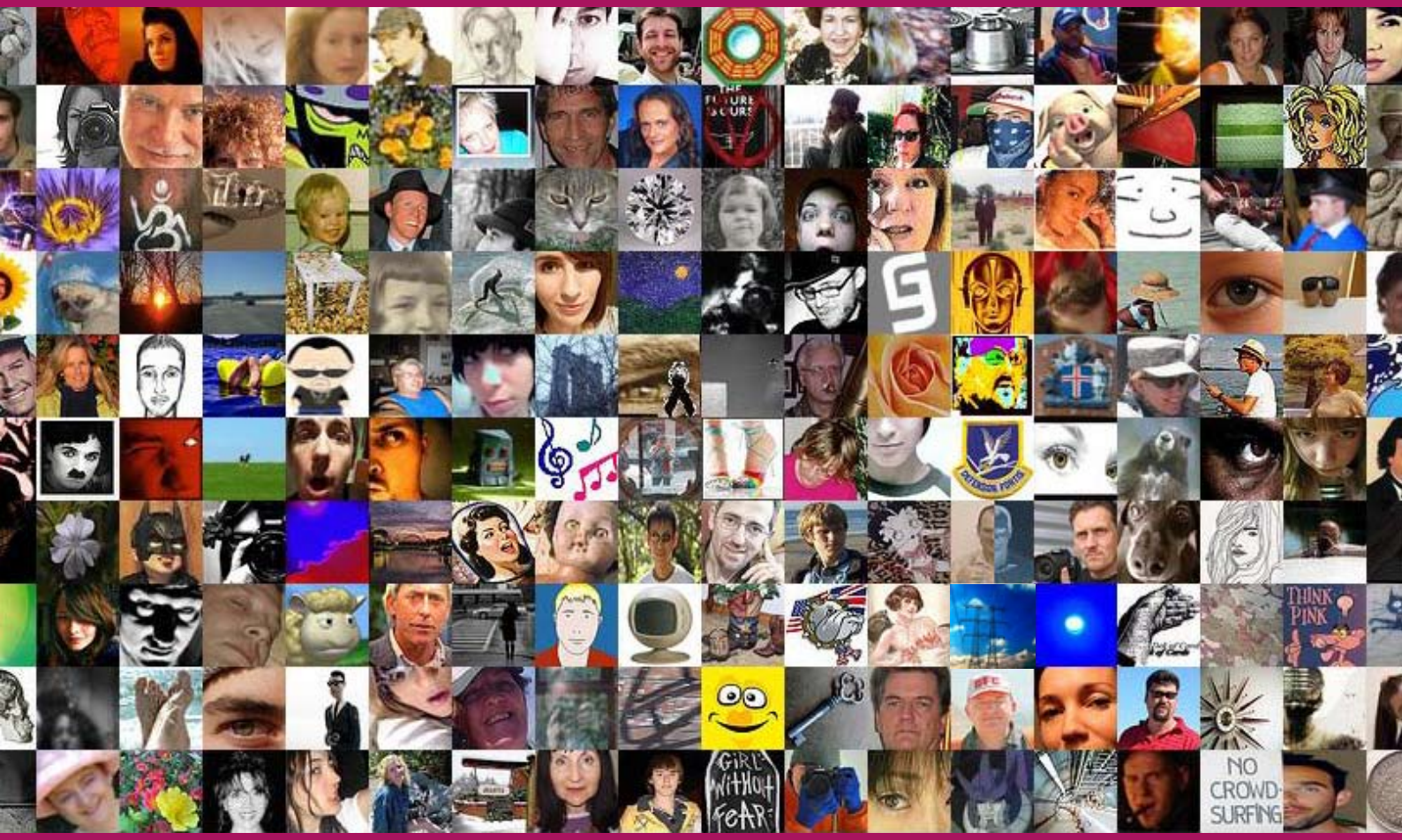


chapter two

Bridging the digital divide

2.1 Measuring the divide: Quantity or quality?

The digital divide is a familiar concept. Indeed, the earliest ITU statistics on telecommunications (published in 1871, recording data on telegraph operations since 1849) show a clear divide between the Member States of the Union, mainly within Western Europe at that time. Such gaps have narrowed and, in some cases, even reversed over time, but other disparities have arisen. This suggests that:

- The digital divide is a dynamic concept, which evolves over time;
- Older technologies tend to be more evenly diffused than newer ones. For example, TV sets are more evenly distributed than 3G mobile phones;
- There is not a single divide, but multiple divides: for instance, within countries, between men and women, between the young and the elderly, different regions etc.
- The main factor underlying these divides is differences in wealth, between countries and between individuals. While disparities in wealth continue to exist, the digital divide will persist.

Some have argued that the digital divide is not a useful concept from an analytical perspective.[1] Certainly it is true that the divide has become a political construct and has been used as an argument for advocating changes in policy or, conversely, as a reason why current policies should not be altered (in case the digital divide should widen). Nevertheless, the digital divide continues to provoke intense debate, including within the WSIS process.

2.1.1 Penetration rates by development status

The digital divide can be measured using the ratio in penetration rates between different groups of economies: for example, "developed" and "developing" economies.[2] However, these categories use UN definitions, which may not be totally up-to-date (for example, the Republic of Korea, which is ranked first in the Digital Opportunity Index (DOI), is classified as a "developing economy" by the UN). Furthermore, "developing economies" includes both emerging middle-income and least developed economies. For these reasons, more refined categories are useful. Three groups of countries may be recognized:

