

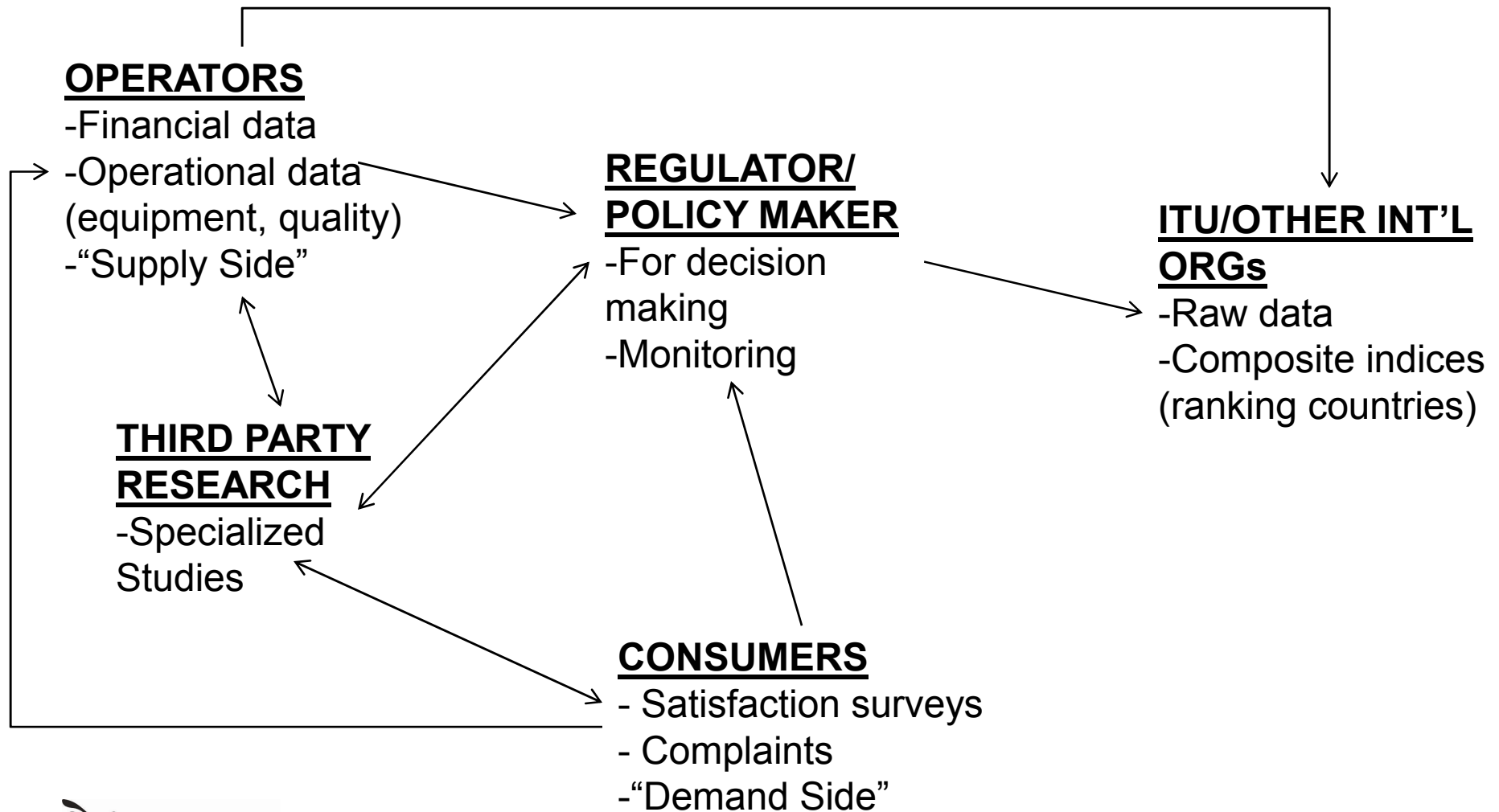
Understanding supply-side data for policy analysis



Rohan Samarajiva
CPRsouth5 Tutorials, Xi'an
December 2010



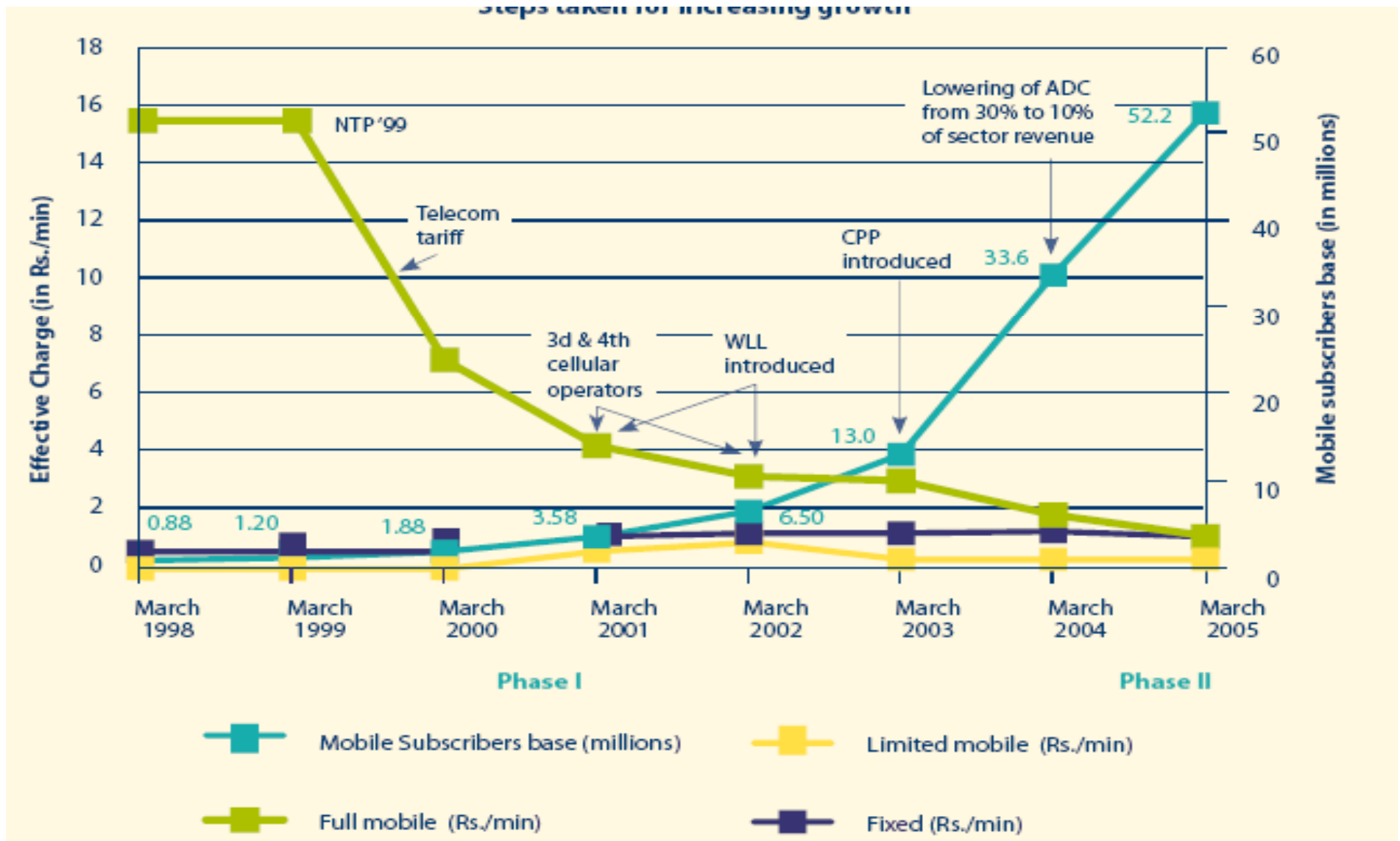
Data on the sector comes from multiple sources. Identify methods and definitions of each



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

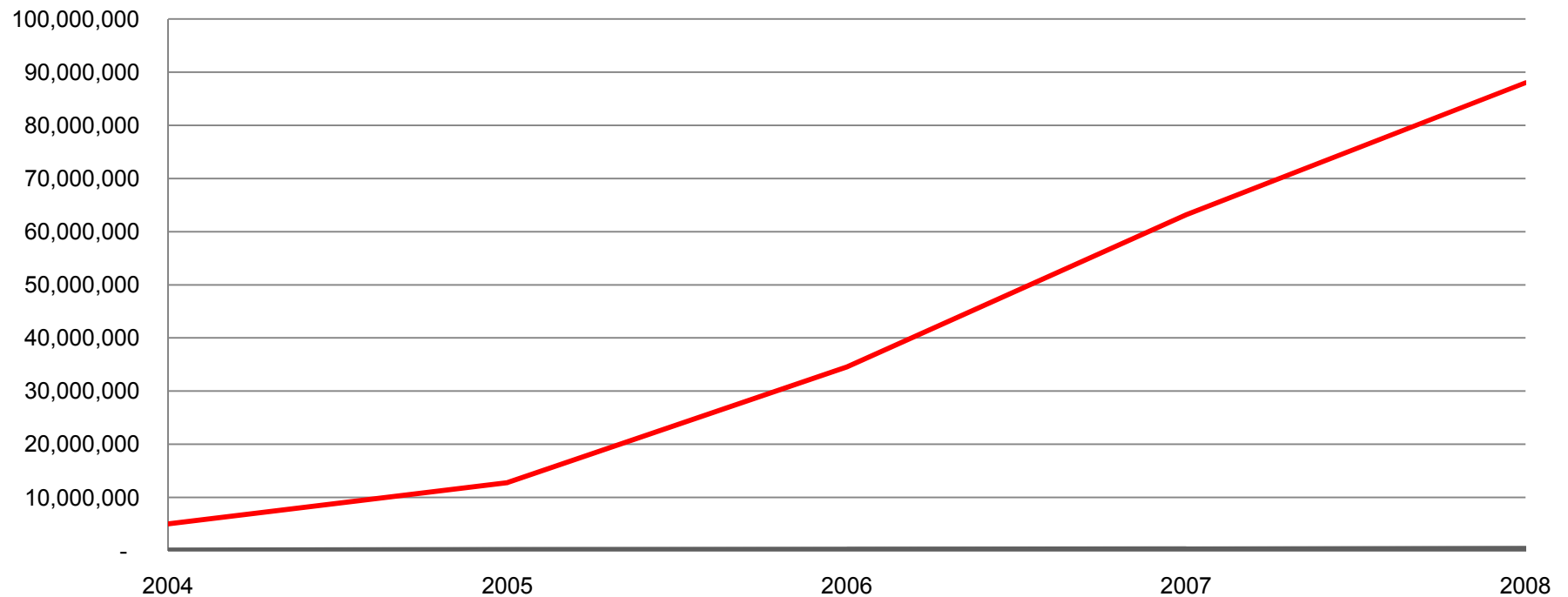
- What are the goals of reform?
 - Increased access (# of connections)
 - Increased choice
 - Increased quality
 - Decreasing prices (or a range of prices)
- Have these things happened?
 - How do you know?

The right data, presented well, can tell a great story (and help make decisions)



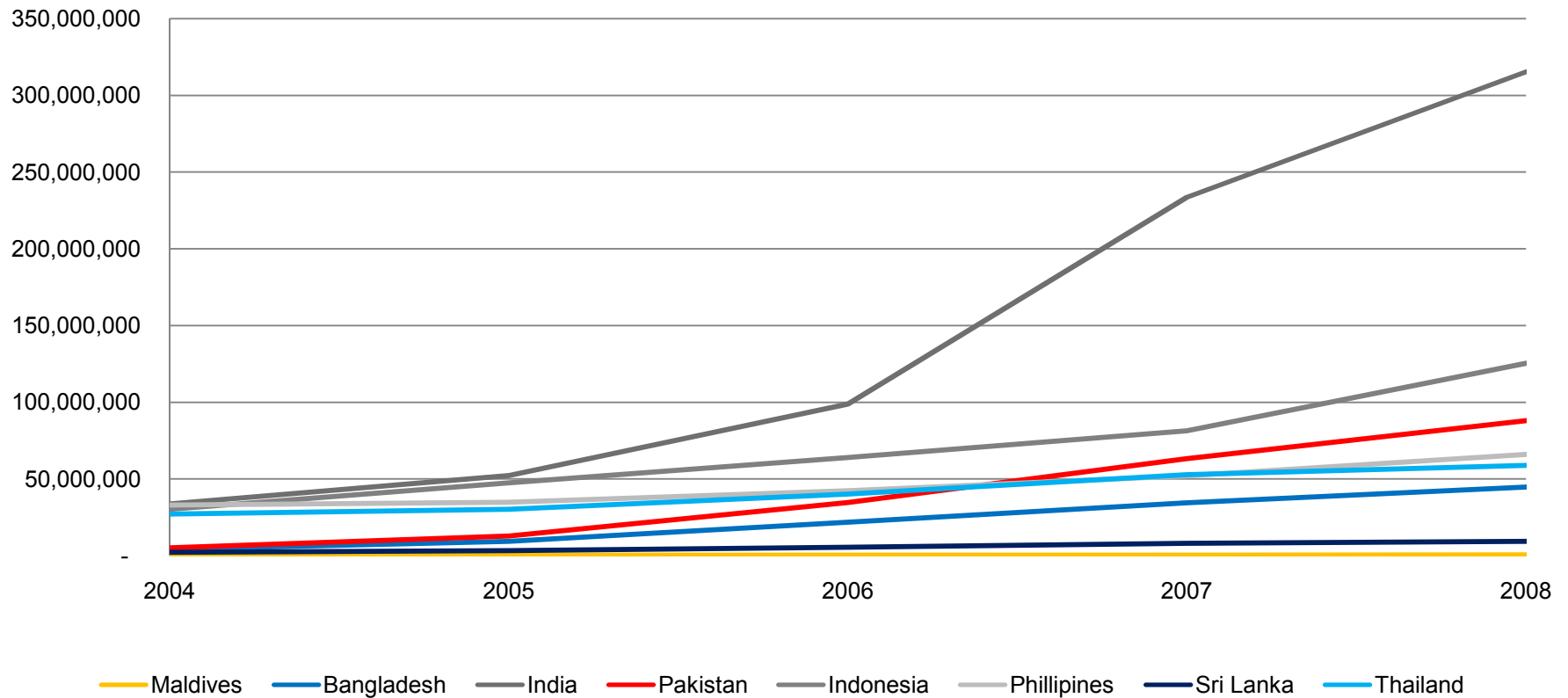
E.g., is connectivity increasing? Look over time

