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GLOBAL MARKET POTENTIAL FOR INFORMATION TECHNOLOGY PRODUCTS AND SERVICES

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SUMMARY

This report describes the use of market potential analysis as a strategic tool to identify market opportunities and make resource investments in countries and regions where they have the greatest potential long-term return. This tool is used to categorize leading and potential growth markets, identify drivers and barriers to growth, and quantify market potential for a set of IT products and services by country and region.

Highlights of the report include:

- IT market opportunities are closely related to national wealth, yet there is a great deal of variance among countries at any given income level. These differences can be seen as evidence of inherent differences among countries that make some leaders and others laggards. But they also can be seen as evidence of untapped market potential.
- While developed countries such as Canada, Germany and Britain have more or less saturated PC markets, others such as Italy and Spain still have break-out potential. More important is the potential in emerging markets such as India, Indonesia and especially China, which could add another 50 million PCs to its installed base at its current income level.
- Relative penetration rates vary by country and product. The U.S. is a leader in PC adoption, but lags in cell phone and broadband, where Korea, Canada and others lead.
- Household market potential for IT products and services depends on average income but also on the distribution of income. Using product penetration curves over the income distribution, we can estimate actual and potential household market size for different products.
- Over 80 million households in the developing Asian economies will pass the \$35,000 income level between 2000 and 2010, creating a massive new middle class of consumers.

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INTRODUCTION

What is the potential global market for various computing products, and how does it break down by region and country? This is a question of interest to many IT firms whether producing PCs, cell phones, game consoles or other devices, or selling Internet or wireless services. Faced with slowing market growth in much of the developed world, many IT companies are looking to the so-called big emerging markets (BEMs) as new growth markets for their products and services. India is reported to have a growing middle class of over 100 million people, while China's middle class is estimated to be as high as 300 million people. Yet we see an explosion of demand for a new product such as the iPod in the U.S. and wonder if there isn't considerable untapped potential in the developed countries as well. How then are companies to identify the most promising markets for their products and services?

In this report we present a tool for estimating market potential for IT products and services at the country level. Market potential is a sophisticated estimate of demand based on the size of a country, the distribution of income among the population, the infrastructure to support IT products and the utility of such products to a country's consumers and organizations.

This paper not only illustrates some of the analytical tools, but develops estimates of market potential. In doing so, we focus on three information technologies—PCs, cell phones and the Internet—although the analysis could be applied to many others. We develop specific estimates of market potential for each of these technologies, and we do so for seventeen countries and nine sub-regions around the world.

The paper is intended for executives and strategists concerned with expanding existing markets, entering new markets, or creating new markets on a global, regional, or country basis.

Defining Market Potential Analysis

Market potential analysis is a strategic tool to identify market opportunities and to make resource investments in markets where they will have the greatest return in the long run. Market potential analysis is not used for short-term forecasting, but can help to target markets with high growth potential in the mid to long term. Market potential analysis enables companies to:

- Categorize countries that are lead markets or potential growth markets.
- Identify growth drivers and barriers in those markets.
- Quantify market potential for a given product or service by country or region.

MARKET POTENTIAL FACTORS

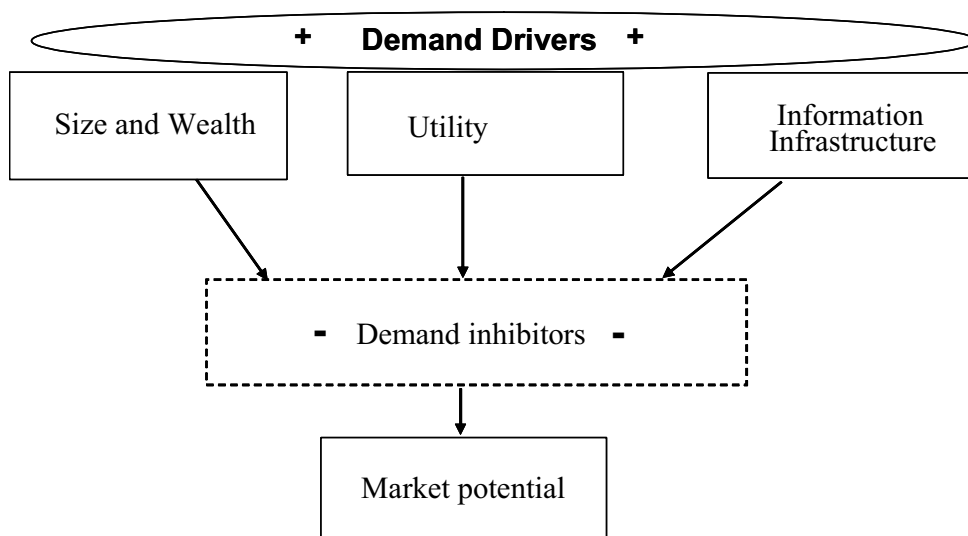
The many forces that influence market potential can be categorized into two broad sets: demand drivers and inhibitors (Figure 1).