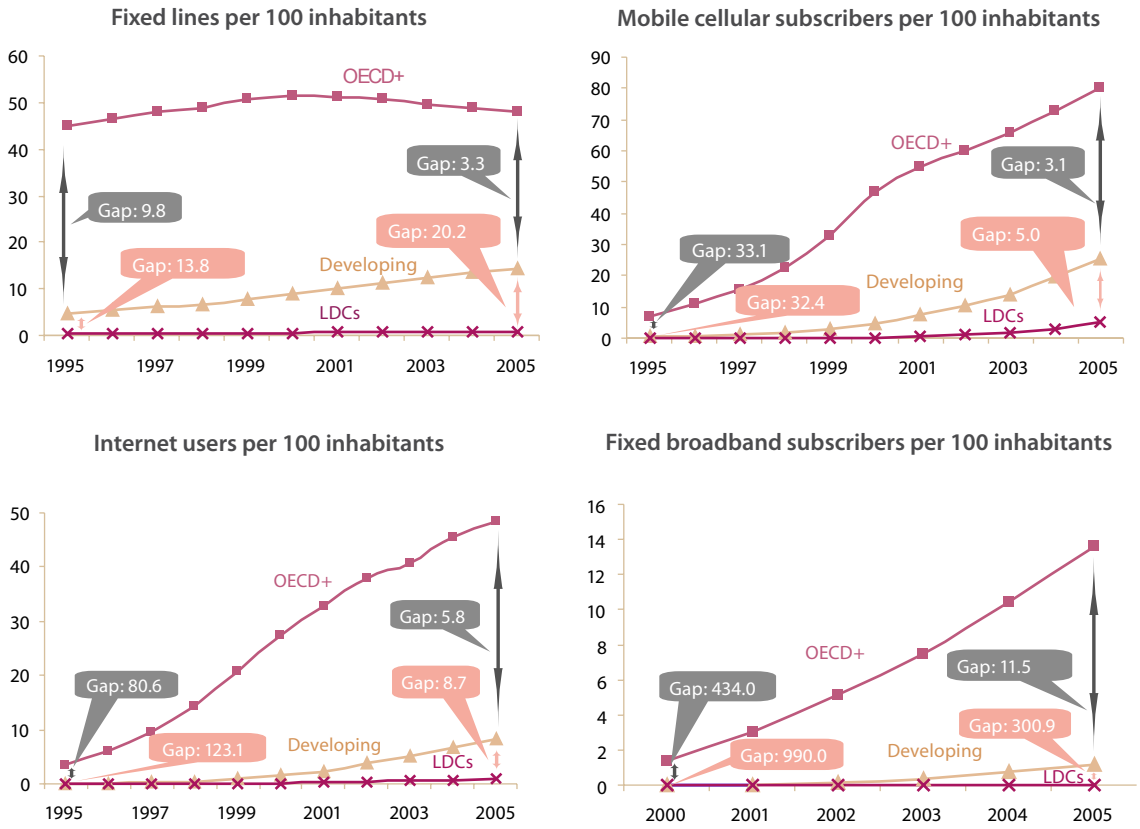
- "OECD+" includes the 30 economically advanced Member States of the Organisation for Economic Cooperation and Development (plus their dependencies) and the four Asian Tigers (Hong Kong SAR, Macau SAR, Singapore and Taiwan-China), representing 18.7 per of the world's population.
- "LDCs" are the 50 Least Developed Countries recognized by the United Nations as requiring special attention in development assistance, accounting for 11.9 per cent of the world's population.
- "Developing" includes all other economies. Notably, they include the most populous economies of India and China. They account for 69.4 per cent of the world's population.

Figure 2.1 illustrates the digital divide in four major ICTs – fixed lines, mobile cellular subscribers, Internet users and broadband subscribers – and trends over the decade from 1995-2005 (2000-2005 for broadband). The clearest evidence of the narrowing of the digital divide is to be found in fixed lines, where OECD+ economies have seen declining teledensity since 2000, while the teledensity of developing economies continues to grow. Thus, the gap in fixed lines between OECD+ and developing economies (measured by the ratio between average penetration rates) has shrunk from 9.8 in 1995 to 3.3 in 2005 (Figure 2.1, top left chart). Furthermore, the absolute difference has also shrunk (in terms of total percentage points between the averages), falling from 40.4 per cent in 1995 to 33.5 per cent in 2005. However, at the bottom of the chart, the position is not so encouraging. The gap between developing and LDCs has actually widened for fixed lines, from 13.8 to 20.2. In other words, while middle-income developing countries (led by China and India) are rapidly closing the gap in fixed line access, LDCs seem to be stagnating.

Mobile communications have grown most rapidly, especially among developing economies. In the developing economies, the number of mobile cellular subscribers rose from just 12 million in 1995 to over 1.15 billion in 2005, at a compound annualized growth rate of 58 per cent per year (Figure 2.1, top right chart). Thus, in mobile communications, the ratio between OECD+ and developing economies has been practically eradicated, falling from 33.1 to 3.1. LDCs have done well

Figure 2.1: The digital divide: Shrinking for most technologies, but growing in others

Measures of the gap between different groupings of countries in 1995, 2000 and 2005 in the penetration rates of fixed lines, mobile cellular subscribers, Internet users and fixed broadband subscribers. The gap is measured as the ratio of average penetration rates between different groups of countries in 1995 and 2005 (2000 and 2005 for broadband subscribers).



Note: "OECD+" includes the 30 Member States of the OECD, their dependencies and the four Asian tigers (Hong Kong SAR, Macao, SAR, Singapore and Taiwan-China). "LDCs" are the 50 Least Developed Countries. "Developing" refers to all other economies. This analysis is based on a total of 213 economies.

Source: ITU World Telecommunication Indicators Database.

too in mobile, growing their subscriber base by a phenomenal 93 per cent per year over 1995-2005. Indeed, among the LDCs, mobile cellular subscribers outnumber fixed lines by seven to one. ITU's World Telecommunication Development Report 2002 made a startling claim with a chapter entitled, "We've found the missing link: It's Mobile Communications". Mobile communications overtook fixed line phones in 2002 and, in the three years that followed, a further billion mobile cellular subscribers were added around the globe, mainly in the developing world.

The term "digital divide" often refers to Internet access and here, users in developed countries are much better off than their developing country counterparts (Figure 2.1, lower left chart). In 2005, half of all OECD+ citizens were Internet users, compared with just one in every twelve citizens in developing economies and one in every hundred in the LDCs. Nevertheless, even for Internet access, the digital divide has shrunk remarkably, with the ratio between OECD+ and developing economies plummeting from 80.6:1 to 5.8:1 in the past decade. Indeed, in 2005, almost twice as many new Internet users were added in developing economies and LDCs as in OECD+ economies. As OECD+ economies approach saturation at around 65-70 Internet users per 100 inhabitants, or up to 80-85 per cent of the active population[3] (see

Figure 2.2), the potential for fresh Internet growth derives mainly from the developing world.

For these reasons, the debate over the future digital divide is now moving away from inequalities in basic "quantity" and "access" to ICTs to differences in the "quality" of the user experience and "capacity", as illustrated by fixed line broadband subscribers (Figure 2.1, lower right chart). Although the ratio of broadband subscribers in OECD+ economies to developing economies has collapsed from 434 to 11.5, the absolute gap measured in percentage points has grown almost tenfold between 2000 and 2005, and this is what gives the strongest visual impression in the chart. Furthermore, broadband penetration is far from common in LDCs, with a mere thirty thousand broadband subscribers in the 24 LDCs with broadband service in 2005 (out of a total of fifty LDCs). LDC users are asked to pay extortionate rates for relatively low-speed broadband access – over US$2'000 per 100 kbit/s per month in Cape Verde, for instance, and over US$100 per 100 kbit/s per month in at least 12 other LDCs where broadband is available, compared with below 10 US cents per 100 kbit/s per month in Japan and the Rep. of Korea.