Pakistan Mobile SIMs: 2004 - 2008



You may think a country is doing well, until you compare it with others

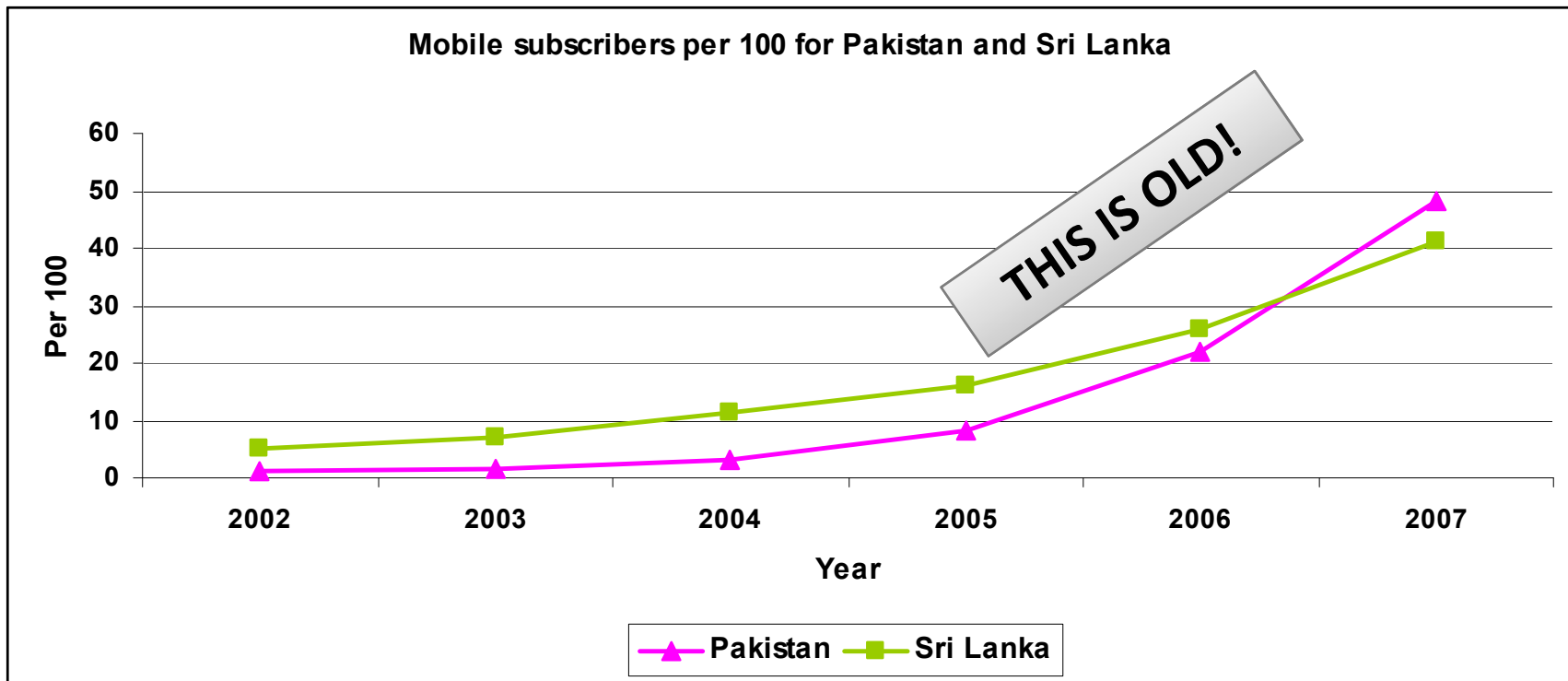
Mobile SIMs: 2004 - 2008



Benchmarking is an effective way to measure performance.

- Benchmark = target/goal to be achieved
 - Static : e.g., “aim to pass 75 fixed access paths per 100 people”
 - Moving: e.g., “aim to be below OECD average price” etc.
- Good data: the primary requirement of good benchmarking
 - Comparable (same definition? same time period? same collection/sampling method?)
 - Accurate

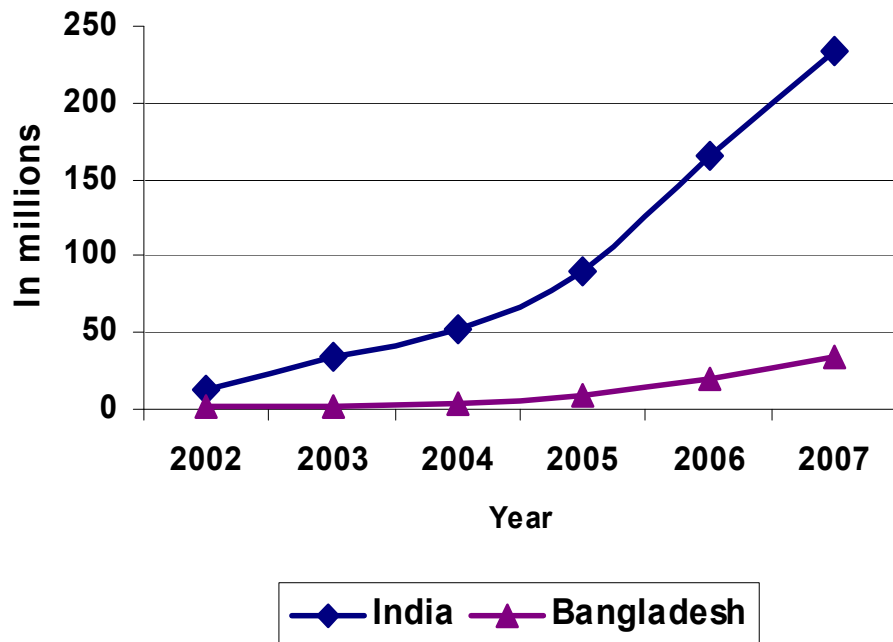
Data change fast. The latest are needed.



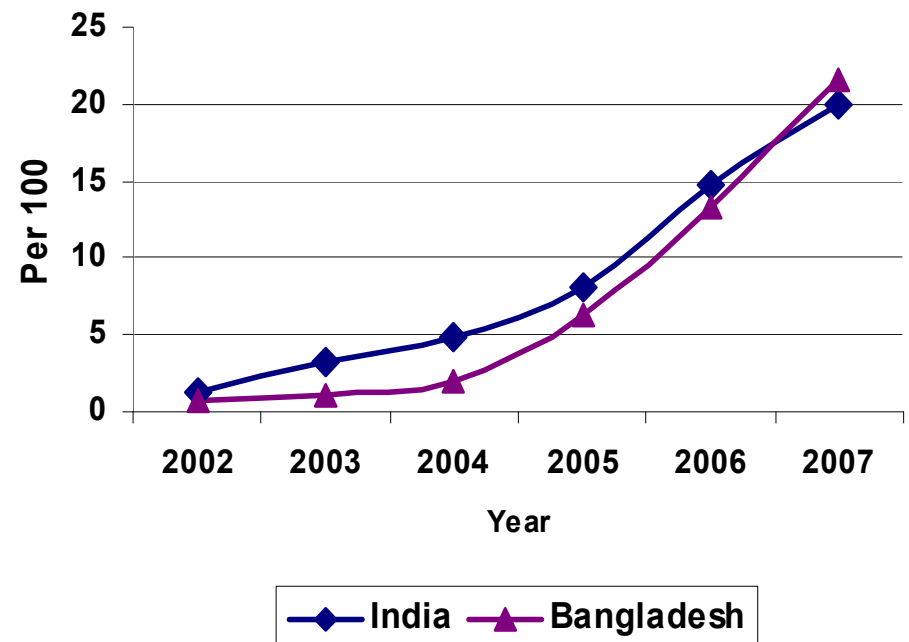
In 2009, Pakistan SIM/100 = 52.18; Sri Lanka 69.65
Caused by recalculations that resulted from millions of SIMs being taken off the rolls in PK

Different indicators can tell different stories. Right one for the purpose?

Total number of mobile subscribers in India and Bangladesh



Mobile subscribers per 100 in India and Bangladesh



Before you benchmark: 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 the same for PK
- Having quarterly data eliminates problem to a great extent

Whose data do you use?

Year	# of internet subscribers (millions), India			Difference between...	
	NASSCOM data	TRAI Data	Ministry of Statistics & PI	NASSCOM & TRAI numbers	TRAI & Ministry numbers
1999	0.35		0.23	-	-
2000	0.65	0.95	0.943	-46%	1%
2001	1.13	3.04	2.909	-169%	4%
2002	1.763	3.42	3.239	-94%	5%
2003	3.661	3.64	3.5	1%	4%
2004	4.403	4.55	4.05	-3%	11%
2005	6.674	5.55	5.3	17%	5%
2006		6.94	5.556	-	20%

Some supply side indicators

Connectivity Indicators

How many people are connected? Via what technology?

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

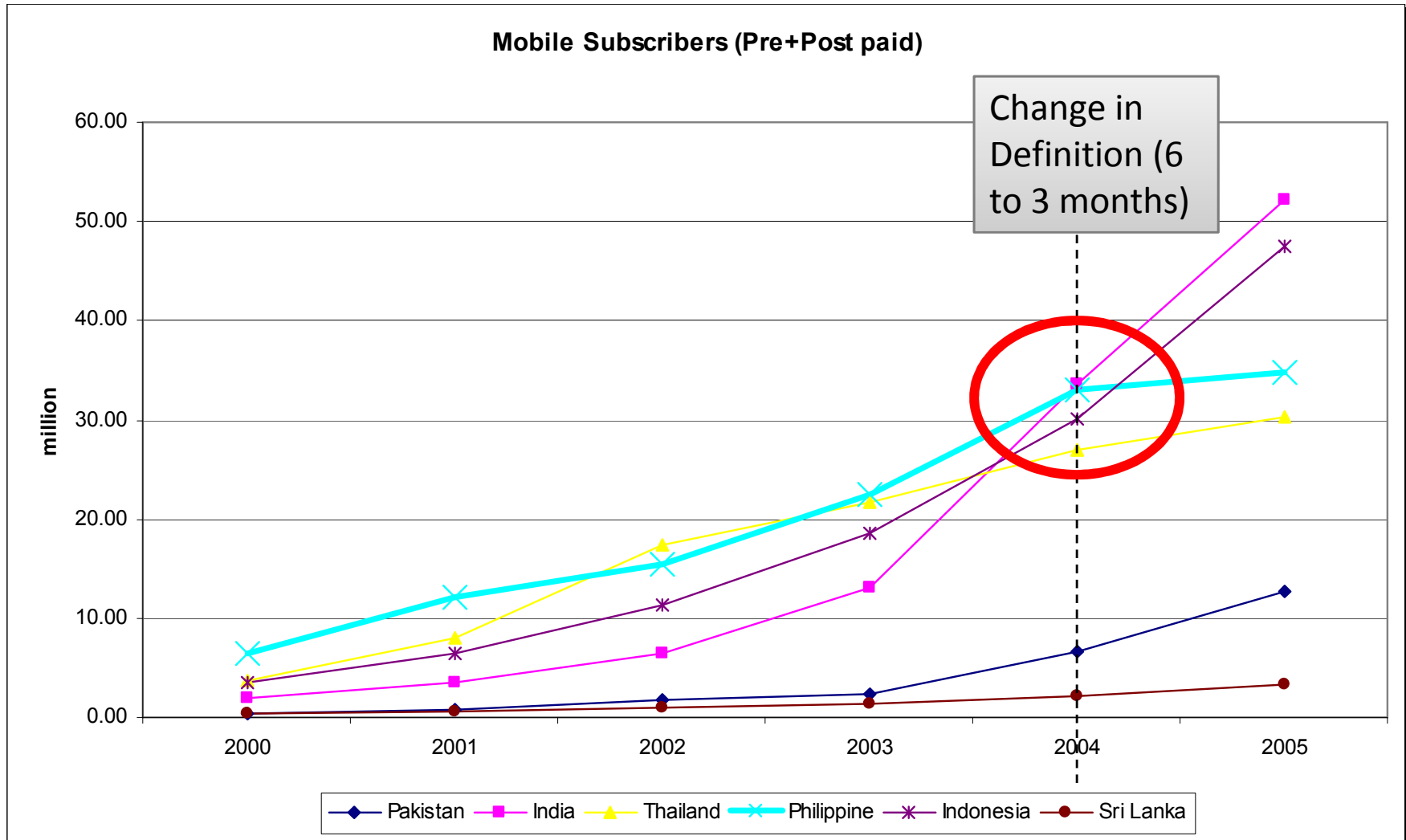
IN-COUNTRY ACCESS GROWTH

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

Mobile users? Subscribers? SIMs?