Demand Drivers

Demand drivers are the factors that affect the size, readiness or exploitability of markets. Three are especially important.

- The first is the **size and wealth** of a market. This is not a simple calculation, and average figures such as total population and GDP per capita offer only a starting point. Other factors include household income distribution and the structure of the business sector. Household income distribution determines the number of potential consumers as higher income households usually spend more on computing products. The structure of the business sector determines the number of potential business customers as some sectors such as financial services have more inherent demand for computing than others. Much of the value of market potential analysis comes in calculating accurately the number of potential customers there are for a given product.

Figure 1. Demand drivers for IT



- The second is the **utility** of a product in a particular market. This varies according to the nature of the product and the characteristics of the market. For instance, the utility of a Chinese-language news service will depend on the size of the Chinese-speaking population in a country while utility of an online gaming service will depend on the number of video game fanatics in the country.
- The third demand driver is the **supporting infrastructure** for a product. For information and communication products, the necessary infrastructure can include telephone lines, wireless networks, Internet service providers, and human resources such as skilled programmers, technicians and users.

Demand Inhibitors

Market potential in a given country can appear to be high, but actual demand remains low. This is usually due to the presence of demand inhibitors that either raise the cost or lower the utility of a product. Some inhibitors such as tariffs are explicit and can be quantified, while others are less visible and can only be identified through in-depth knowledge of a country. For example, management cultures that favor personal relationships rather than digital interaction, government

restrictions on technology use, incompatible standards, and consumer indifference or resistance can inhibit demand for high-tech products and services.

STEPS IN MARKET POTENTIAL ANALYSIS

In this report we focus on market size and wealth as drivers of market potential, and specifically on household markets. We begin by employing a top-down model that correlates market penetration with income level for PCs, mobile phones, Internet use and broadband use. This allows us to develop a snapshot of market potential for regions and key countries who are behind the leaders in adoption. We then look at how the trend line has shifted from 1995 to 2004, and how individual countries have moved relative to the trend line. Based on these patterns, we project potential market size for regions and countries in 2010.

Next, we use household income data to build a bottom-up analysis of consumer product market potential. Based on this analysis of diffusion across the income distribution, we are able to characterize market potential for different countries and analyze product markets in a more refined way. Finally, we look at the shift of income distribution in the Asia-Pacific region to show how millions of households have entered the middle class in the past ten years.

Thus, market potential analysis involves four components:

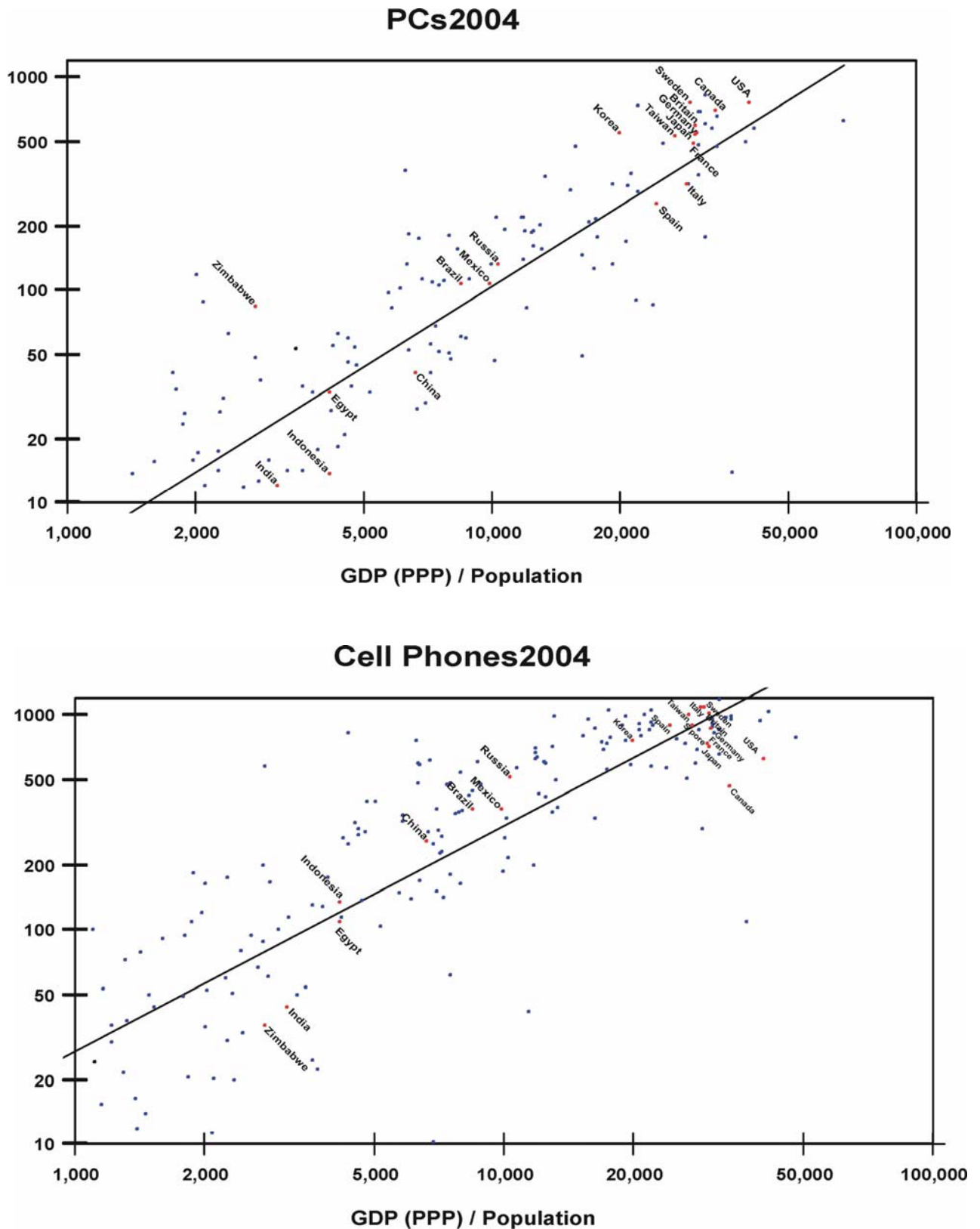
- Top down analysis of market potential size by region, country
- Analysis of the dynamics of market potential over time
- Analysis of how income distribution affects market potential
- Analysis how shifts in income distribution affect market potential

1. Top down analysis of market potential size

The top-down model starts with the premise, supported by evidence from a large number of countries, that IT market opportunities are closely related to a country's wealth. It looks across countries to quantify the relationship between wealth and diffusion of different technologies, and identify leaders and laggards among countries, i.e., those that fall above or below the trend line (Figure 2).