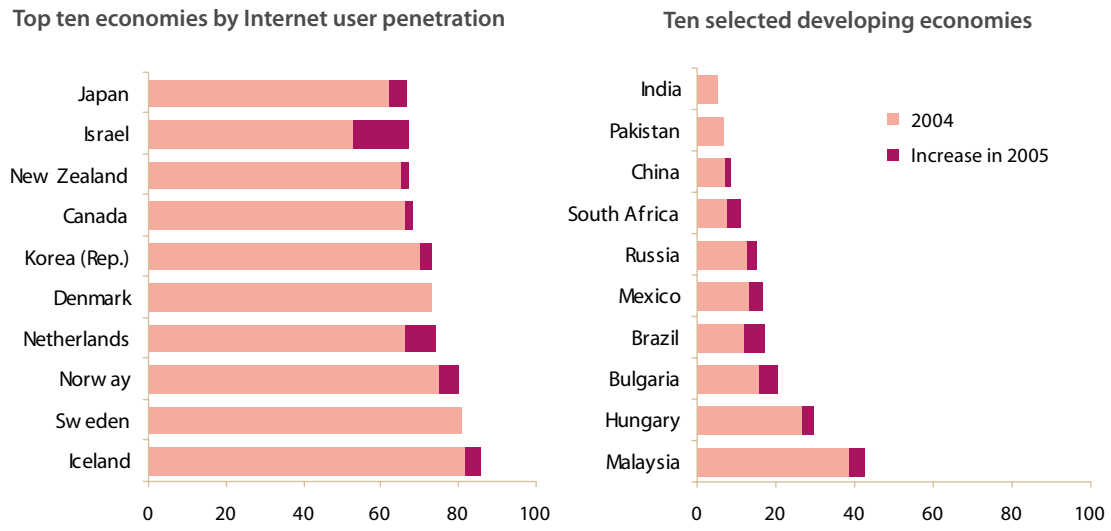
2.1.2 Penetration rates by income

An alternative approach for measuring the distribution of ICTs is based on the World Bank categories of high-, upper-middle, lower-middle and low-income states. By comparing the shares of ICTs with population, it is possible to determine whether the digital divide reflects underlying disparities in wealth or whether it is actually reinforcing them. As shown in Table 2.1, although high-income economies represent less than 16 per cent of world population, they account for almost 80 per cent of global Gross Domestic Product (GDP). Low-income economies account for over a third of world population, but just 3 per cent of global GDP.

Inequality in the distribution of ICTs is not as extreme as inequality in the distribution of global wealth (see Figure 2.3). Mobile phones are the most evenly distributed and fixed broadband connections the least. Intriguingly, among low-income countries, their largest share of global ICTs is in Internet users, with low-income countries accounting for 10.2 per cent of global Internet users in Figure 2.3, since Internet usage

Figure 2.2: What a difference a year makes in the Internet economy

Growth in Internet user penetration, between 2004 and 2005. Among the top ten economies, penetration increased by an average of 7 per cent, while among developing economies, it increased by 27 per cent or three times as much.



Note: In the left chart, estimates are based on user surveys and may be expressed as a percentage of the active population, i.e., in a particular age group (e.g., for Iceland, it is as a percentage of the 16-74 age group). For the right chart, since survey data is not available for all economies, the penetration rate is expressed as per 100 inhabitants.

Source: National statistical offices and ITU World Telecommunication Indicators Database.

Table 2.1: Distribution of population and GDP by income group

Income group	Number of economies 2005	GDP per capita US$, 2005	Population millions 2005	Population % 2005	Total GDP % 2004
High	55	29'434	1'013.3	15.7%	79.9%
Upper-middle	39	4'344	584.8	9.0%	6.7%
Lower-middle	54	1'521	2'479.1	38.3%	10.1%
Low-middle	58	503	2'396.3	37.0%	3.2%
World	206	5'768	6'473.5	100.0%	100.0%

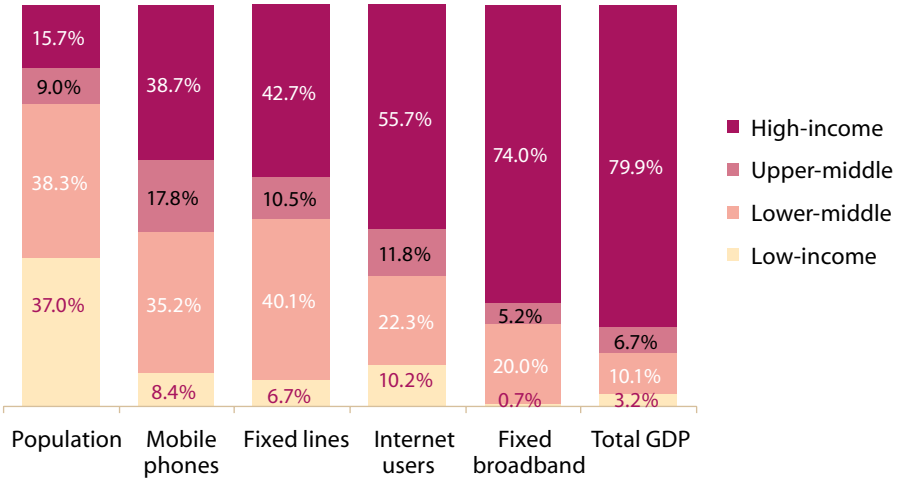
Note: Population and income data are for year-end 2005, GDP data relate to year-end 2004

Source: ITU World Telecommunication Indicators Database.

in low-income countries includes many forms of communal access (e.g., through schools or tel-ecentres – see Chapter 6, Section 6.2.1). Overall, mobile phones are more evenly distributed than fixed line telephones, given that, at the end of 2005, there were 1.7 mobiles for every fixed line. However, surprisingly, fixed lines are more evenly distributed than mobile phones in lower-middle income economies, reflecting a few economies – mostly transition economies, such as Armenia or Turkmenistan – where fixed lines still outnumbered mobile phones at the start of 2006.

Some 74 per cent, or nearly three-quarters, of broadband subscribers worldwide were located in high-income countries in 2005 (Figure 2.3), which accounted for just 16 per cent of world population. Furthermore, two economies – India and Vietnam – accounted for 94 per cent of all broadband subscribers in low-income countries, while a single economy – China – accounted for 87 per cent of broadband subscribers in the lower-middle income group (Figure 2.6, left chart).