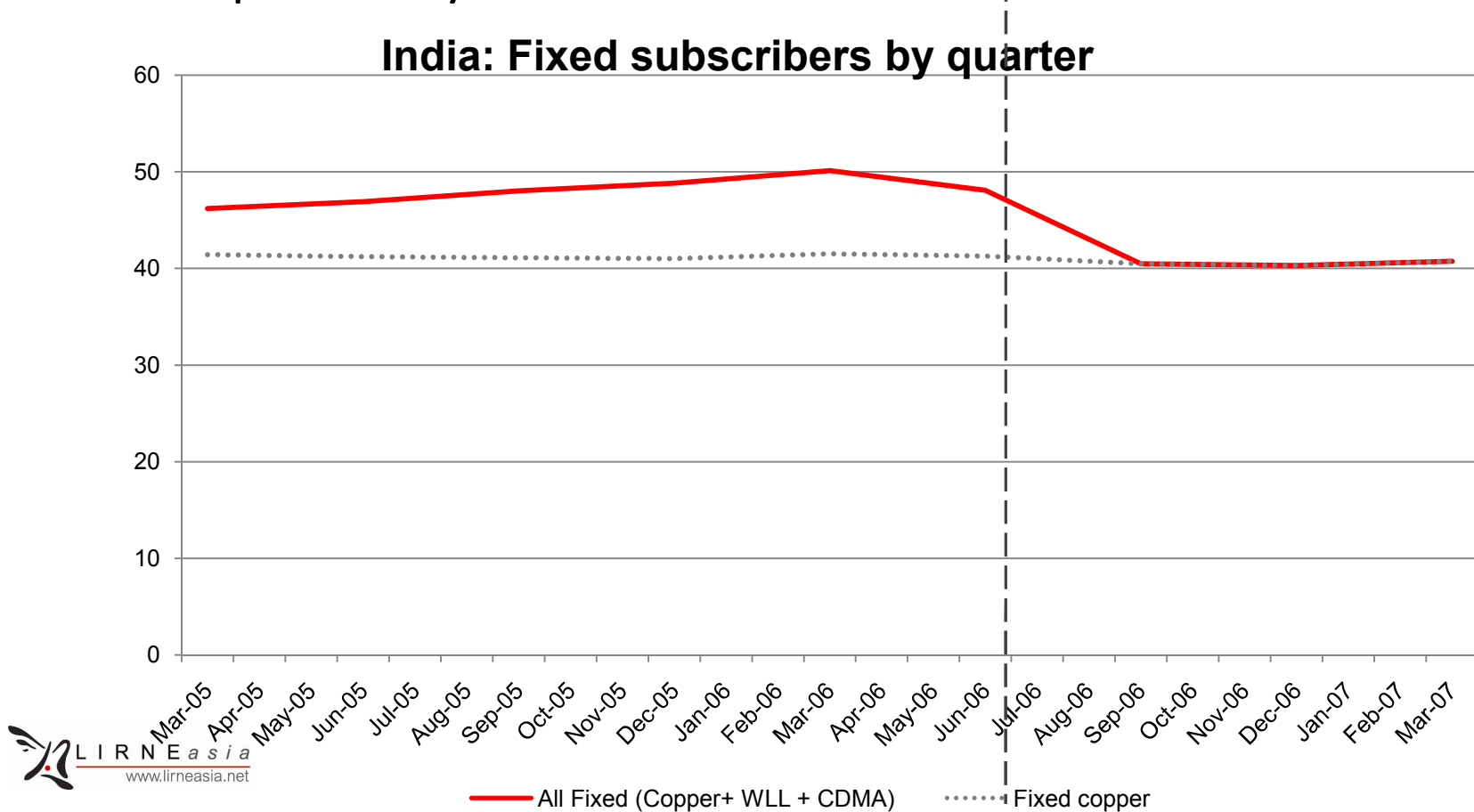
- One phone, used by many.
 - How do you measure # of users?
- One person, owning multiple SIM cards
 - How do you count subscribers?
- Nearly always, operators only count SIMs issued
 - Not number of people who are customers
 - Nor number of users of those SIMs
- Can we count subscribers?
 - Under strict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

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

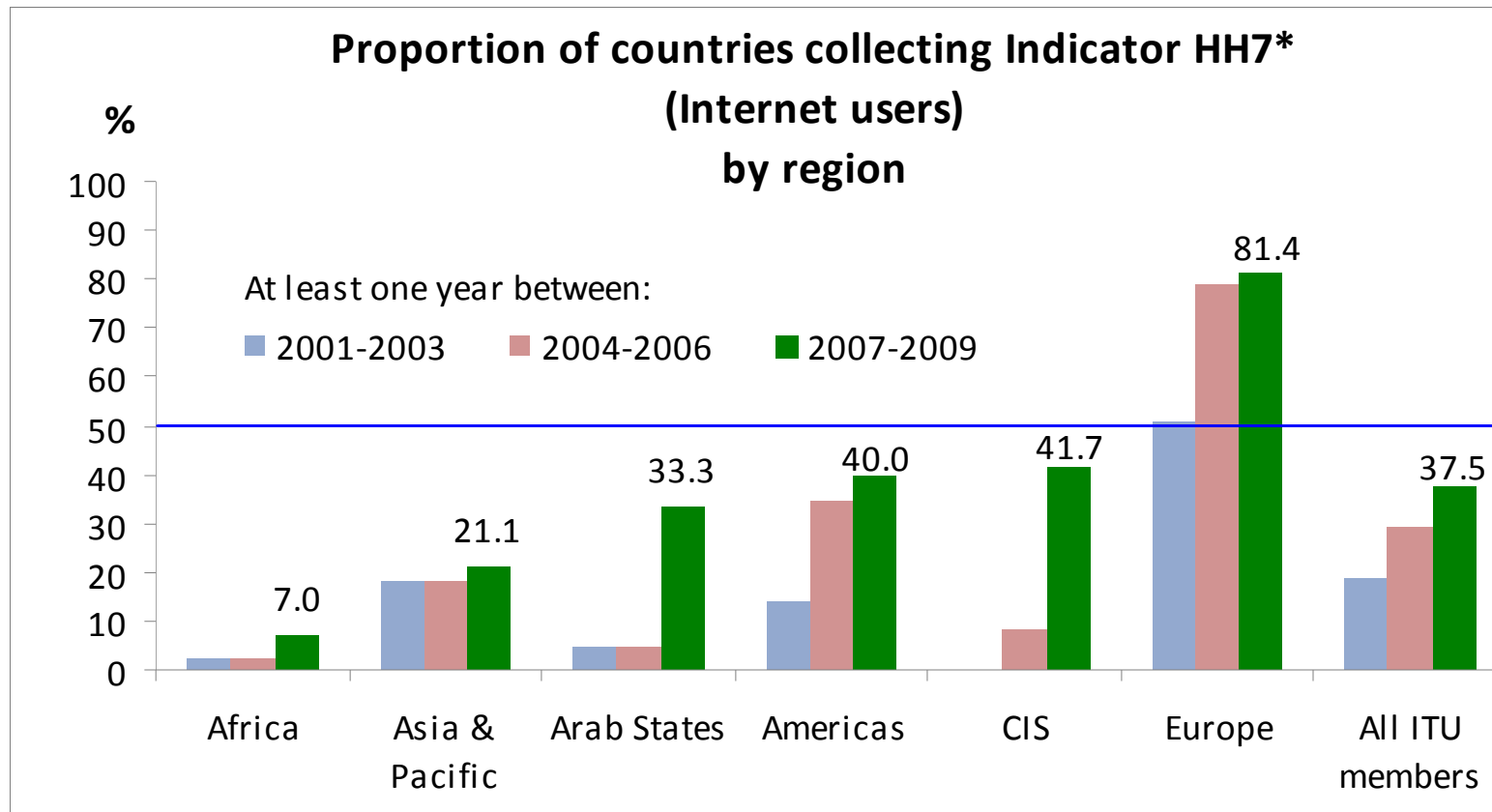
Focus of this section

The ideal way to measure

Surveys (household and individual), carried out by NSO

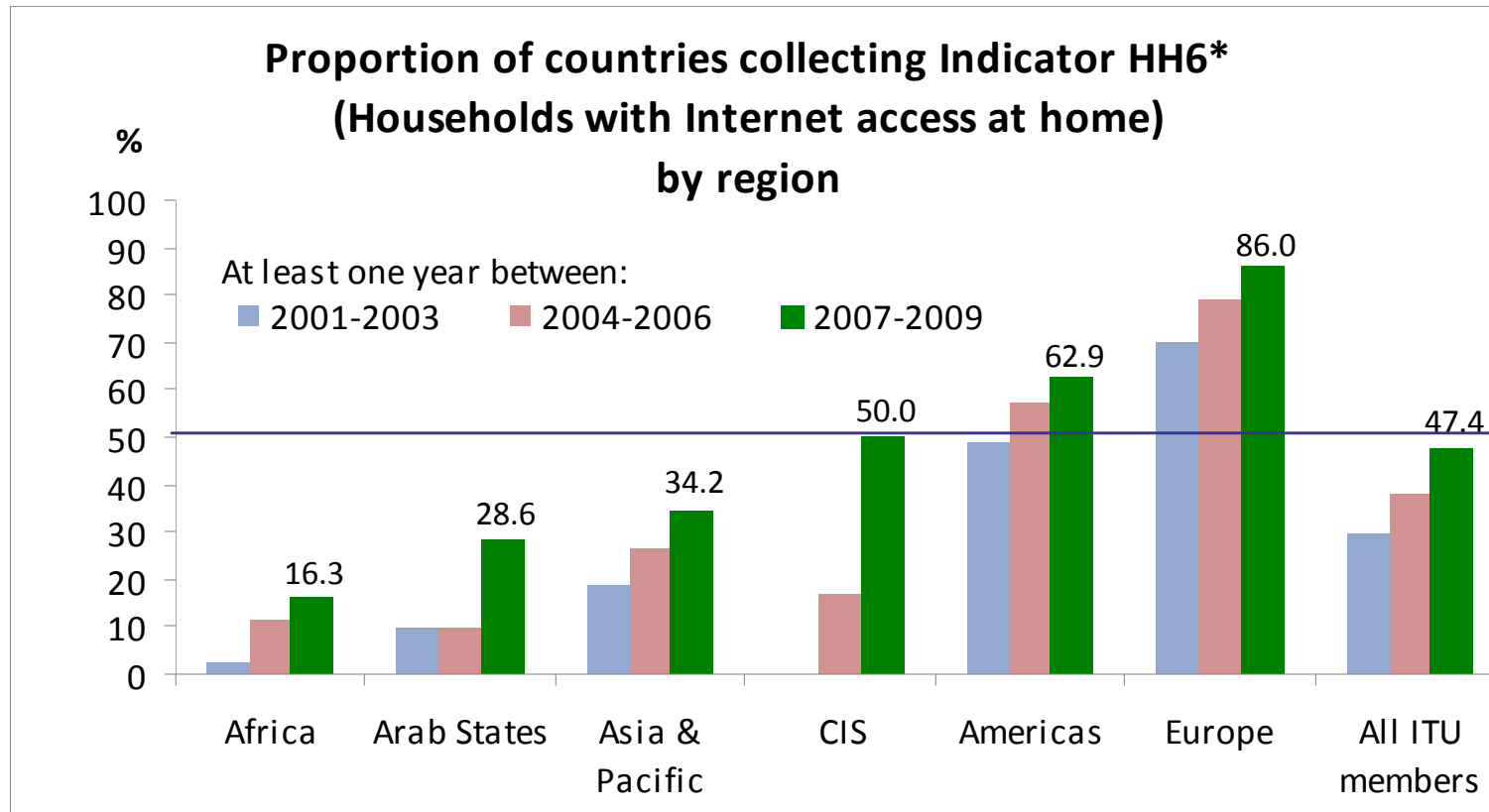
- Best method – collect HH7 through surveys
 - HH7: Proportion of Individuals who use the internet (from any location) in the last 12 months
 - Special survey, using ITU model questionnaire or other
 - Include question in multi-purpose household survey, HHIES (HH income-expenditure survey), ALS (Agriculture & 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 HH7 through surveys. But an increasing number do



Source: ITU World Telecommunication/ICT Indicators database.

Slightly more countries collect HH6 through surveys, and the number is 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 Subscriptions**

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 to report (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	13
Mauritius	88	1,288	224	174	174	133.5	1.42
Liberia	211	2,000	2	0.1	2	0.05	13
Liechtenstein	1	35,000	5,000	143	5,000	143	1.42
Uganda	193	33,333	30	0.09	3,200	9.6	106.67
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
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

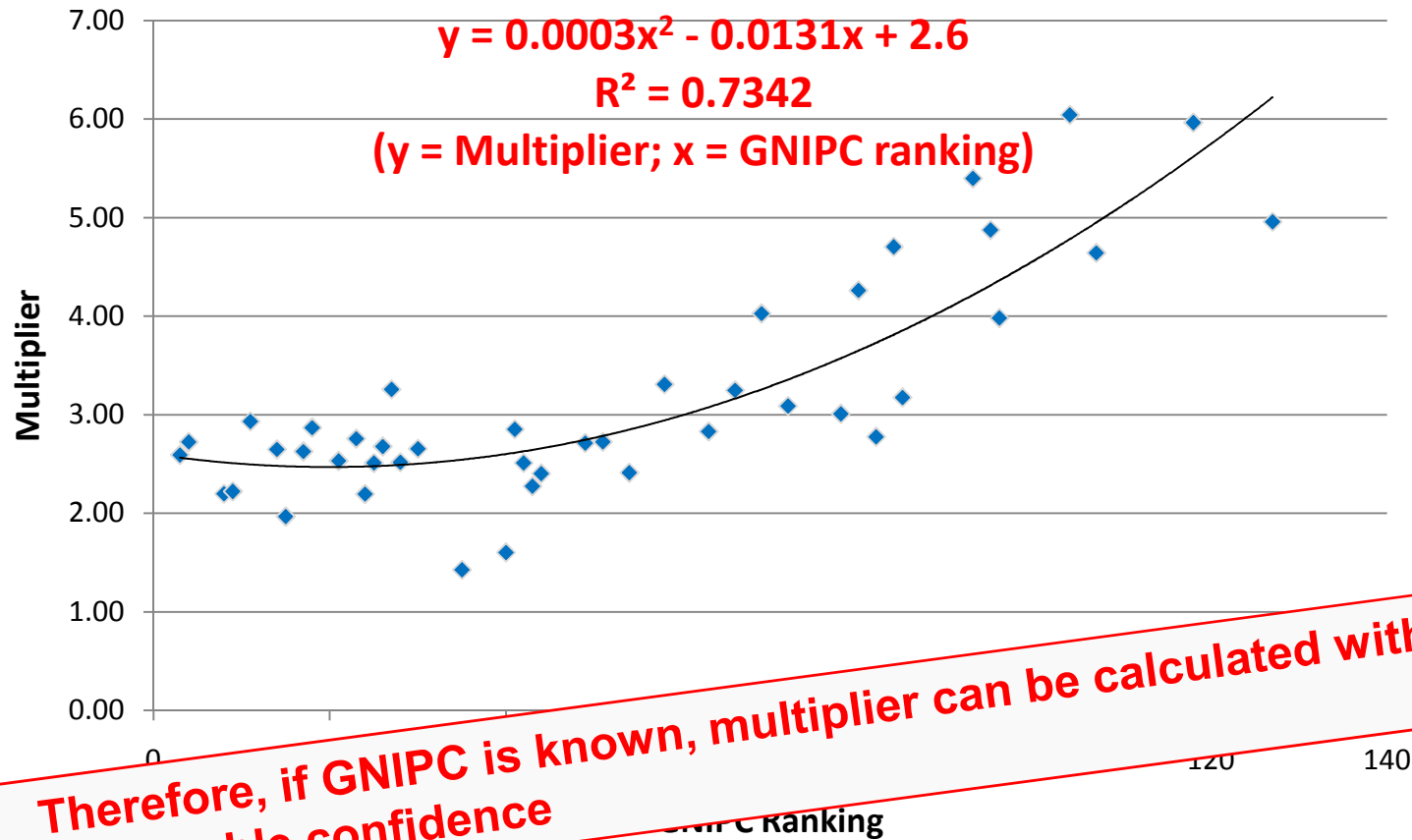
- Huge variance in Multipliers: 0.68 (Russia) to 500 (Afghanistan)
- “Similar” countries with very different multipliers
 - Afghanistan - 2,000 fixed subscriptions; 202nd GNI ranking; Multiplier=500
 - Burundi - 5,000 fixed subscriptions; 213th GNI ranking; Multiplier=13

**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



- Therefore, if GNIPC is known, multiplier can be calculated with reasonable confidence

Recommendation: Step 1: If survey is available, use it since surveys produce most reliable data

- 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?