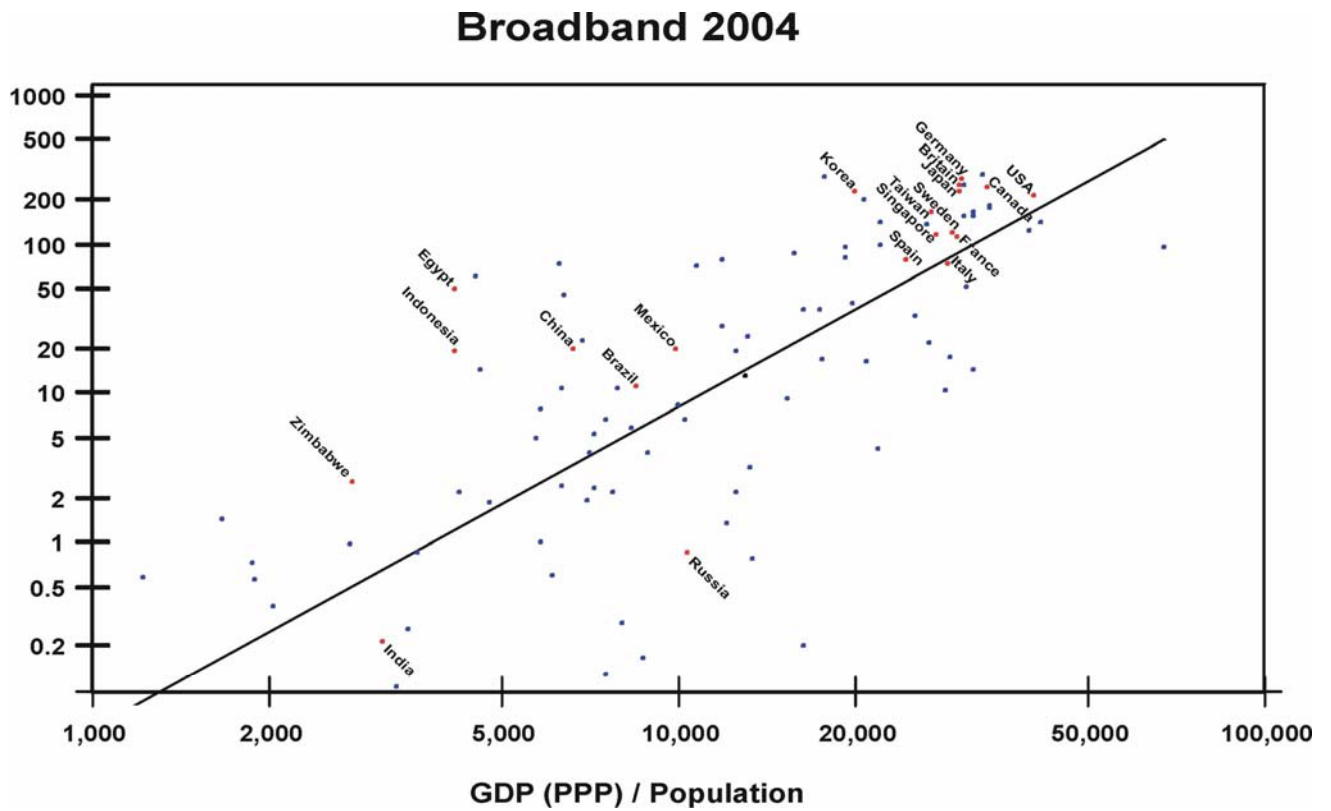
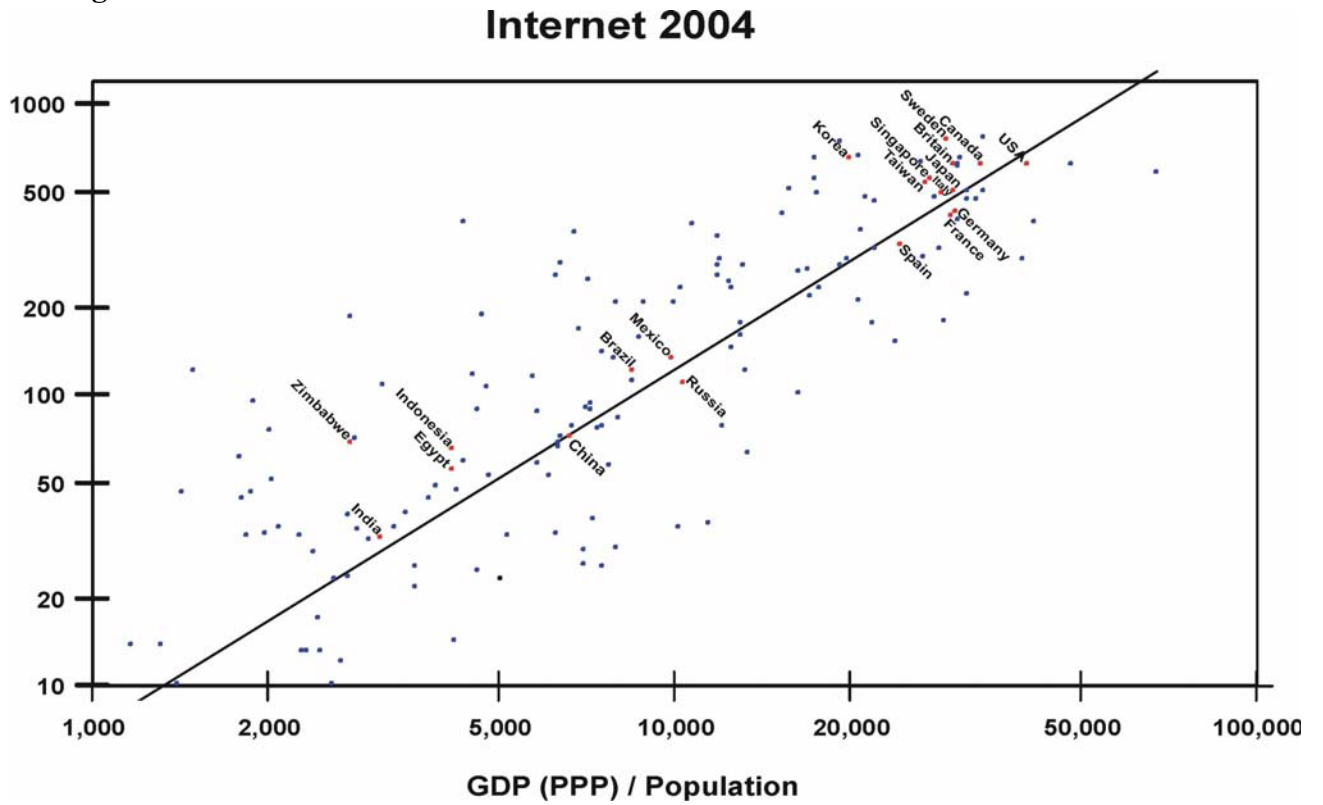
Figure 2 shows that adoption of PCs is clearly correlated with national income, so not surprisingly PCs/1000 people is higher in Sweden than in Zimbabwe. It also shows, however, that there is a good deal of variance from the trend line at any given income level. For instance, while South Korea and Spain both have per capita incomes of about \$25,000, Korea has 545 PCs per 1000 people, while Spain has only 266. These differences can be seen as evidence of inherent differences in national environment that make some countries leaders (Korea) and others laggards (Spain). On the other hand, they can be seen as evidence of untapped market potential; i.e., if certain demand inhibitors are removed, Spain has great potential for growth based on its income level. In the past, we have seen countries jump relative to the trend line when conditions changed. For instance, Japan lagged far behind the U.S. in PC penetration in the 1990s due to fragmented standards and higher prices. After the market consolidated on Windows in 1995, followed by a price war among PC makers, Japan's market grew rapidly and achieved the market potential we had identified at that time.