Figure 2.3 : Distribution of major ICTs by income group of economies

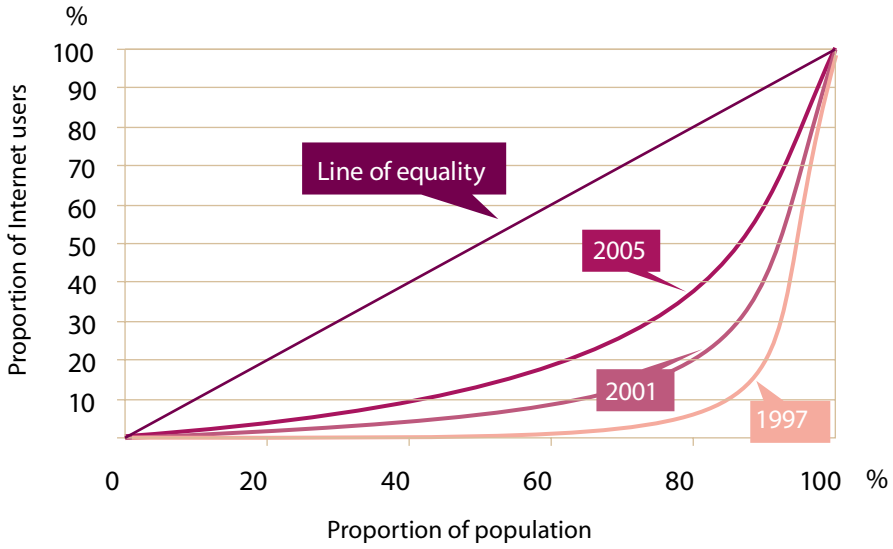


Note: Population data and ICT data are for year-end 2005, GDP data relate to year-end 2004.

Source: ITU World Telecommunication Indicators Database.

Figure 2.4: Narrowing of the digital divide in Internet usage, 1997-2005

Growing equality in the worldwide cumulative share of Internet users in 1997, 2001 and 2005.



Source: UNCTAD, adapted from ITU data.

2.1.3 Measures of inequality

Inequality in the distribution of goods and services can also be analyzed using mathematical techniques, such as the Lorenz curve and Gini coefficient.[4] A Lorenz curve for Internet users is illustrated in Figure 2.4. If the rate of Internet usage were the same across nations, the Lorenz curve would be a 45-degree diagonal line, matching the world distribution of population. The Gini coefficient summarizes the Lorenz curve in a single number, the ratio of the area between the Lorenz curve and the diagonal to the total area under the diagonal. Perfect equality yields a Gini coefficient of zero (e.g., where everyone is an Internet user, so the distribution of Internet users and diagonal of equality coincide) and perfect inequality gives a Gini coefficient of one (e.g., where a single individual has the only Internet access in the world). Figure 2.5 shows the trend of growing equality over time with Gini coefficients for several key ICTs.

In 1997, the lower 80 per cent of the world's population situated mainly in developing countries accounted for only around 5 per cent of Internet users. The Lorenz curves for 2001 and 2005 are above those for 1997, indicating increasing equality with time. Indeed, in 2001, 80 per cent of the world's population accounted for nearly one fifth of all Internet users, but by 2005, they accounted for just over a third of all Internet users.

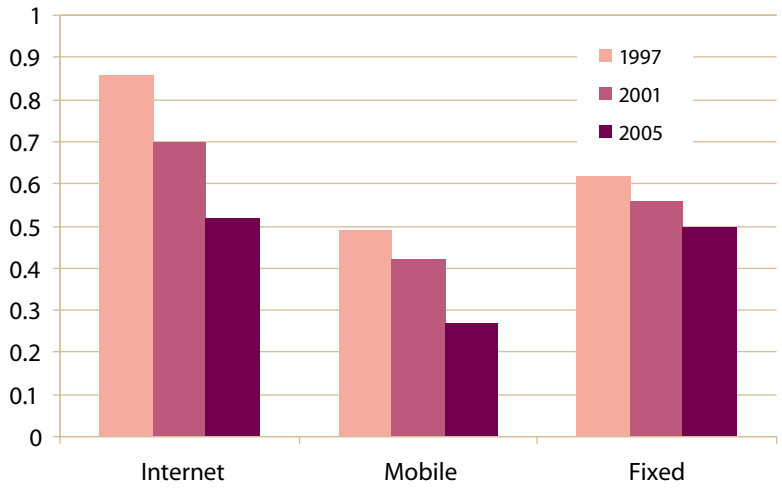
Gini coefficients have declined during this period, indicating increasing equality. The biggest drop has been seen in mobile access, with mobile subscriptions becoming more widespread. By 2008, one half of all the world's inhabitants are expected to have access to a mobile phone. Mobiles are the most equally distributed ICT, with a Gini coefficient of 0.27 at the end of 2005. This is not surprising, given that a basic mobile telephone is easy to buy and cheap and does not need the same, advanced literacy skills as Internet access. In contrast, the Gini coefficient for fixed lines has not fallen as much, as growth in fixed lines has been more sluggish. In developed nations, the number of fixed lines is dropping as consumers switch to broadband (negating the need for an extra dial-up line – see Chapter three) and mobile. In developing nations, consumers are opting for mobile as their main, and often only, phone.

2.2 Connectivity

Analysis of international differences in broadband prices reveals one underlying cause. A broadband connection in a high-income economy costs, on average, around US$16 per 100 kbit/s of data transmission capacity per month (and in Japan and the Rep. of Korea, even less at under 10 US cents per month). The average price in low-income economies is more than US$186

Figure 2.5: Gini coefficients for ICT services

Growing equality over time in the global distributions of Internet users, mobile and fixed lines, for 1997, 2001 and 2005.



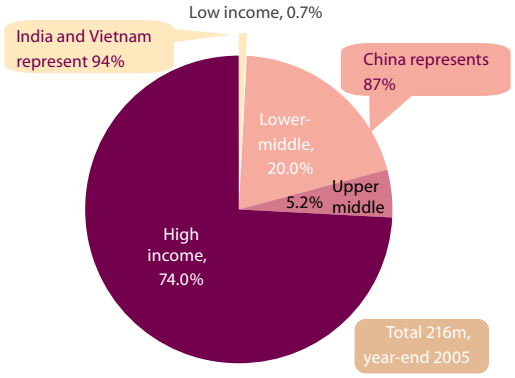
Source: UNCTAD, adapted from ITU data.

per month, almost twelve times more (Figure 2.6, right chart). Furthermore, in terms of affordability (or price relative to monthly income), the gap between high- and low-income economies is a staggering ratio of 432. Consumers in a high-income economy spend only 2 per cent of their average monthly income on broadband connectivity, whereas in a low-income economy, even the cheapest broadband offering costs more than 900 times average income.[5]