Economic Impact of Industry

How important is the telecom/ICT sector to the country? To foreign direct investment?
What about taxes?

Why do we care?

- Telecom is growth sector in most countries
 - Often fastest growth
 - Significant foreign direct investment
 - Huge contributor to government tax
- To argue against policies that may make sector less attractive to investors and less affordable to consumers
 - E.g., sector-specific taxes on profits, customs duty on equipment

Useful indicators

- Total annual investment in the telecom sector
 - Investment into expansion of network services
 - Going towards public services (not private)
 - Not include money injected by firms acquiring a management interest in telco [track M&A money separately]
- Investment disaggregated by origin
 - Foreign Direct Investment (FDI) into the sector
 - Locally generated
- Revenue generated by sector
 - Fees (e.g. spectrum charges, license fees) + tax
- Total tax paid by the sector
 - Paid by consumer
 - Paid by corporates
- Total employment in the telecom sector (direct, indirect?)

Telecom sector attracts significant FDI

Pakistan: Foreign Direct Investment (FDI into Telecoms)

Year	Total FDI (USD millions)	FDI in Telecom Sector (USD millions)	Telecom Sector's Contribution to Total FDI (%)
2001-02	484.7	6.1	1.3
2002-03	798	13.5	1.7
2003-04	979.9	207.1	21.1
2004-05	1524	494.4	32.4
2005-06	3521	1905.1	54.1
2006-07	5124.9	1824.3	35.6
2007-08	5152.8	1438.6	27.9

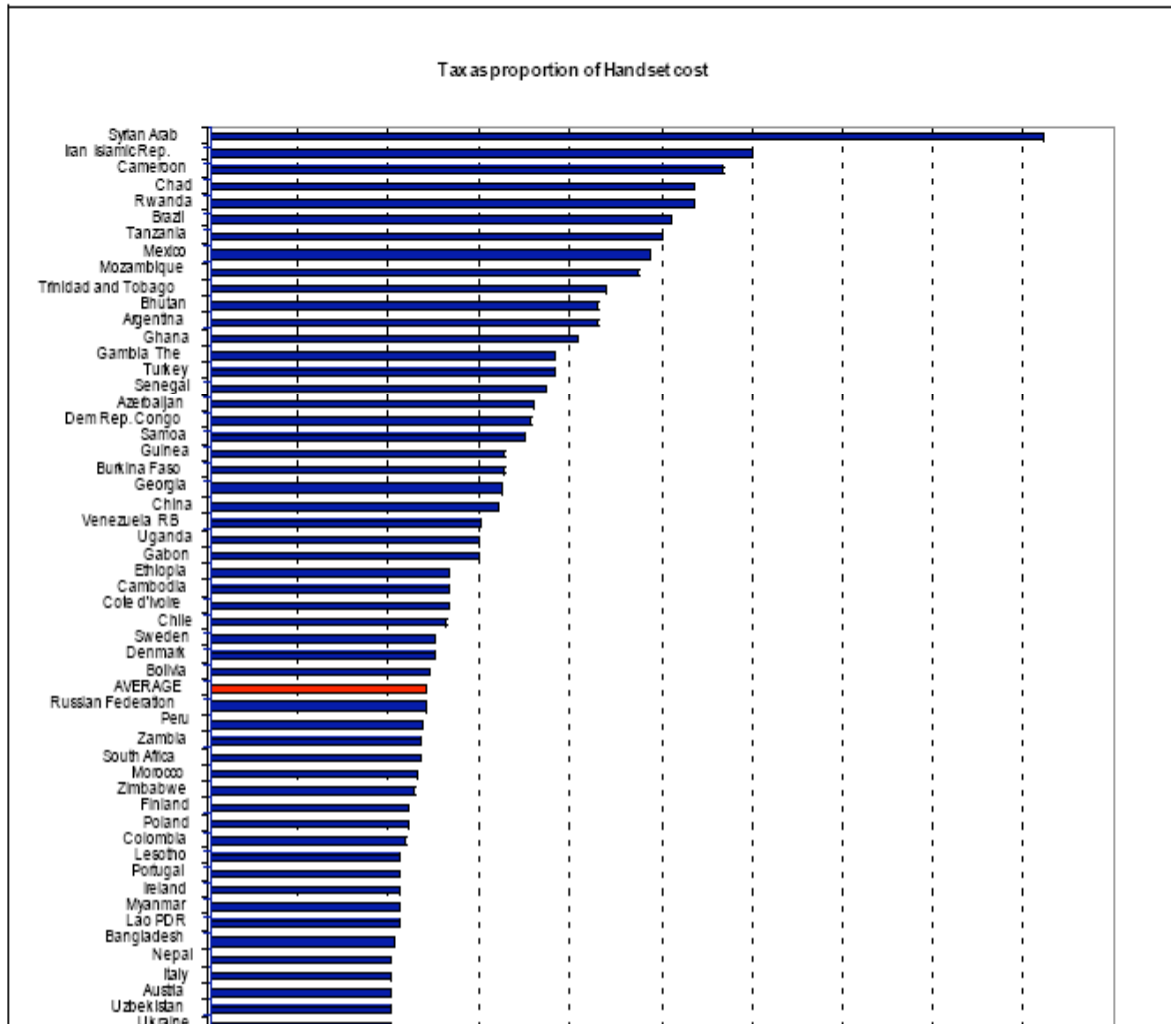
Telecom contributes significantly to government revenue

Maldives: Telecom Sector's contribution to GDP

Sector	% contribution to GDP		
	2006	2007	2008
Tourism	27.4	27.8	27.4
Government Administration	14.8	15.8	17.6
Communication	8.9	9.1	9.6
Transportation	9.6	9.7	8.7
All other sectors	39.4	37.6	36.7

Understanding taxes on telecom is useful.....

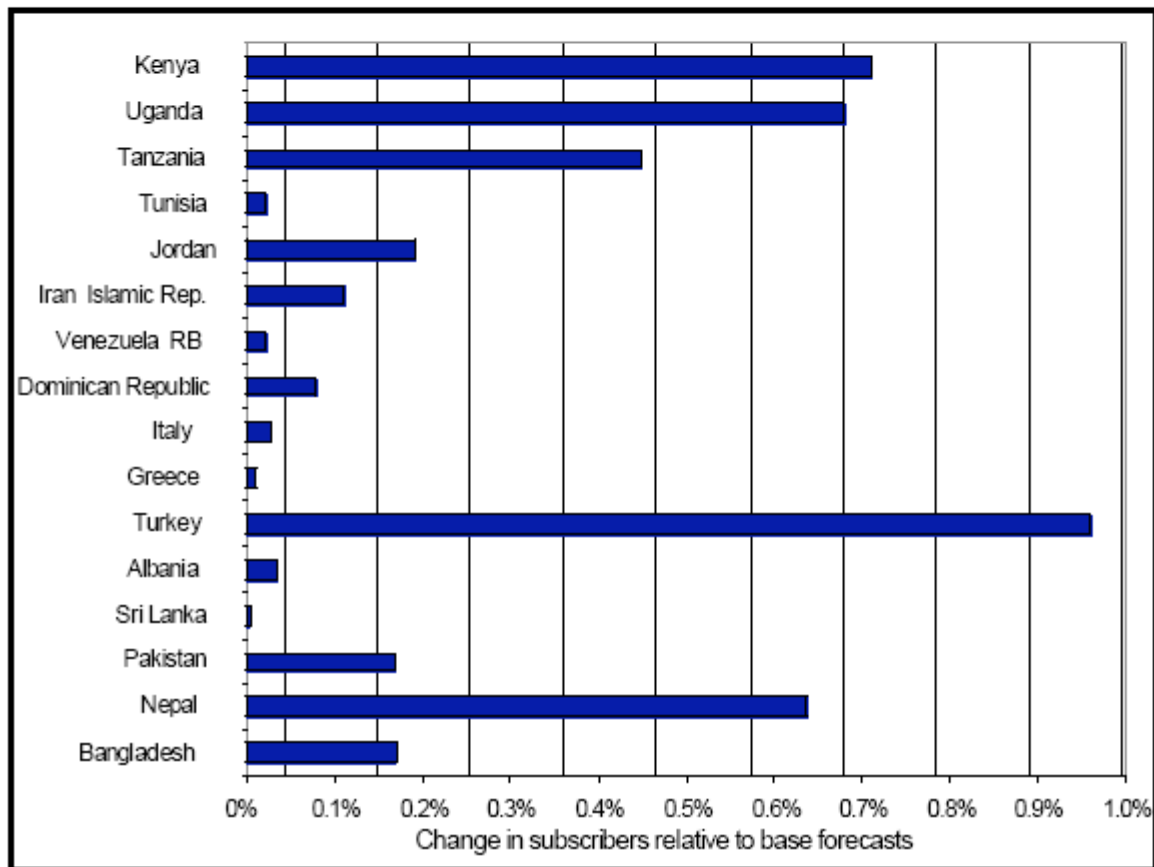
Figure 11: Tax as a percentage of handset cost



- As per GSM Association
 - 65% of African countries charge consumers above average taxes in cost of mobile ownership
 - 63% of African countries charge consumers above average taxes in Mobile Services cost
 - 50% of African countries charge consumers above average taxes in handset cost

..in order to understand impact of tax changes (e.g. GSMA calculations)

Figure 21: Percentage change in subscribers from base case in 2010 following the removal of telecoms specific taxes



Source: Deloitte

But taxes and fees vary. Benchmarking requires in-depth understanding

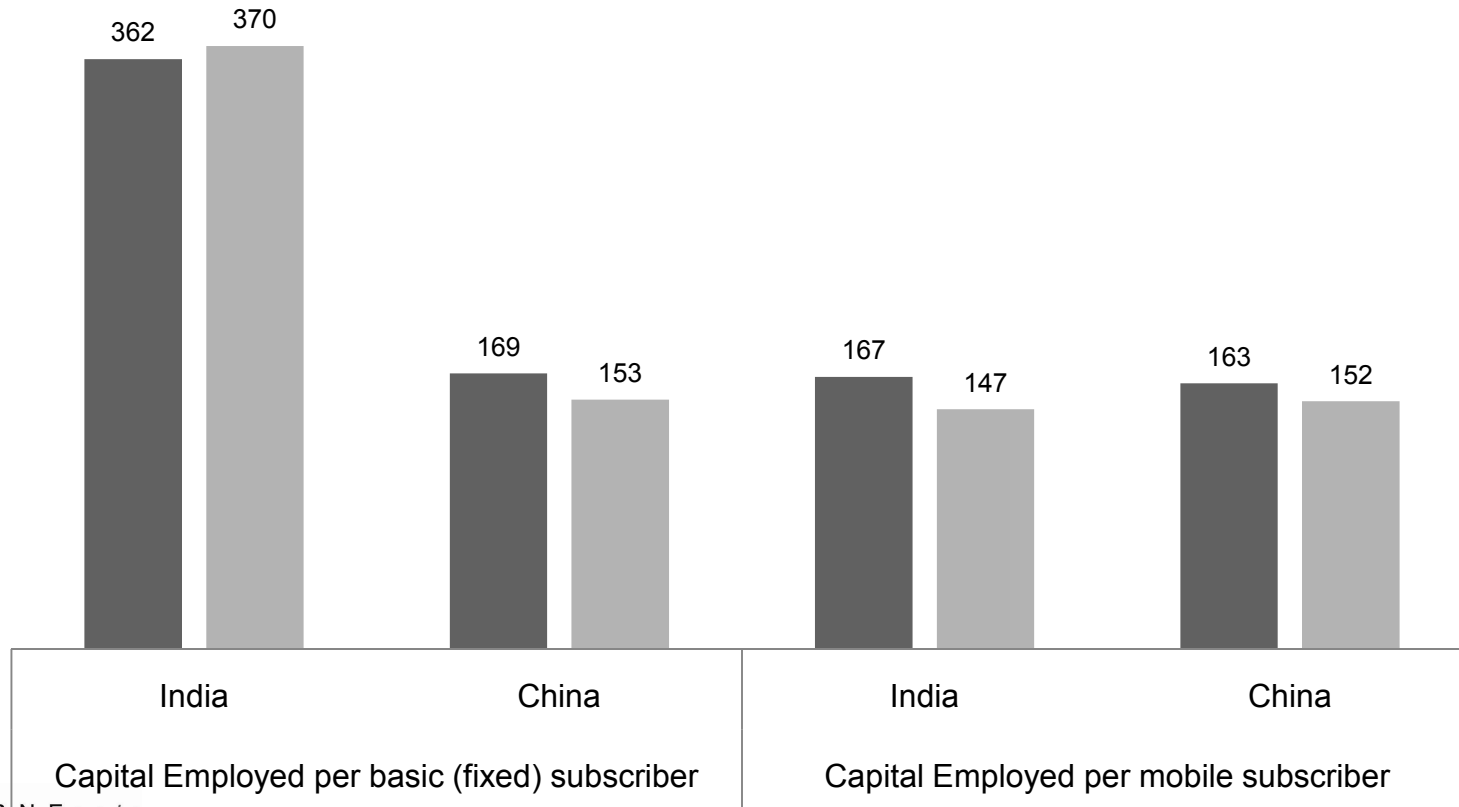
	Pakistan	Sri Lanka	China	India
<u>Regulatory charges</u>	<u>%age of revenue</u>	<u>%age</u>	<u>%age of revenue</u>	<u>%age of revenue</u>
Service Tax, GST	GST	VAT	3%	8%+ GST
License Fee	0.5% + 0.5% R&D	0.3% turnover (t.o.) + 1% of capital invested (inv)	Nil	5~10%
Spectrum Charge	Cost recovery	~ 1.1% of t.o.	~ 0.5%** (China Mobile)	2~6%~
USO	1.5%	Nil (only on ISD calls)	Nil	Incl in license fees
<u>Total Regulatory charges</u>	2.5% +GST+ cost recovery	=1.3% t.o.+1% inv+ VAT	~ 0.5 % + 3% (Tax)	15% ~ 24% + GST

Source: TRAI, 2005

Many other useful investment-related indicators..

