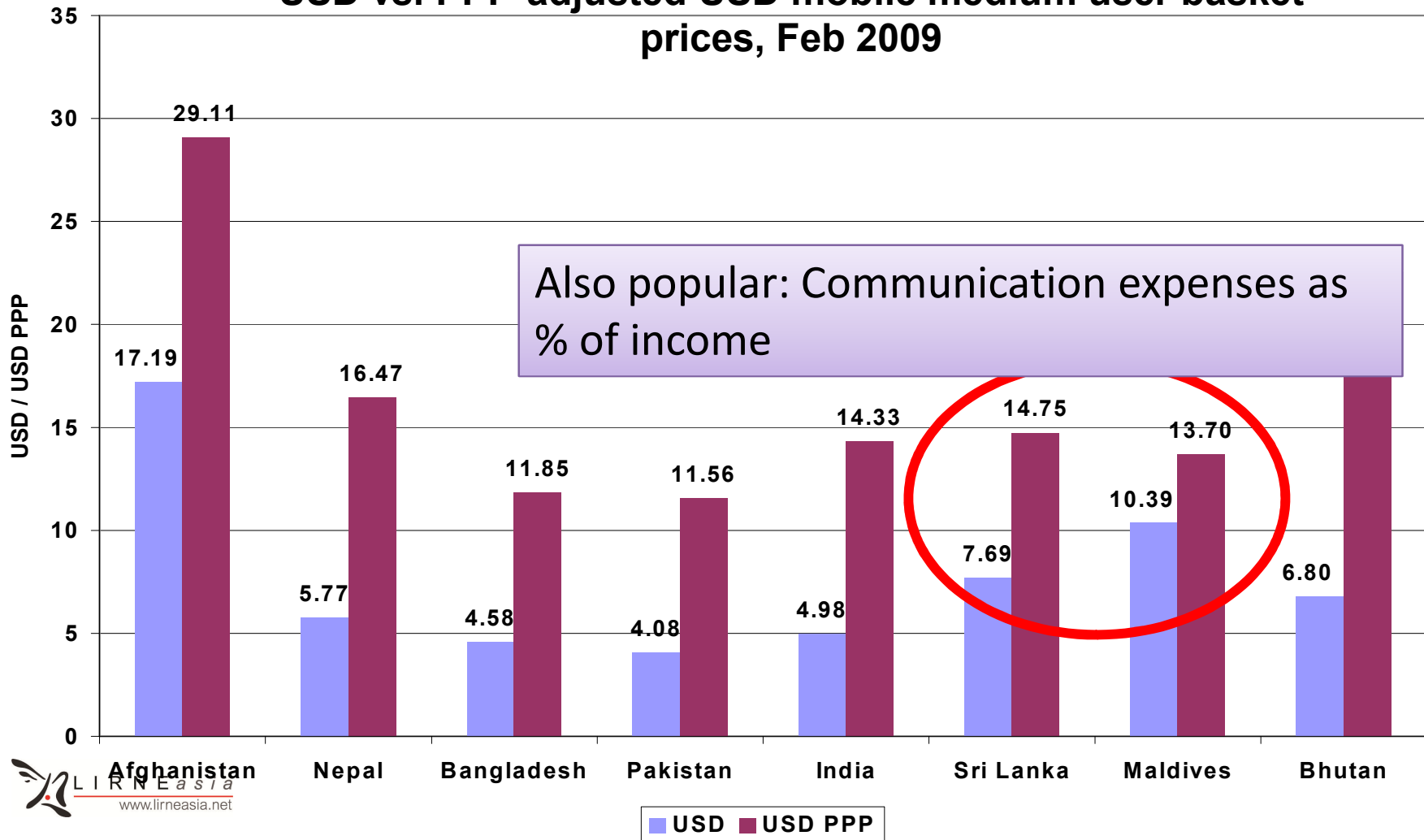


But not straightforward

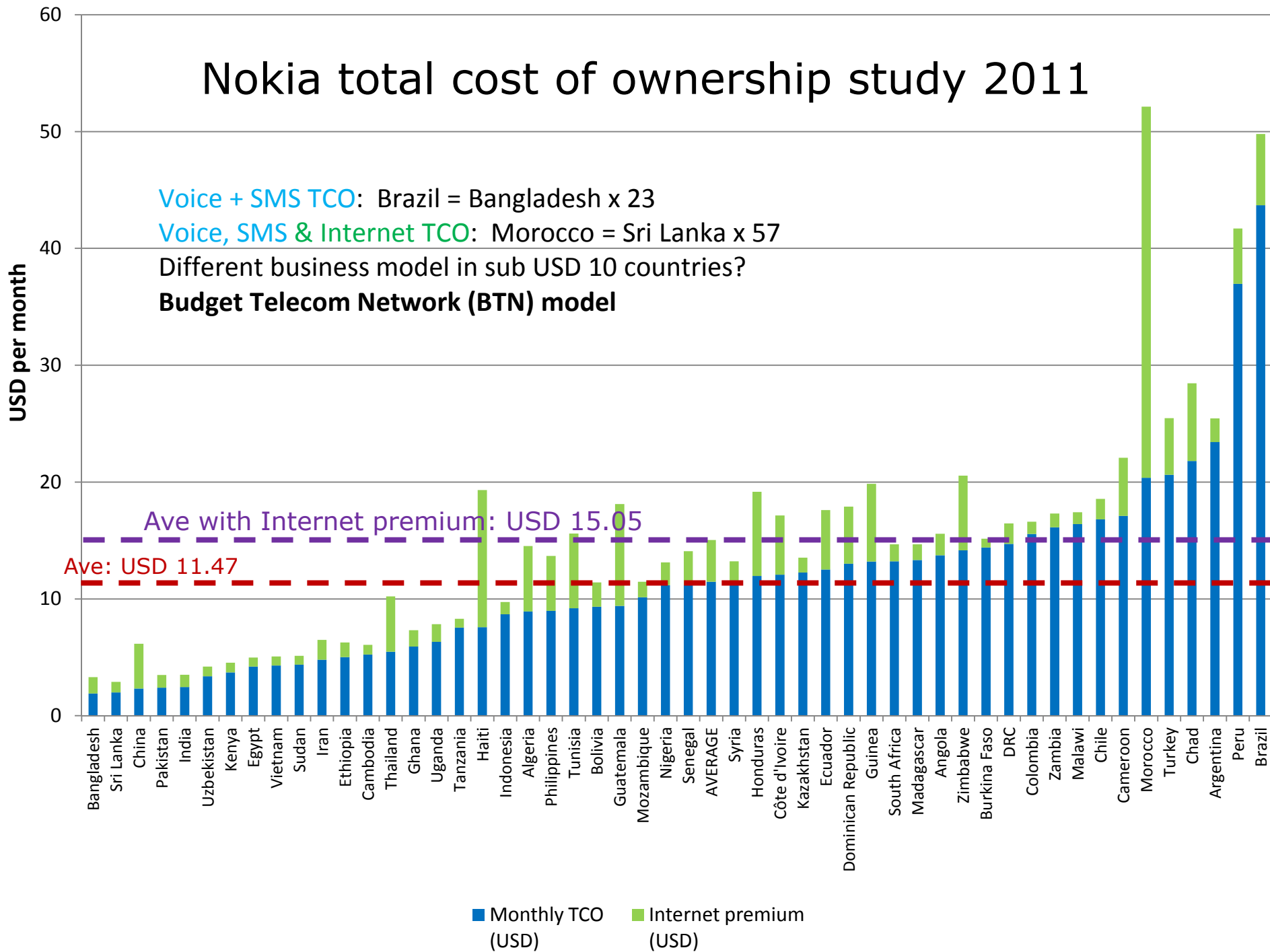
- Regional variations
 - E.g., Average minutes of use in SAARC= 164 vs OECD = 119
 - A regional basket more meaningful?
 - Or just stick to OECD
- “Average users” vary even among regional neighbors
 - Philippines vs. other SE Asian countries
- Not easy to get the data
 - Needs cooperation from operators (ideally)
 - Best calculated by regulator

But price is not affordability. USD vs. PPP adjusted USD

USD vs. PPP-adjusted USD mobile medium user basket prices, Feb 2009



Nokia total cost of ownership study 2011



What about other prices? E.g. BB, wholesale & retail?

Oct 2009

Table 1- Broadband Prices in Emerging Asia in USD²

Country ³	Annual cost, 2Mbps, 2km DPLC (tail cost)	Annual cost, 2Mbps, 100km DPLC ⁴	Annual cost, 2Mbps Broadband business connection (unlimited download)	Annual cost, 256kbps Broadband business connection (unlimited download)	Annual cost, 256kbps Broadband residential connection (unlimited download)	Price per GB, for 