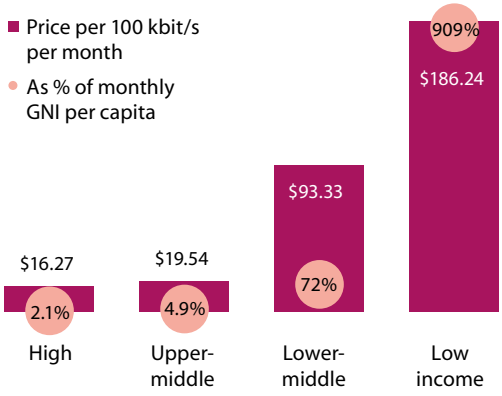
These differences in price are due to structural and economic reasons in both access and wholesale markets. Low-income countries are less likely to have infrastructure-based competition in their broadband markets, whereas many high-income

Figure 2.6: Broadband inequality … and its cause

Distribution of fixed broadband subscribers, by income group, 2005



Broadband prices and affordability, by income group, 2006 (in USD per month)



Source: ITU World Telecommunication Indicators Database, UNCTAD and "ITU Internet Report 2006: digital.life"

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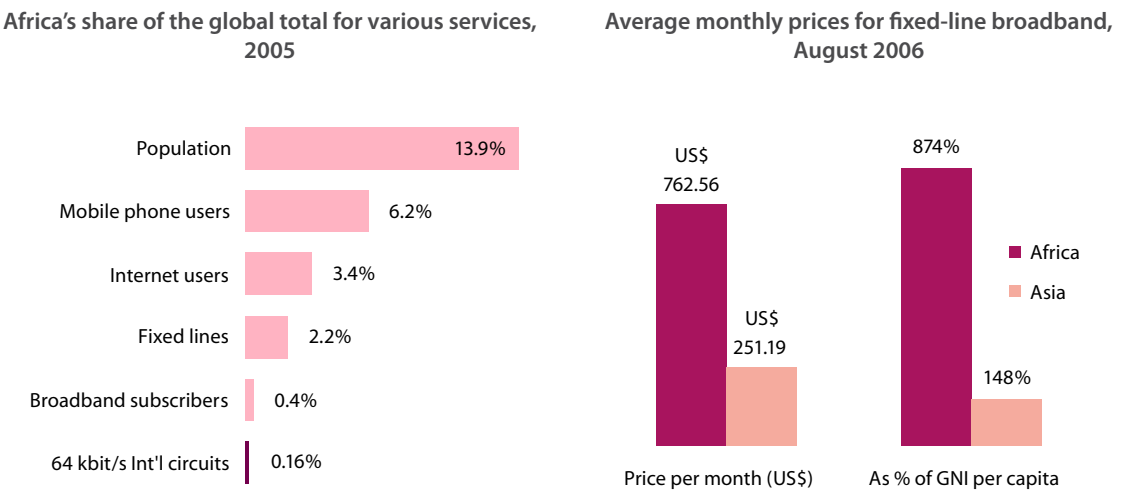
countries have markets that are open to competition from both cable modems and DSL, as well as fibre, satellite, metro Ethernet, fixed wireless access etc (see the discussion of ICT growth strategies in market and regulatory reforms in Chapter four).

In the wholesale market, low-income countries also suffer from a lack of supply. The major reason for the shortage of international bandwidth in developing nations is cost. The small size of Internet markets in many low-income countries means that economies of scale in discounted bulk purchases of international bandwidth are not available. Some developing nations are landlocked or, even if they have sea access, they may not have access to submarine fibre optic cables. They must rely on satellite connectivity, which can be more expensive and provide less capacity. Another reason for high costs is the difference in payment arrangements for Internet connectivity compared to voice telephone traffic. For voice telephony, developing countries receive income for terminating calls. For Internet, developing countries must pay the full costs of the connection to developed countries, where most content originates.

Take the case of the market for wholesale Internet capacity in Africa, for example. Data for 2005[6] show that Africa accounted for a total of 19'512 international circuits (i.e. 64 kbit/s circuit equivalents) or just 0.16 per cent of the global total of 12.2 million international circuits, compared with nearly 14 per cent of world population. Indeed, Africa has fewer international circuits than Ireland, despite the fact that Africa has more than 200 times as many inhabitants. Furthermore, as shown in Figure 2.7 (left chart), Africa's lack of connectivity is even more stark compared to the rapid progress it has made in other ICTs: for example, in expanding its Internet user base, where Africa accounts for 3.4 per cent of the global total, or mobile phone ownership, where Africa accounts for 6.2 per cent of the world's mobile phones.

This lack of connectivity means that African Internet users are starved of bandwidth, which translates into higher prices and slower connection speeds. For example, a sample of representative offers for broadband service in Africa (on the basis of 100 hours per month or 1 Gigabyte of data per month) costs on average US$745 per month, more than three times the average for Asia (and nearly six times higher, expressed as a percentage of GNI per capita - see Table 11 in the Statistical Annex). Higher prices for basic services choke demand and reduce incentives for investment. Furthermore, higher prices for fixed line-bandwidth are also evident in higher cellular mobile prices, which are, on average, 24 per cent higher in Africa than in Asia (see Table 7 in the Statistical Annex).[7] Although mobile phone users do not directly use

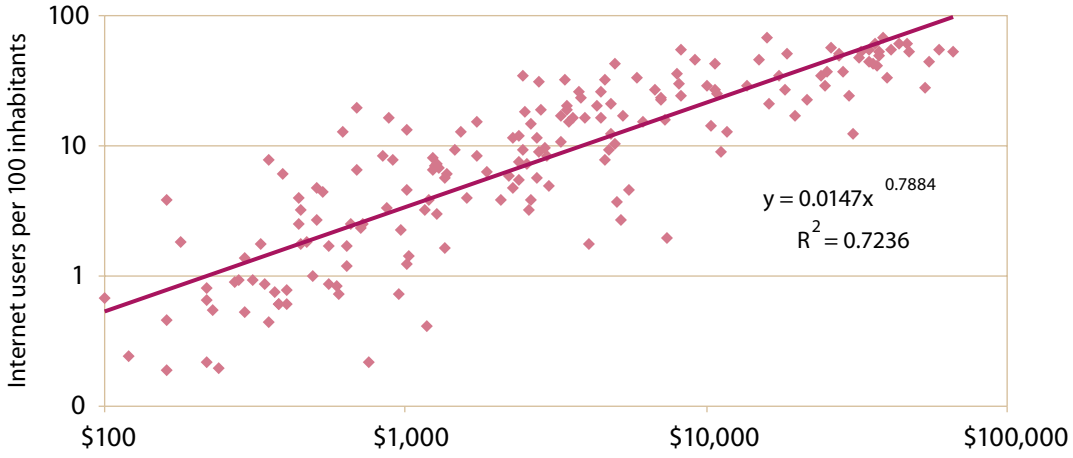
Figure 2.7: Bandwidth scarcity and its consequences in Africa



Note: In the right chart, the price sample is based on the 22 African economies that had fixed-line broadband service at the end of 2005. The average value is inflated, since in a high proportion of the economies in this sample, broadband is offered through leased lines and is priced as a business service, rather than for residential users.