Productivity of Capital, India vs. China

■ 2004 ■ 2005



Indicators to measure Industry structure

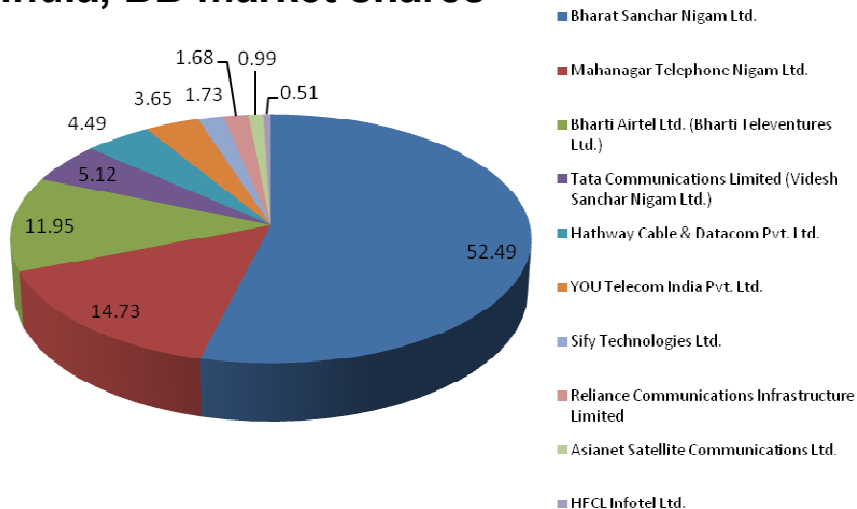
Is the industry getting more competitive? What are the bottlenecks in resources?

HHI (Hirschman Herfindahl Index) is basic measure of market concentration

- Define Market
 - Fixed? Mobile? Voice telephony (fixed and mobile)? Internet Services?
 - Identify market share of each operator M1, M2, M3....
 - Subscriber share, revenue share, minute share?
- $HHI = (M_1)^2 + (M_2)^2 + (M_3)^2 + \dots + (M_n)^2$
- US Dept of Justice says...
 - Greater than 1800 → concentrated market
 - Between 1000-1800 moderately concentrated
 - Less than 1000, unconcentrated
 - M&A activity increasing HHI by 100+ and HHI > 1800 → automatic review (etc.)

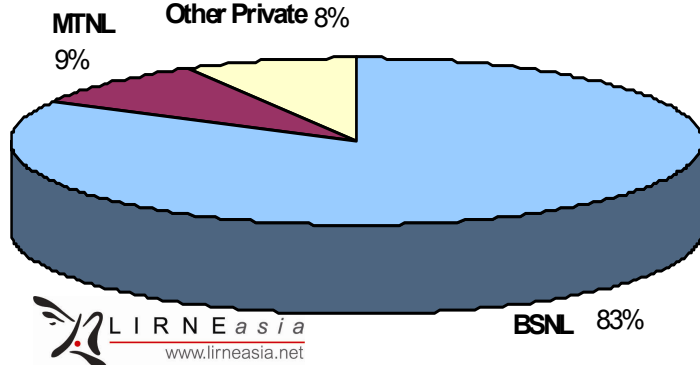
Market shares and HHI by segment

India, BB market shares

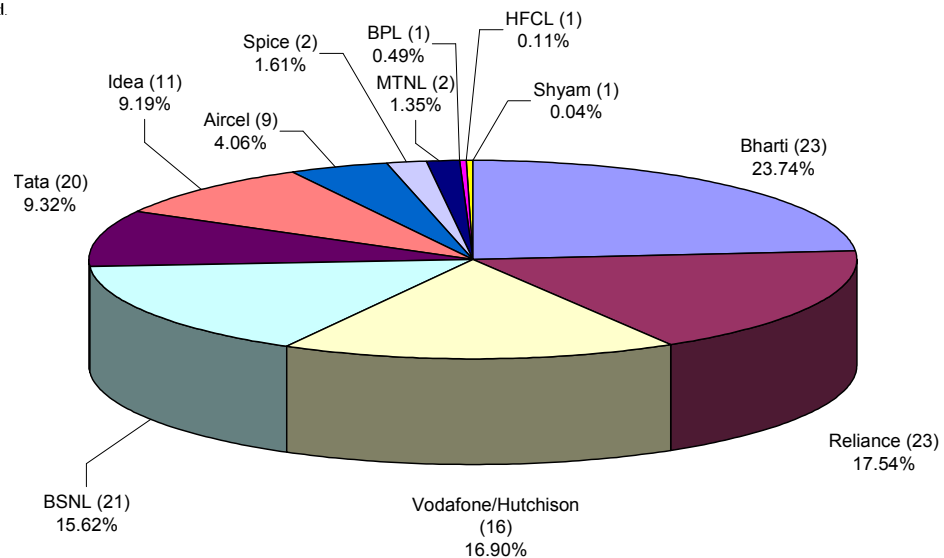


India, Mar 31 2008
 - Mobile HHI = 1593
 - BB HHI = 3171
 - Fixed HHI = 7034

India, fixed market shares



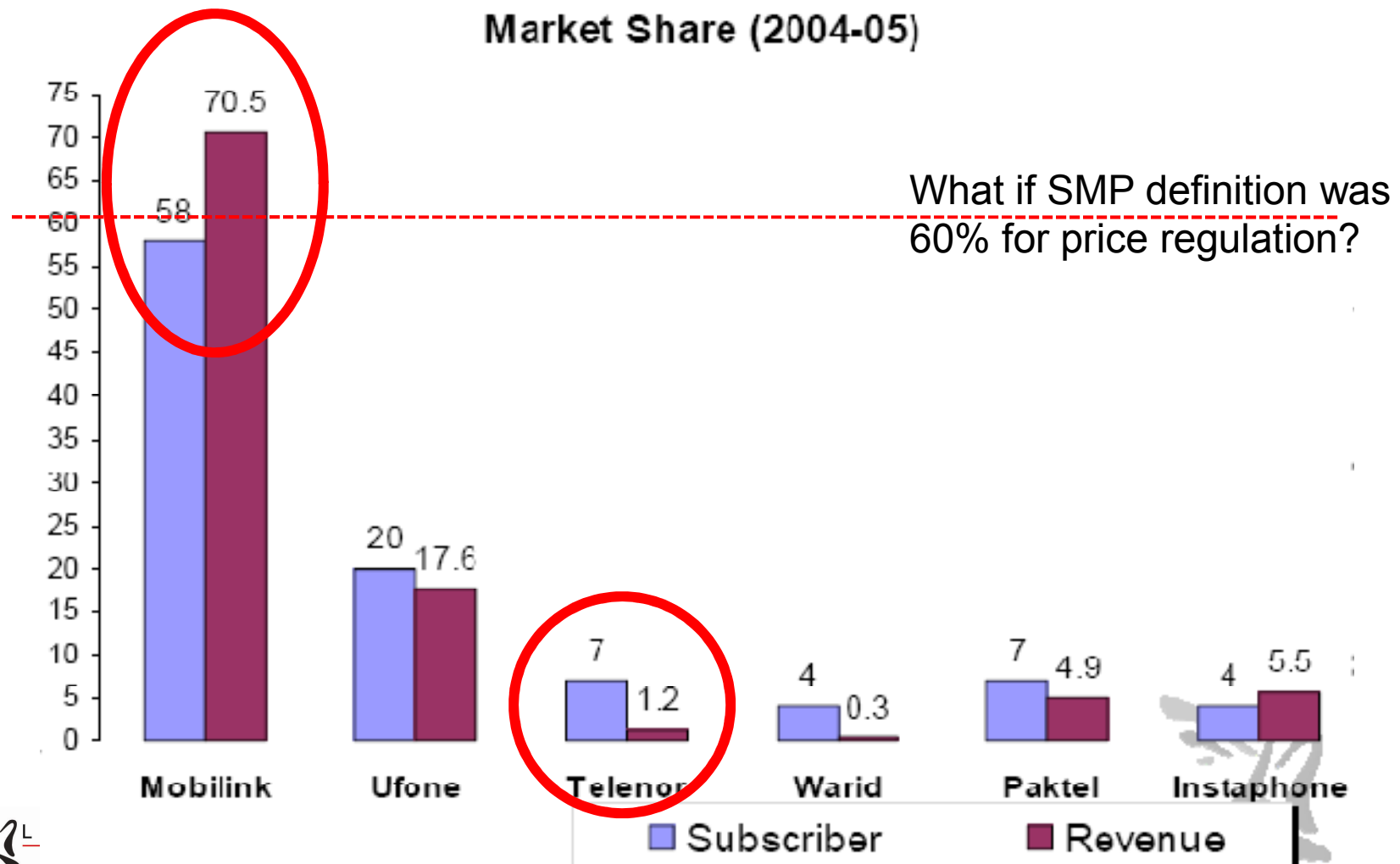
India, mobile market shares



Important to operators, not just regulators

- Investors look at company performance indicators
 - market share
- Valuations → stock prices impacted
- E.g. Investor reaction to Sri Lankan operator's loss of market share
 - “Declining share by subscribers” (analysts)
 - “But share of minutes increasing” (CEO)

Market share based on subscribers? Revenue? Minutes? Significant differences can be seen



- You should look at all three, wherever possible
- Also, market segmented by wholesale vs. retail
 - E.g., Ofcom (UK) reports wholesale (BT dominated, HIGHLY concentrated) vs. retail (less concentrated)

How are the companies doing? Revenue, profitability, margins, ratios

- EBITDA primary profitability indicator for comparison purposes
 - Tax: varies by country
 - D : varies based on accounting rules (USGAAP vs. Europe vs. ...)
 - I: varies by company (cost of capital)
- But EBT vs. pure-E allows comparison of tax distortions
- But be careful of the impulse
 - tracking profits → regulate profits

Price and Affordability Indicators

Are prices coming down or going up? Are ICT services affordable? To all people?

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

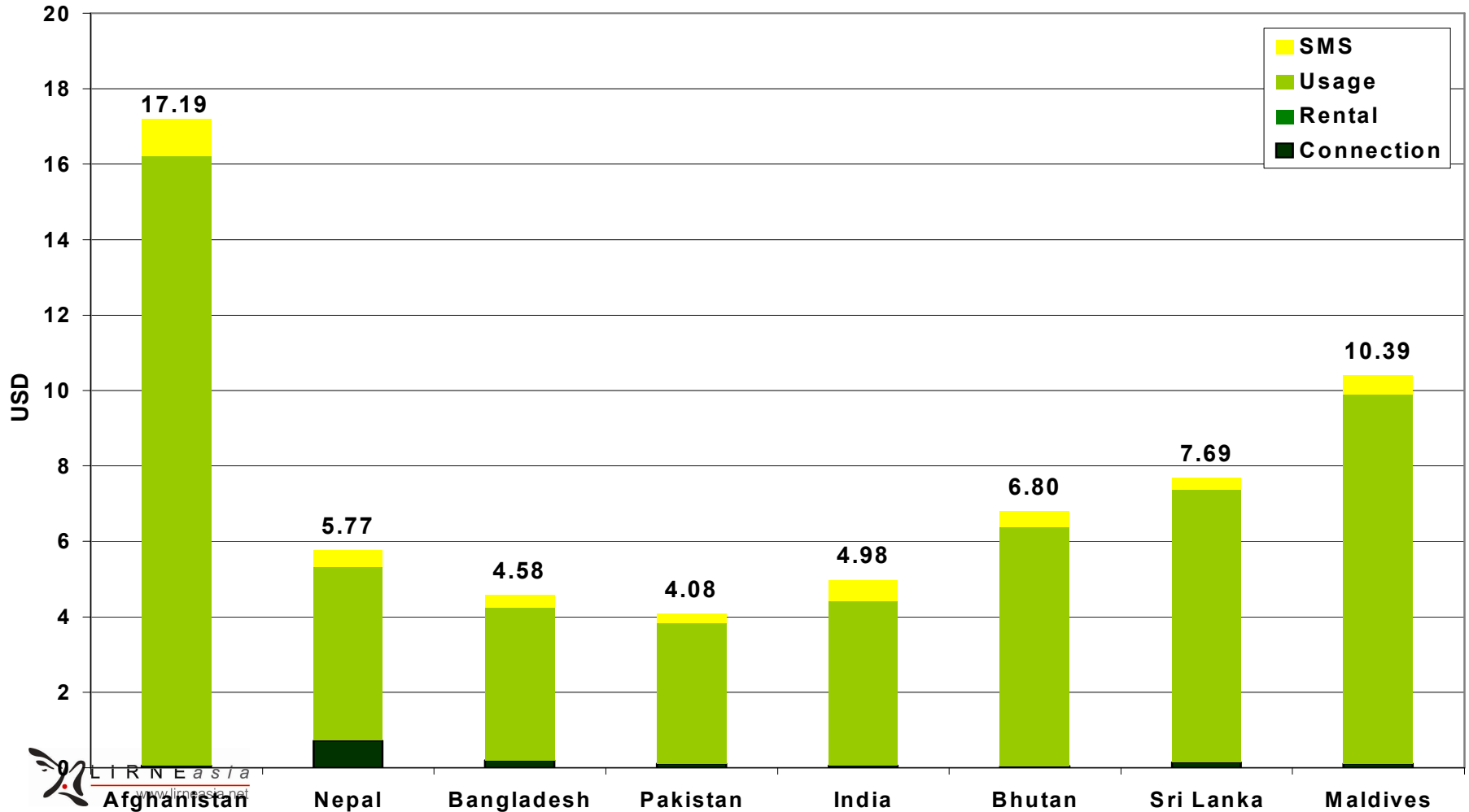
- ITU reported many micro-measures (till recently)
 - E.g., “price of a 3 minute on-net call”
- But in selecting an operator, consumers are likely to think about ALL costs
 - Connection charge, monthly charge, what’s given “free” (i.e. X SMSs per month and Y minutes per month included in package), cost 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