2Mbps, 5-10 GB data limit (Business)	Price per GB, for 256kbps, 5-10 GB data limit (Business)	Price per GB, for 256kbps, 1-4 GB data limit (Residential)	Price per GB, 1Mbps speed, 1GB data limit mobile internet	Value of 1 USD in local currency as at September 20, 2009 ⁵
South Asia										
Afghanistan	6	7	11,700 ⁸	4,200 ⁹	4,200 ¹⁰					50.10
Nepal	11	12	1,423 ¹³	230 ¹⁴	230 ¹⁵					78.43
Bangladesh	786 ¹⁶	3,502 ¹⁷		598 ¹⁸	256 ¹⁹					70.25
Pakistan	56 ²⁰	2,807 ²¹	289 ²²	116 ²³	116 ²⁴		3 ²⁵		2 ²⁶	83.11
India	348 ²⁷	3,607 ²⁸	899 ²⁹	147 ³⁰	147 ³¹	3 ³²		6 ³³	8 ³⁴	48.93
Sri Lanka	4,656 ³⁵									
Bhutan	999 ⁴²									
Maldives	15,865 ⁴⁶									
East Asia										
Philippines	392 ⁵⁶		753 ⁵⁷	250 ⁵⁸	199 ⁵⁹					47.82
Indonesia	3,025 ⁶⁰	8,520 ⁶¹		741 ⁶²		21 ⁶³		8 ⁶⁴	16 ⁶⁵	9718.17
Mongolia	(2880) ⁶⁶	(2880) ⁶⁷	5880 ⁶⁸	1200 ⁶⁹	1200 ⁷⁰				3 ⁷¹	1418.61

With 71 footnotes in the most recent publications we did

www.iimcasia.net

When comparing prices...

- Are installation charges included or not?
- Are taxes included?
- Are one-time/special discounts included?