Source: ITU World Telecommunication Indicators Database.

Figure 2.8: Relationship between Internet user penetration and Gross National Income per capita, 2005



Logarithmic scale.

Source: ITU/UNCTAD/KADO Digital Opportunity Platform, adapted from ITU World Telecommunication Indicators Database.

fixed-line bandwidth, it is still an important cost component for mobile operators, especially where the fixed-line incumbent still has a monopoly over international communications. However, not all African economies have a gloomy outlook for high-speed Internet access. One African nation that is forging ahead with investment in broadband infrastructure is Rwanda (Box 2.1), while Morocco and Senegal are introducing higher-speed Internet access (see Boxes 3.1 and 3.2 in Chapter three).

Table 2.2: ICT affordability by income group of economies, 2006

Income group	Monthly basket of Internet use		Monthly basket of fixed broadband use		Broadband Prices (USD per 100 kbit/s)	
	USD	% monthly per capita income	USD	% monthly per capita income	USD per 100 kbit/s	% monthly per capita income
High	$22	0.9	$15	0.7	$16	2.1
Upper-middle	$22	4.9	$12	2.6	$19	4.9
Lower-middle	$24	19.7	$11	7.6	$93	71.8
Low	$44	172	$13	54.9	$186	909
World average	$29	55.2	$13	18.3	$72	225.1

Methodological Note: The Internet basket is based on 10 hours of peak rate and 10 hours of off-peak use. Where applicable, telephone usage charges are included, but not the monthly rental of the telephone line. The mobile basket is based on the OECD low-user definition. Averages are not weighted, with each county in the income group having equal weight. For broadband tariffs, the price is calculated as the cost of 100 kbit/s broadband access per month based on a selection of representative offers for 100 hours per month (time-based packages) or 100 Mbit/s data download (for content-based packages).

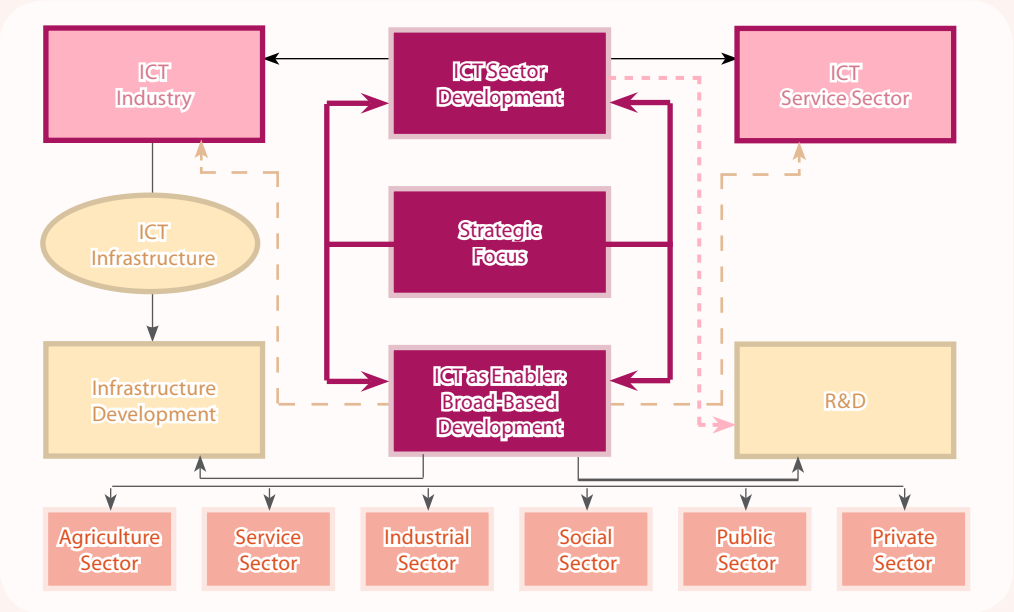
Source: ITU/UNCTAD/KADO Digital Opportunity Platform.

Box 2.1: Rwanda: ICT4D

Rwanda was rocked by a devastating civil war and genocide in 1994. Today, it is keen to reconcile its past and look towards the future. The Government views ICTs as a major means of lifting Rwanda out of poverty and has developed a National Information and Communication (NICI) Plan. These rolling five-year plans began in 2001 and cover a twenty-year period in the nation's Vision 2020. The goal is to transform a mainly agricultural economy into a Predominantly Information-rich, Knowledge-based Economy (or PIKE).

The latest plan, covering 2006-2010 , has a dual focus: to build up an export-oriented ICT industry and to use ICTs to boost development across all sectors (See Box Figure 2.1). The Rwanda Information Technology Authority (RITA) is a key agency for implementing the NICI plan. It aims to promote pro-ICT development by pairing local ICT companies with international players. RITA's headquarters in Telecom House is being converted to a "cyber building" with fibre connectivity. It hosts the Rwanda Internet Exchange and a number of local IT companies.

Box Figure 2.1: The dual focus of Rwanda's ICT Plan



Source: Government of Rwanda, The NICI-2010 Plan.

Rwanda has forged ahead with structural reforms. It privatized the incumbent Rwandatel in 2005 when 99 per cent of shares were sold for US$ 20 million to Terracom, a Rwandan ISP owned by an American entrepreneur. This is the highest private ownership of any incumbent operator in Africa and helps ensure independence from government influence. The new Rwandatel/Terracom has launched a fibre frenzy, laying fibre optic lines in the capital Kigali, as well as a national backbone extending to the Ugandan and Burundi borders.

Rwandatel has also launched a broadband wireless network to compete with Rwanda's first mobile operator, a subsidiary of MTN South Africa. The new wireless network is Africa's fastest 3G system with broadband speeds of up to 2 Mbit/s. Rwanda has a small territory with one of the highest population densities in Africa and achieved a mobile population coverage of around 90 per cent by 2006, one of the highest in Africa.

Although international Internet bandwidth has grown, bandwidth is constrained by the landlocked country's reliance on satellite technology. Part of the incentive of running fibre to Uganda is the hope of connecting to the planned East Africa Submarine System (EASSy), of which Rwanda is a founding member. Rwanda's ICT aspirations are high and it has undertaken some admirable initiatives. Even if only some of its goals are met, it will have gone a long way towards developing an information society.