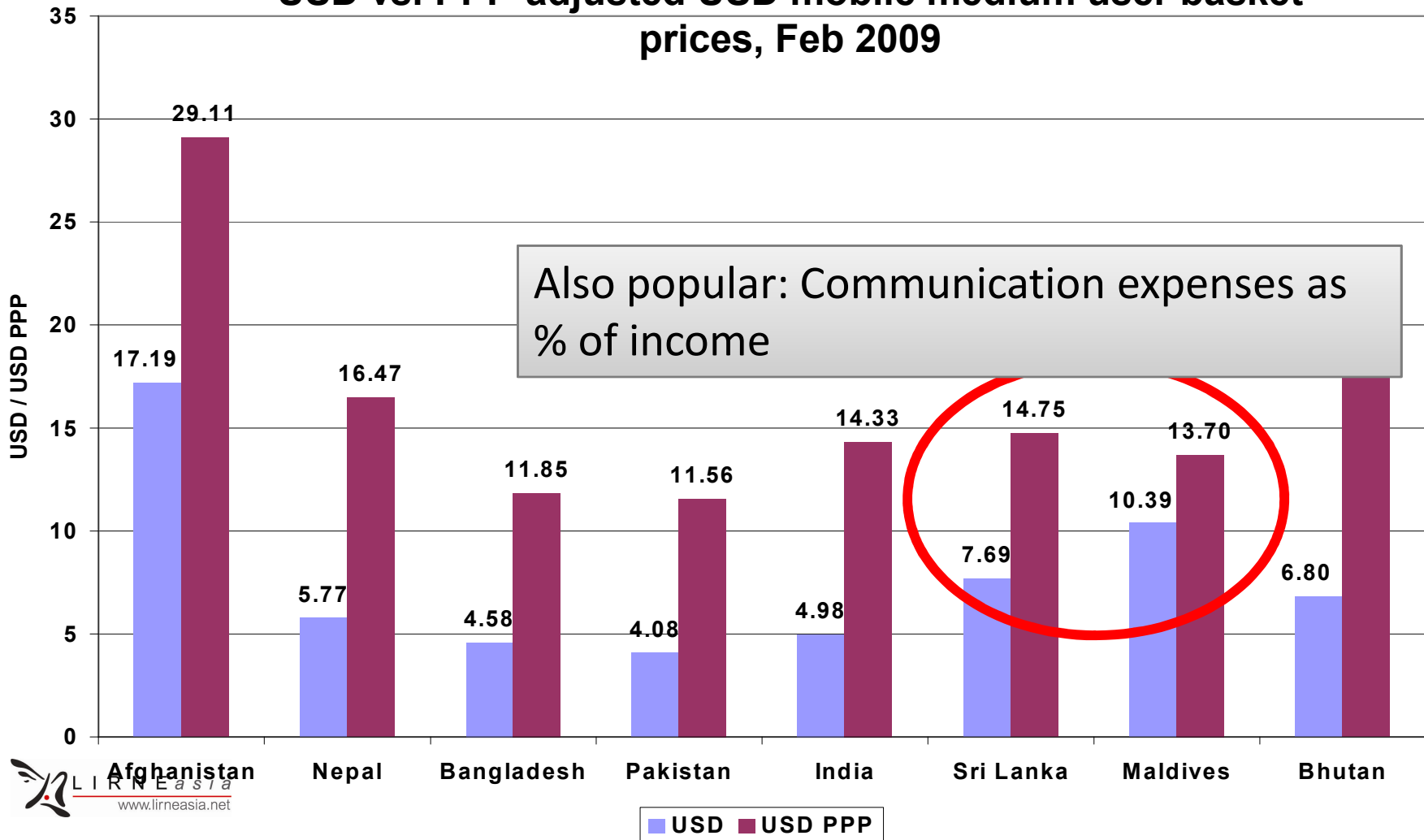


But not straightforward

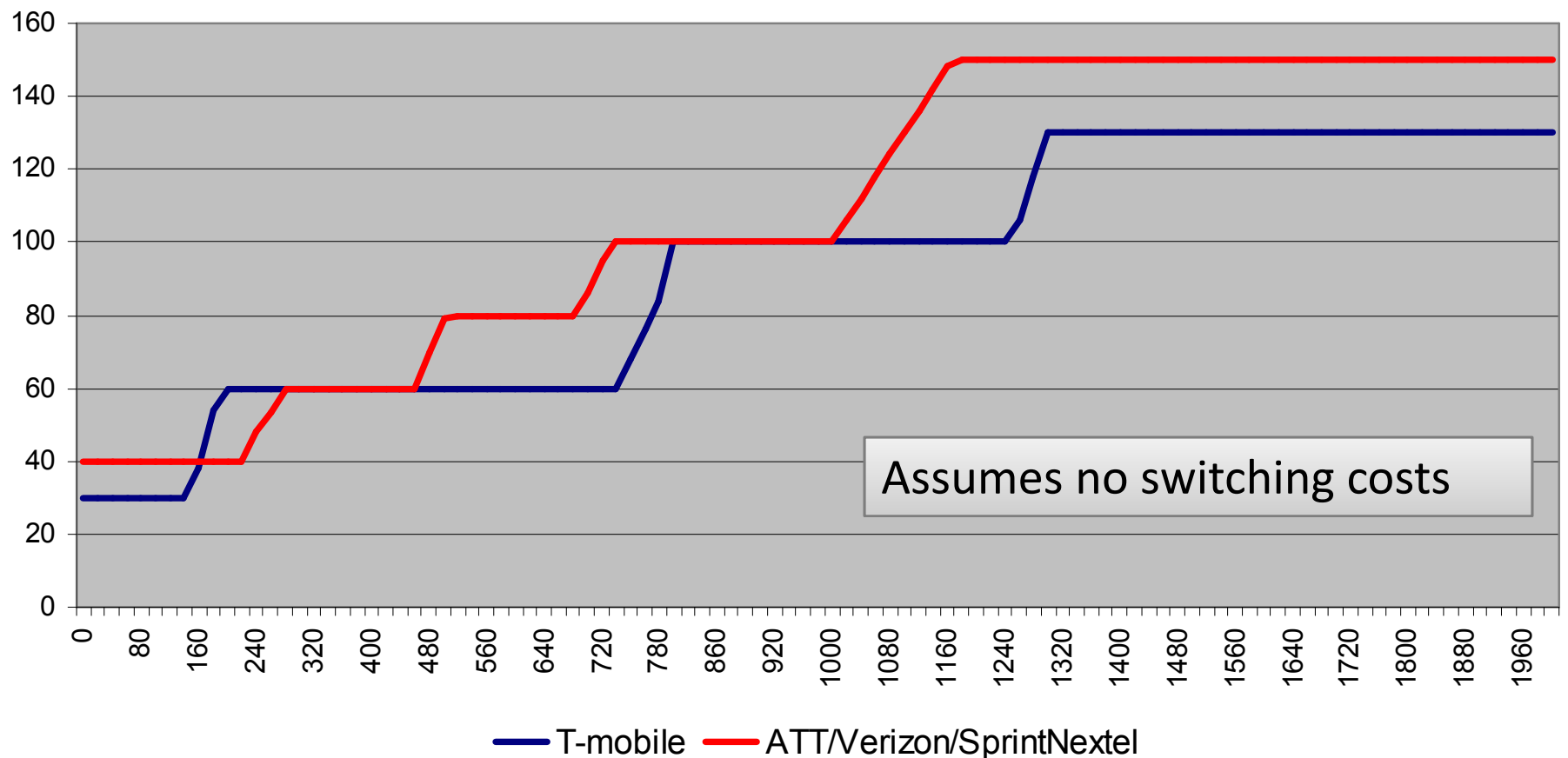
- Regional variations
 - E.g., Average minutes of use in SAARC= 164 vs OECD = 119
 - A regional basket more meaningful?
 - Or just stick to OECD
- “Average users” vary even among regional neighbors
 - Philippines vs. other SE Asian countries
- Not easy to get the data
 - Needs cooperation from operators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

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

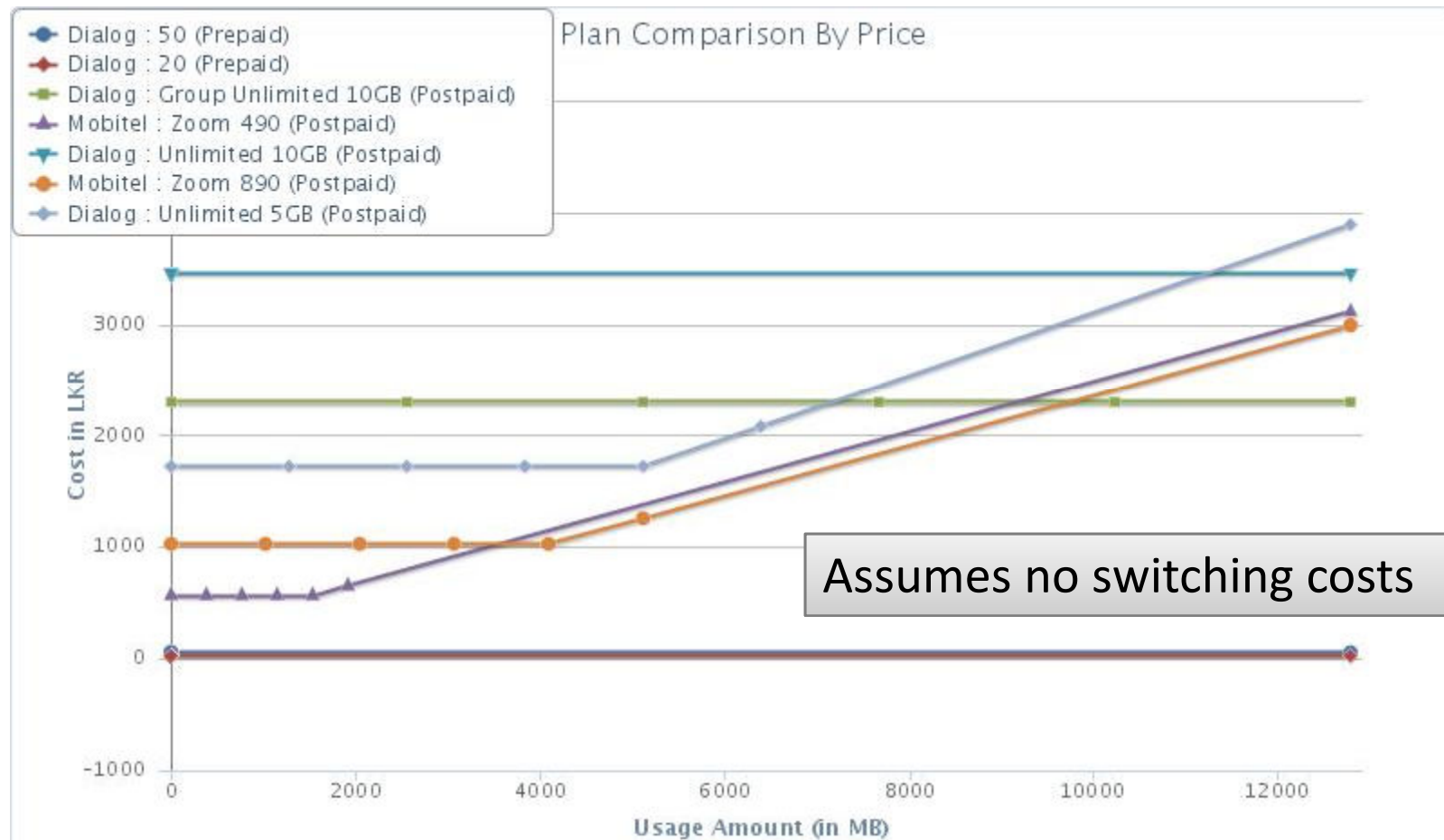
USD vs. PPP-adjusted USD mobile medium user basket prices, Feb 2009



Another Approach based on baskets: Lowest Cost Frontier (Bauer & Kim of Michigan State)