Source: UNCTAD, from the ITU/UNCTAD/KADO Digital Opportunity Platform.

2.3 Affordability

Another way of considering the digital divide is in terms of the affordability of services. Overall, differences in the price and affordability of ICT services – such as Internet access or mobile phone service – are not as great as for higher-capacity services such as broadband. Table 2.2 shows the average monthly prices for Internet and mobile use by income group. In high-income countries, monthly Internet access costs less than one per cent of per capita income. Internet prices are on average twice as great in low-income countries, where the high price of Internet access exceeds the low average incomes, putting Internet access out of reach for most consumers.

Figure 2.8 illustrates the close relation between per capita income and Internet usage. Although other factors influence Internet usage (e.g., literacy, education and age), the ability to pay for ICTs is one of the most important. This is particularly true in developing nations, where incomes are lower and more sensitive to pricing and where the impact is much greater, as shown by the non-linear trend line in Figure 2.8. For example, an increase in average annual income from US$ 100 to US$ 1'000 per capita is associated with an increase in Internet user penetration of 2.9 percentage points, whereas an increase in income from US$ 10'000 to US$ 11'000 per capita is associated with an increase in penetration of just 1.6 percentage points.

For mobile telephony, the average price of the low-user basket of monthly mobile use in low-income countries is US$ 13, the same as the world average (Table 2.2). This helps to explain why mobile penetration is far higher than Internet user penetration in low-income countries (7.5 per 100 capita, compared with 2.8 per capita). Nonetheless, monthly mobile prices are still over half the average per capita income in low-income economies. There are several factors influencing the price of mobile services. One is the size of ICT markets - markets may be too small to generate the economies of scale needed for lower prices. Regulatory environment is another factor – even where markets are open, there may be other barriers to access by competitors, such as high license fees, lack of transparency and the dominance of incumbent operators. A third factor is taxes (import duties, VAT and excise duties on telecom services). A study from the GSM Association found that taxes on mobile services add 20 per cent to the overall cost of ownership in around one third of the countries analyzed and that a one per cent reduction in taxes could result in a two per cent increase in mobile penetration by 2010.[8] The case of Jamaica is interesting, showing how one island economy overcame regulatory barriers to liberalize its market and boost mobile penetration (Box 2.2).

2.4 Sector Reform

Sector reform is a vital factor shaping the digital divide. Sector reform usually involves a mix of:

- Market liberalization and the introduction of competition: e.g., by licensing new operators;
- Private sector participation: e.g., through privatization of the incumbent and/or by admitting new, privately-owned, operators to the market;
- Effective sector regulation: e.g., by establishing a regulatory body independent of government and the licensed operator(s).

ITU has carried out a wealth of research into the progress of sector reform around the world through its annual "Trends in Telecommunication Reform" publication series.[9] The relationship between telecommunication reform and the digital divide is complex. Historically, gaps in service provision between urban and rural areas have been used by incumbent operators as a justification for resisting reforms. Incumbents have argued that private investors, without universal service obligations, would neglect rural areas and the incumbent would lose its cross-subsidies that enabled it to subsidize service to less profitable rural areas on the basis of profits made from more populated and affluent urban areas.

In contrast, some countries have used targeted sector reforms as a means of addressing the digital divide. In South Africa, for instance, VoIP was at first licensed only for use by the incumbent and initially in those areas designated as being underserviced. [10]

For most countries, however, the evidence suggests that sector reform has played a positive role in promoting ICT development and narrowing the digital divide (see the case of Jamaica in Box 2.2).

From a methodological viewpoint, one of the hardest things to prove is that a particular policy change led to a particular reaction in the market. In the case of Jamaica (Box Figure 2.2), the timing

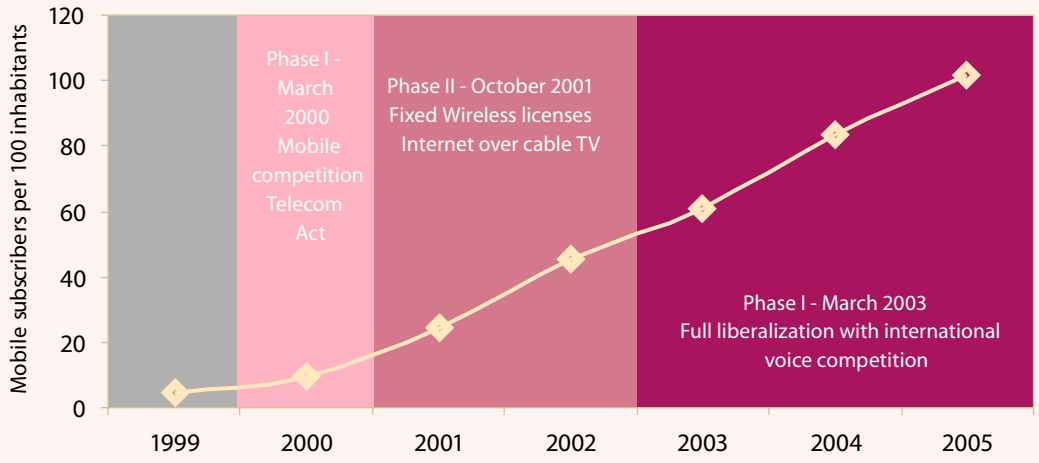
Box 2.2: Jamaica: Setting an example for the Caribbean

According to the Policy Institute of Jamaica, Jamaica had 2.75 million mobile subscribers at the end of 2005 or a penetration rate of 102 per 100 inhabitants. This makes Jamaica the first middle-income nation to break the theoretical 100 per cent mobile penetration barrier and gives it a higher mobile subscription rate, for instance, than Japan. Jamaica's mobile penetration is significantly above where it should be, given its average per capita income.

Jamaica has achieved this success thanks to a market liberalization process that began in 1999. It renegotiated the 25-year monopoly held by Cable and Wireless, allowing the country to introduce competition on a phased basis (Box Figure 1.3). Liberalization began in April 2000, when Jamaica became one of the first Caribbean countries to liberalize its mobile market by granting licenses to two new mobile operators, Digicel and Oceanic Digital, for around US$ 92 million in total. The second phase began in October 2001, when licenses were issued for Fixed Wireless and Internet access over cable television networks. Liberalization was completed when the international long-distance market was opened up to full competition in March 2003.

Digicel launched its mobile network in April 2001 and became an overnight success story. In its first 100 days of operation, Digicel gained 100'000 subscribers, a target it had originally envisaged reaching after one year. After its first year of operation, Digicel had 400'000 subscribers; roughly what the incumbent had taken a decade to achieve. Jamaica's success is significant, as it disproved a long-established theory that small island economies were too small to sustain competition. One positive factor for mobile competition in small island economies is that they are often tourist destinations. Given the rise of mobile telephony and roaming, these markets are attractive to investors, as they can reap significant roaming revenues from tourists.

Box Figure 2.2: Mobile penetration and market liberalization phases, Jamaica



Source: Adapted from the Jamaican Office of Utility Regulation (OUR), Planning Institute of Jamaica (PIOJ) and Spectrum Management Authority (SMA).

Jamaica is one of the largest Caribbean countries and is watched closely by its neighbours, many of which have followed Jamaica's example and ended their monopolies. Digicel, the pioneer mobile operator in Jamaica, has exploited the new environment to launch mobile services in numerous Caribbean neighbours. Today, it has networks in over 20 economies in the region. It has also expanded to island nations in the Pacific, with licenses in Fiji, Papua New Guinea, Samoa and the Solomon Islands.

Source: UNCTAD, from the ITU/UNCTAD/KADO Digital Opportunity Platform.

of changes can be compared with the situation before and after. However, the impact of policy changes is often delayed over a few years. Furthermore, it is difficult to find the counterfactual (would mobile penetration have grown anyway, even without the policy change?). Also, given that nearly all countries are gaining in ICT, a single country may sbe doing well, but it may still be falling behind its neighbours.

One innovative approach adopted recently in the Asian market is to try to quantify the extent of sector reform. LIRNEAsia has conducted research into the regulatory environment in six Asian economies (India, Indonesia, Pakistan, Philippines, Sri Lanka and Thailand). Their research is based on interviews rating performance in market entry, scarce resources, interconnection, prices, anti-competitive practices and universal service. Their evaluation of the regulatory environment is in general agreement with sector performance, as measured by the DOI. However, the fit is not perfect: for instance, Sri Lanka actually gained two places in the DOI, but it lagged behind, ranked fourth out of the six countries in regulatory performance.[11] This suggests lags in relating changes in the regulatory environment to sector performance.

2.5 Conclusions

This chapter has shown that the digital divide is shifting over time and is most evident for more recent ICTs, such as broadband and 3G mobile. It is also increasingly apparent in growing gaps between middle-income and the Least Developed Countries. However, this chapter has also demonstrated that the digital divide is durable and lasting, which, in turn, reflects underlying disparities in wealth distribution. It seems likely that, in a world where wealth is unequally distributed, there will always be a digital divide in ICTs, in the same way that there is a persistent "luxury divide" in, say, ownership of fast cars and yachts.

Does it matter? Yes. Similar to differences in the distribution of luxury items, the digital divide in ICTs reflects past and existing wealth divides. But, more fundamentally, the digital divide suggests how future divides in wealth may take shape, as ICTs are increasingly determining the ability of individuals, firms and nations to create future wealth. ICTs drive access to the information economy and ICT-intensive services. Further, from the experience of countries that have succeeded in establishing ICT hubs (such as India, Malaysia and Singapore), there are important multiplier effects from ICT investments, in their ability to generate income and drive supplier and consumer industries throughout the economy. With only limited access to ICTs, some developing countries risk being left behind in the new information economy. However, based on the astounding growth in ICTs in economies like China, one can safely predict that some developing countries will be among the economic powerhouses of the coming century.

Notes for Chapter Two

[1] See, for instance, Kenny, Charles and Fink, Carsten (2003) "W(h)ither the digital divide?", presenting a World Bank view at: www.itu.int/wsis/docs/background/themes/digital_divide/fink-kenny.pdf or the Economist article "The real digital divide", 10 March 2005, available at: www.economist.com/opinion/displayStory.cfm?story_id=3742817.

[2] See, for instance, chapter one of ITU "World Telecommunication/ICT Development Report 2006: Measuring ICT for social and economic development", Geneva, 2006.

[3] Although certain economies may exceed this theoretical level of saturation, allowing for young children and older people who may not access the Internet. Sweden and Norway had Internet penetration rates above 80 per cent in 2005, apparent exceptions to this theoretical level of saturation. Iceland had a high Internet penetration in 2005 of 86 per cent among the age group 16-74.

[4] Both the Lorenz curve and the associated Gini coefficient have been widely used to measure income inequality, but they can also be used to compare cumulative shares of ICT equipment and utilization. The Lorenz curve is typically used to illustrate the distribution or cumulative share of count data across the population.

[5] The analysis presented here for unit prices (in US$ per 100 kbit/s per month) is based on the best available offer in a particular country. In Switzerland, for example, this is based on Bluewin's ADSL 3500 service offering 3.5 Mbit/s download speed. The analysis for affordability is based on the lowest sampled price in a particular as a percentage of average monthly GNI per capita. In Switzerland, Bluewin's ADSL 600 service is used offering 600 kbit/s service (its 150 kbit/s did not qualify under ITU's definition of broadband, which includes any dedicated connection of 256 kbit/s or more for both upload and download speed). Price comparisons are based on August 2006 data.

[6] The 2005 International Circuits Report was issued by the FCC in January 2007. It is available from: http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-269605A2.pdf. For more information, see the FCC International Bureau website at: www.fcc.gov/ib. Although the report covers only US facilities-based international carriers and therefore omits some inter-regional connectivity, in practice, due to reporting requirements, this still covers most of the world's carriers.

[7] The average price for the OECD low-user basket in Africa is US$12.83, compared with US$10.32 in Asia. These price estimates are for March 2006 - see Table 7 in the Statistical Annex.

[8] GSM Association, Tax and the digital divide, 2005, available at: www.gsmworld.com/news/press_2005/press05_22.shtml

[9] ITU's "Trends in Telecommunication Reform" series was launched in 1998 and is published annually. The latest edition (2007) is "The Road to Next-Generation Networks". For a full list of previous titles, see: www.itu.int/ITU-D/treg/publications/index.html.

[10] See, for instance, Chetty, Marshini et al (2006), "VoIP deregulation in South Africa: Implications for underserviced areas", available at: http://pubs.cs.uct.ac.za/archive/00000381/01/policy_paper_mchettyf.pdf.

[11] Work to evaluate the Telecommunication Regulatory Environment by LIRNEAsia is ongoing. For interim results, see the presentation by Rohan Samarajiva et al (March 2007) at: www.lirneasia.net/wp-content/uploads/2007/03/telecom-regulatory-environment-rohan-samarajiva.pdf. For ongoing work on refining the methodology, see: www.lirneasia.net/2007/03/colloquium-on-refining-tre-methodology/.