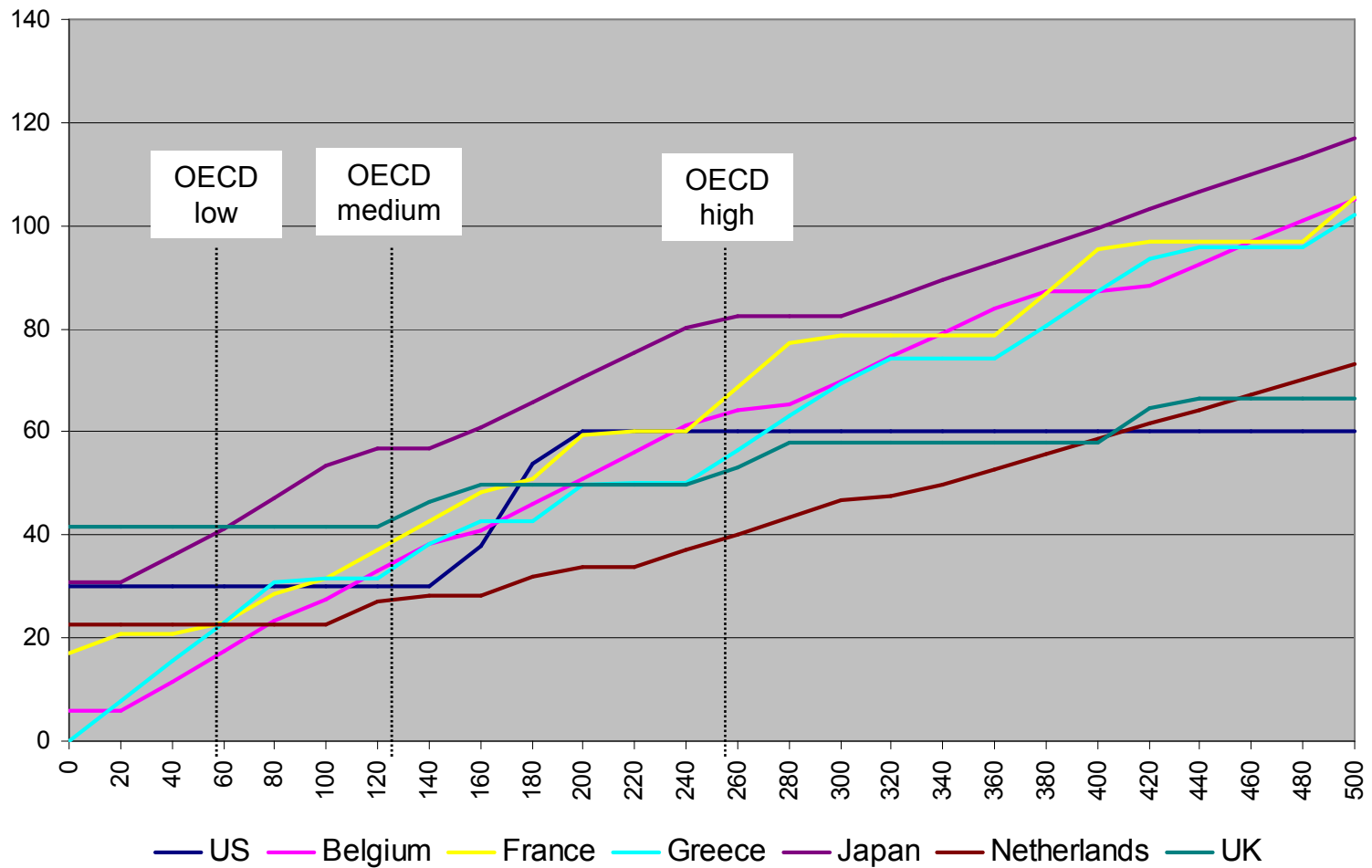


Another Approach based on baskets: Lowest Cost Frontier (Bauer & Kim of Michigan State)



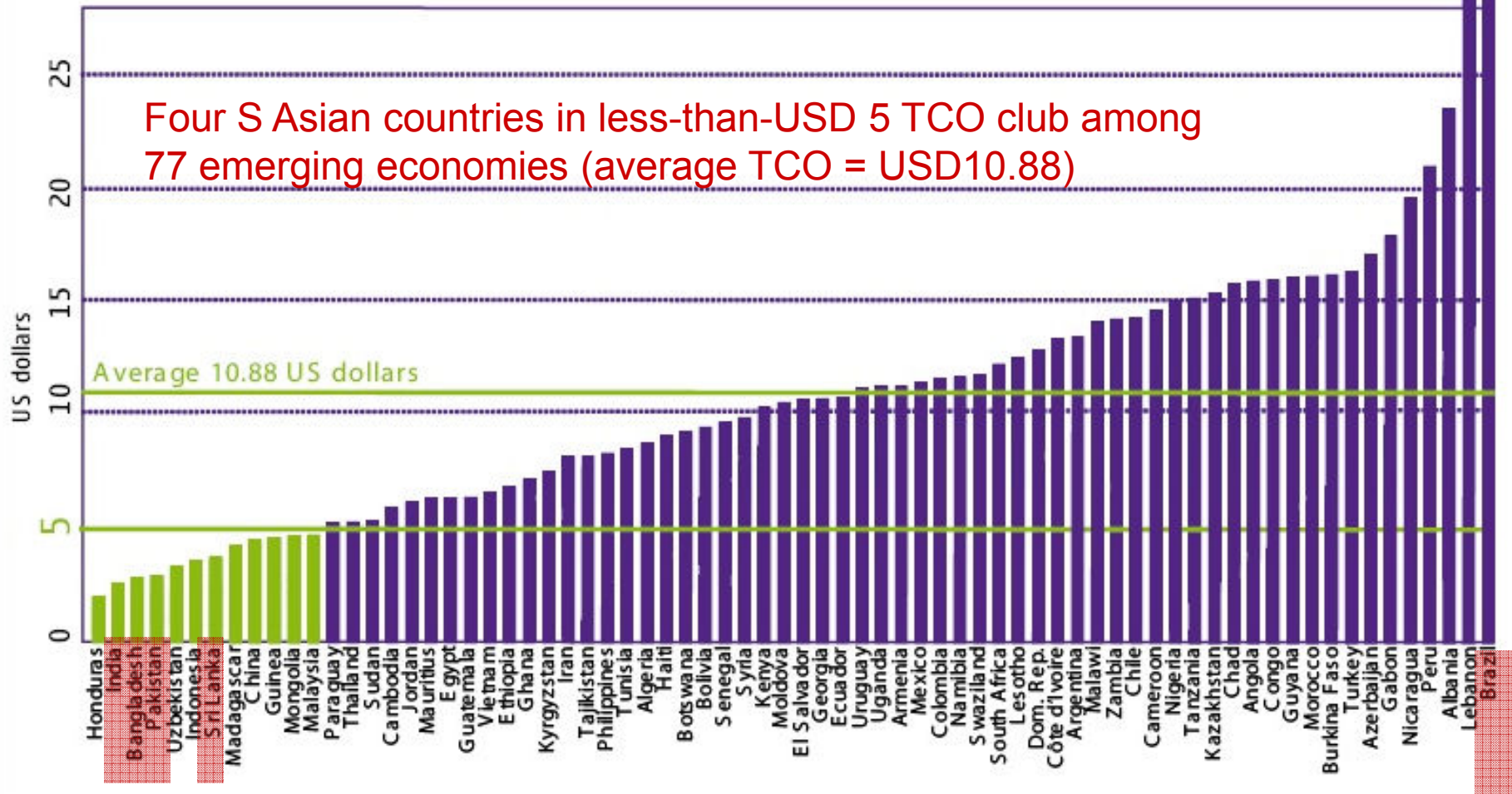
Lowest Cost Frontier. <http://lirneasia.herokuapp.com/>

2007, cross country example



Total Cost of Ownership – includes not just usage, but handset prices also (Nokia)

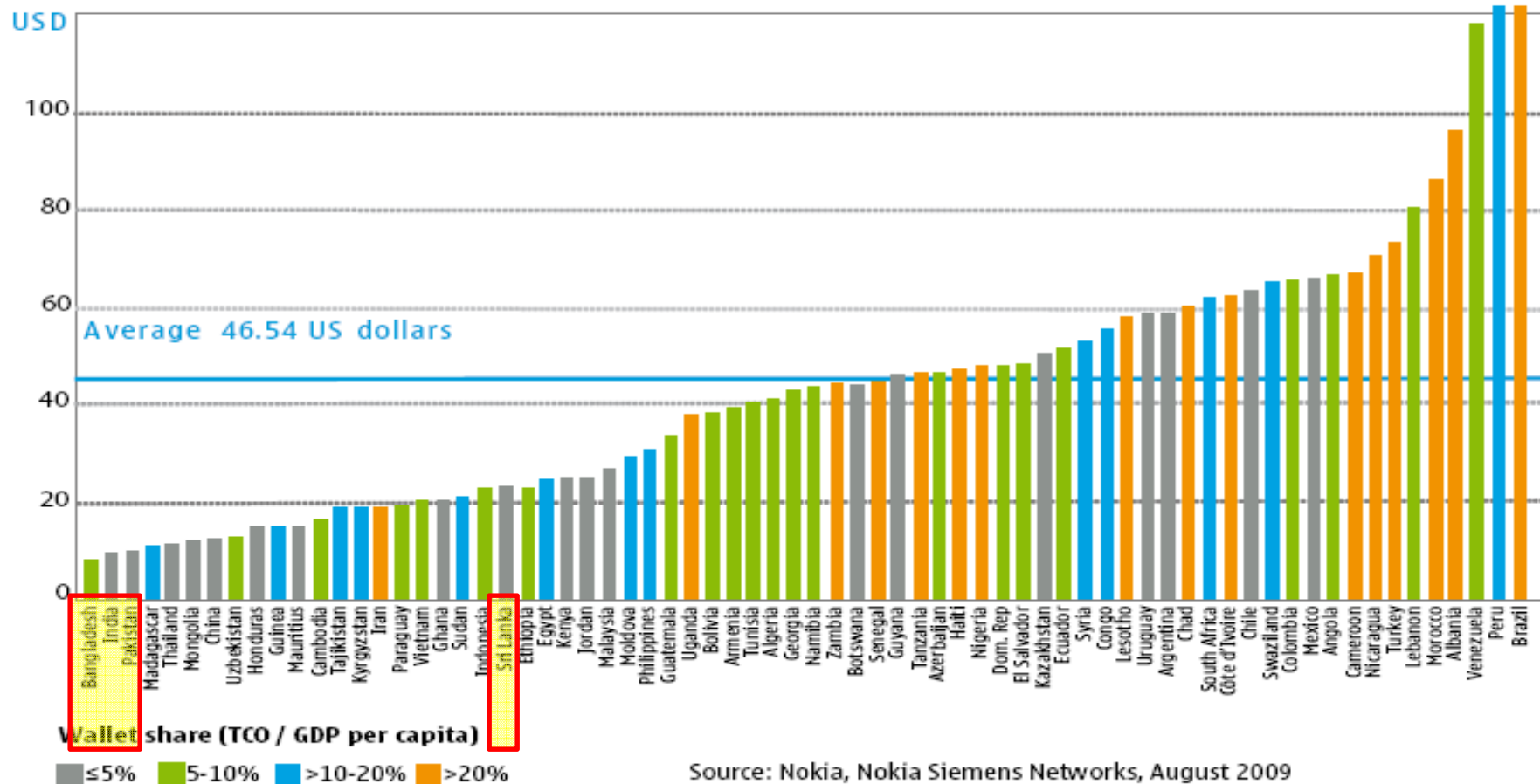
Monthly TCO by country



Source: Nokia Research 2009

Baskets for mobile data also being developed (Nokia).

Monthly mobile data TCO by country



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

Oct 2009

Table 1- Broadband Prices in Emerging Asia in USD³

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 ¹¹	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	15,065 ⁴⁶									
East Asia										
Philippines	392 ⁵⁶		753	250	199					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.iimeasia.net

When comparing prices...

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

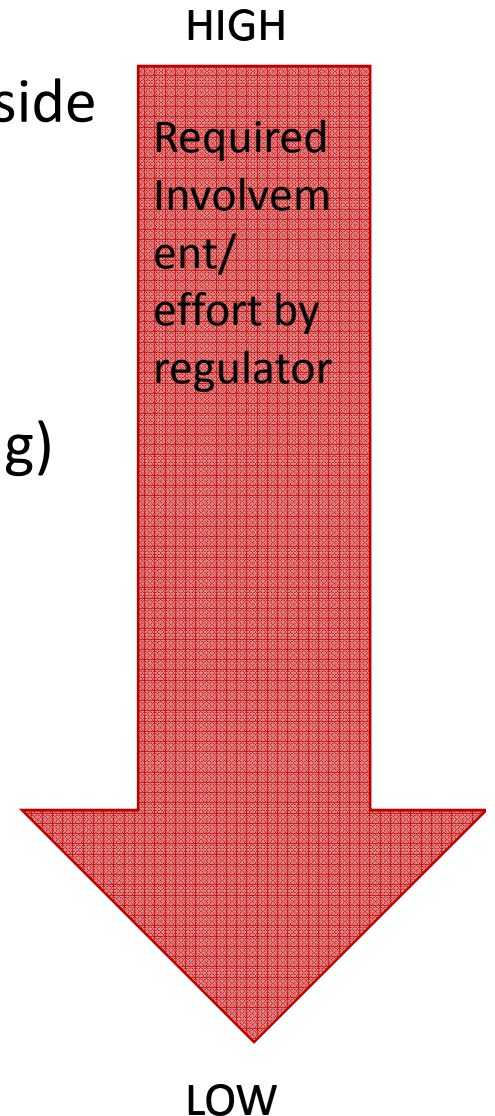
Quality of Service

Useful Indicators

- Telephony Quality
 - Waiting list for main fixed lines
 - Faults per 100 main (fixed lines) per year
 - Percentage of telephone faults cleared by the next working day
 - Call drop rates
 - Percentage of connections with good voice clarity
 - Call success rate
- Broadband Quality
 - Broadband download speed (kbps/Mbps)
 - Broadband upload speed (kbps/Mbps)
 - RTT (mili-second)- Round Trip Delay
 - Jitter (mili-second)
 - Packet- Loss (as a percentage)
 - Broadband availability (as a percentage %)

Measuring BB quality: trade offs across differing approaches

- The regulator measures, installing equipment inside operators' networks
 - cost, competency, intrusiveness
- Get operators to measure and report
 - principal-agent problem?
- Get users of BB to measure (volunteer computing)
 - Coordination and publicity costs
 - LIRNEasia approach
- Survey users and ask if they are happy with BB Quality (e.g. UK)
 - Doesn't everyone just want to be happy?
 - A real measure of quality?
 - "Anyone" can do it



Composite Indices

Many indices, varying methodologies, different rankings. Rankings depends on others

- All take multiple indicators, combine them in varying ways (assigning weights to arrive at the composite index)
 - ERI = E Readiness Index (Economist Intelligence Unit)
 - NRI = Networked Readiness Index (World Economic Forum)
 - IDI = ICT Development Index (International Telecommunication Union)
 - KEI = Knowledge Economy Index (World Bank)
- Examine individual indicators with the same care
- Question the weights (or how the final figure is arrived at)
 - Keeping in mind there's some arbitrariness involved, no matter what

	ERI (rank among 70 countries) (2009)	NRI (rank among 134 countries) (2008-2009)	IDI (rank among 154 countries) (2007)	KEI (rank among 146 countries) (2009)
Sri Lanka	63	72	100	88
India	58	54	118	109
Pakistan	66	98	127	118
Nepal	-	127	139	131
Banglades	-	130	138	138
Myanmar	-	-	119	140

Other basic data you need

Mostly supplied by the NSO

- Total Population of a country
- Number of households in a country
- Number of Urban vs. Rural Households
- Number of Urban vs. Rural population
- Average number of people per household
- GDP (often from central bank), GNI

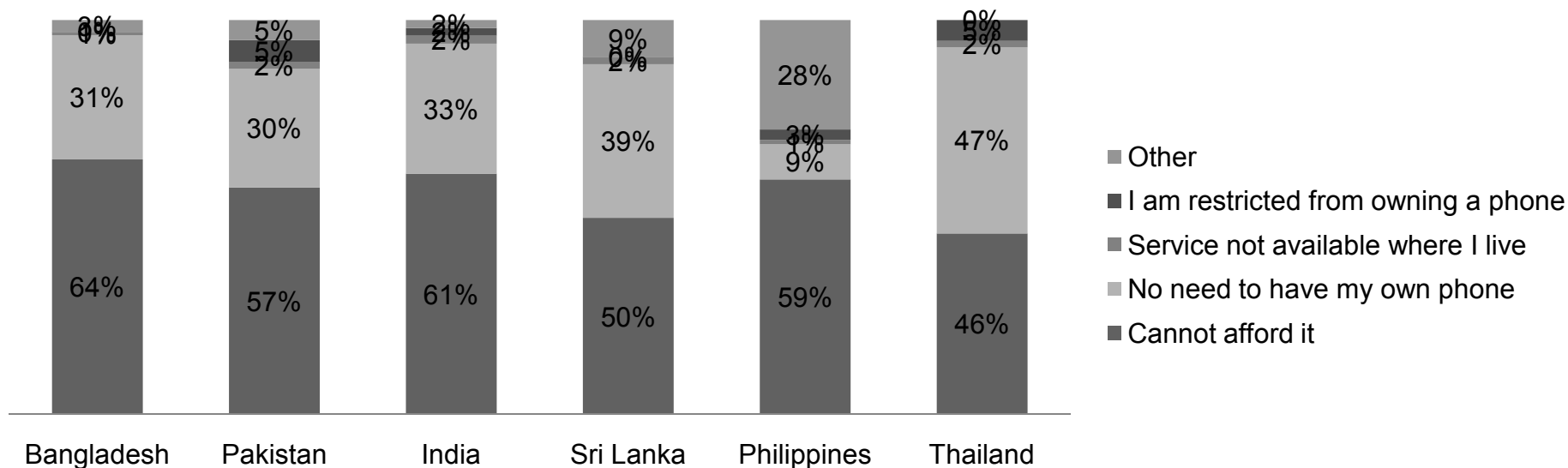
**Supply-side data alone is
insufficient**

Access is not 1 or 0; it's about how much access, who, why/why not, for what...

- We don't know how many people USE phones
 - (we only know how many SIMs are sold)
- We don't know WHAT they use the phones for
 - For voice? For internet? For agriculture prices? For ...
- We don't know WHO uses the phones
 - Men? Women? Kids?
- Similarly for internet - We don't know how many people USE computers or the internet, for WHAT, and WHO..
 - we only know how many internet connections are sold
 - With AMAZING customs control, we may know the # of computers
- Most important – We don't know why (or why not) they are using ICTs, when they use it, where, or for what?

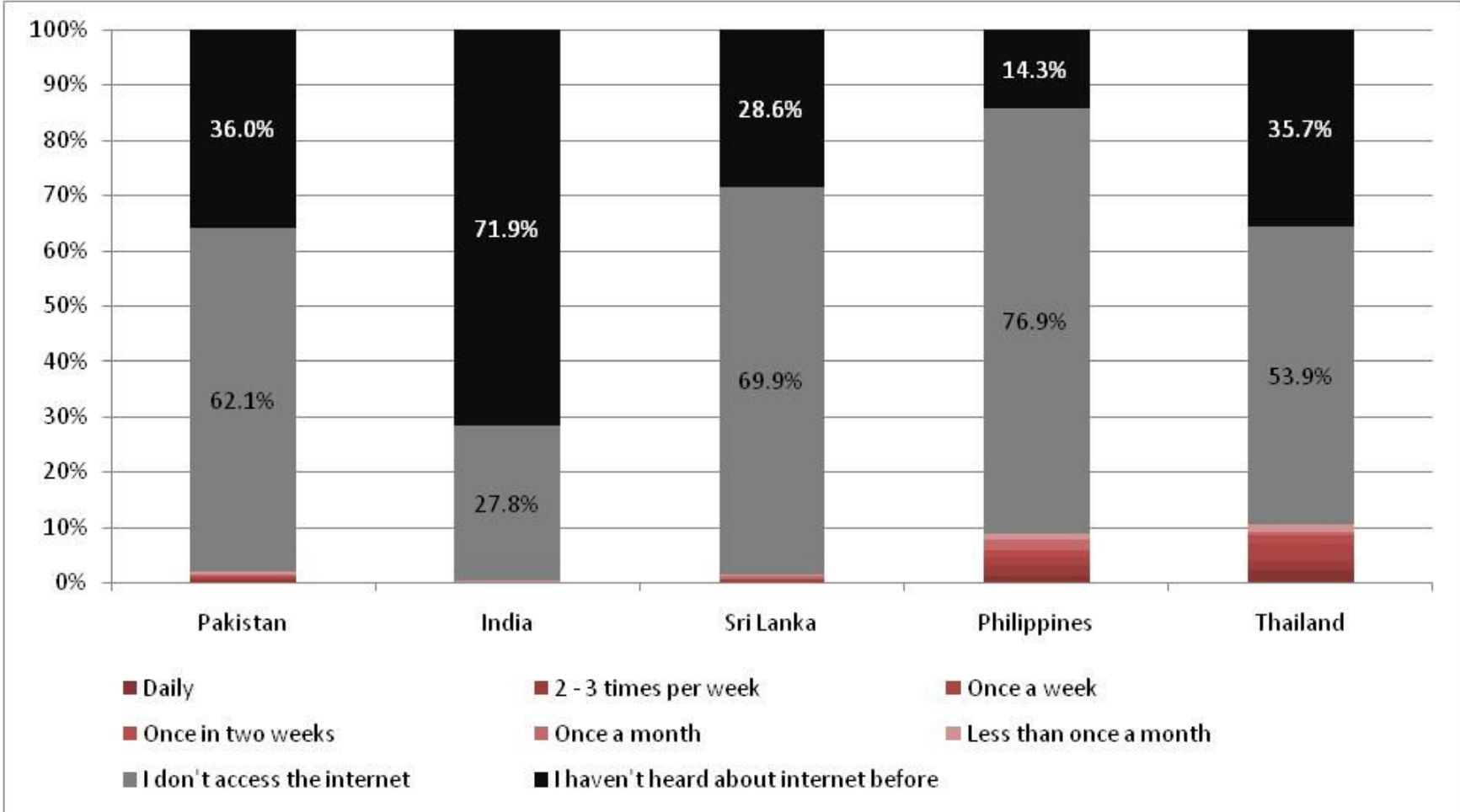
Why don't people own a phone? Answers from demand-side survey of the BOP

Primary reason for not owning a phone (% of BOP non-owner teleusers)



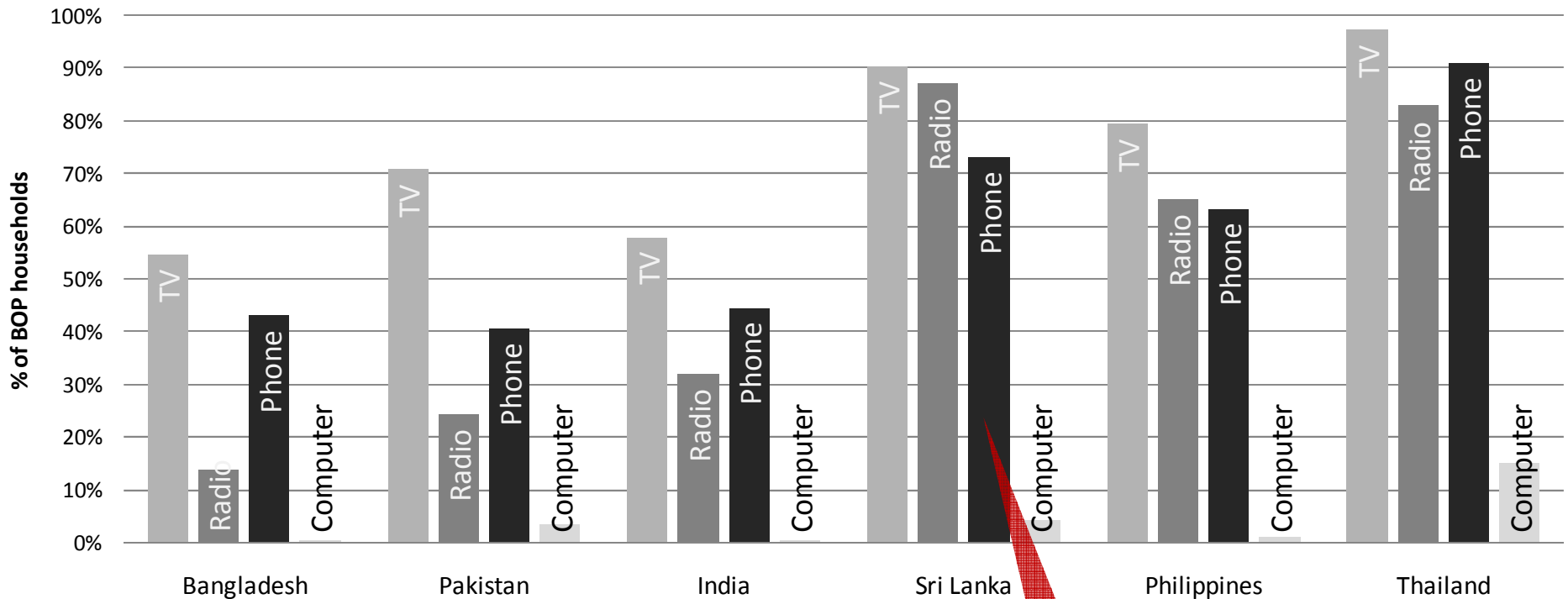
- Just 2% say that service is not available where they live → network rollout no longer an issue

Are the poor using the Internet? Answers from the demand side survey of the BOP



Is radio still the way to reach the poor?

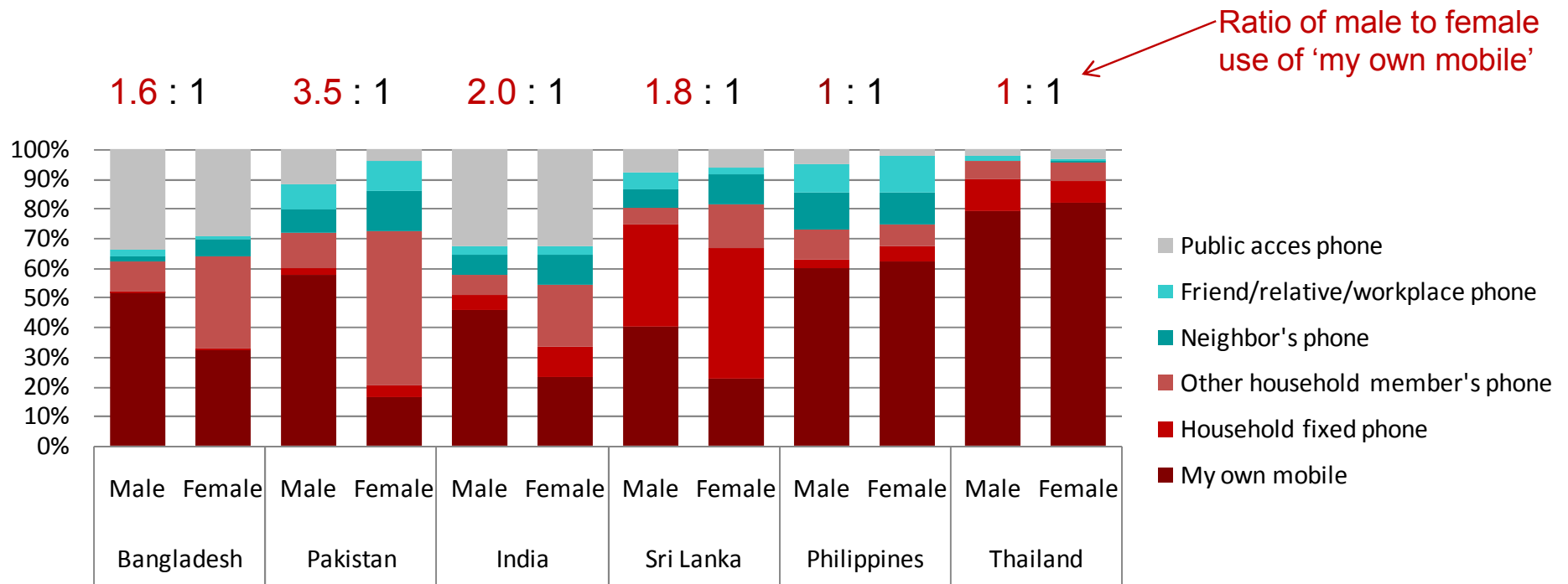
Access to communication technologies within the household (% of BOP teleusers)



Mobile
or fixed
phone

Gender divide: Sri Lankan BOP women less likely to use mobiles, more likely to use fixed phones

Most frequently used phone (% of BOP teleusers)



- Fixed phones also used more by older users in Sri Lanka

16% of BOP mobile owners have more than one (active) SIM, up from 9% in 2006

	Bangladesh		Pakistan		India		Sri Lanka		Philippines		Thailand	
	2006	2008	2006	2008	2006	2008	2006	2008	2006	2008	2006	2008
More than 1 SIM	10%	12%	23%	5%	9%	9%	16%	9%	19%	1%	13%	

Concluding thoughts

1. Supply side data tells you a lot. But don't take it at face value

- Question **EVERYTHING**
 - Definition of the indicator
 - Data collection method
 - Who is reporting the data
- Definitions not standardized
 - care when comparing countries and operators
- Where possible, triangulate with demand side data

2. Without demand side data, you only have half the picture

- Nuanced policies can only be made by understanding supply AND demand
- Demand side is even more important in understanding barriers to access
 - And designing appropriate policies
- Increasingly, demand side data is going to be MORE important than (some types of) supply side data
 - Fast changing telecom sector
 - Usage