Figure 2. National Income and Diffusion of technologies (per thousand people), 2004ⁱ



ⁱ Selected countries are labeled to represent leading markets as well as the largest economies in each region. GDP

Figure 2 continued



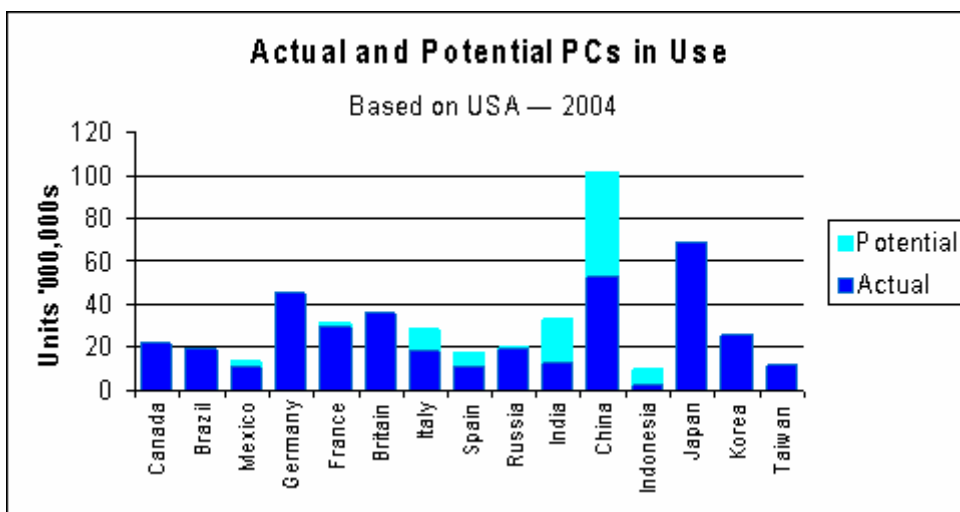
is measured in purchasing power parity (PPP) value.

Looking at Figure 2, we see different pictures for PCs, mobile phones, Internet use and broadband Internet. For instance, while the U.S. is a leader in PCs, it is a significant laggard in mobile phones. This is partly due to the presence of a fragmented carrier market with incompatible standards, and to difficulties providing coverage to a spread-out population. For broadband Internet, there are some surprises such as Egypt and Indonesia being well above the trend line, far ahead of Russia and India, who both are better known for their technical prowess. Looking at these figures, firms may find advanced markets or markets with high potential that they had not considered. For example, South Korea is an advanced user of PCs, cell phones and the broadband Internet, thanks in part to low cost Internet and wireless service. Driving use, and also benefiting from such wide penetration, is a thriving online gaming business.

Illustrative application

In Figure 3 we illustrate market potential for PCs, assuming countries reached the US level of penetration relative to the trend line (at their current income level). This shows that while countries such as Canada, Germany and Korea have more or less saturated PC markets, there are still some developed countries with break-out potential, including Italy and Spain. More important is the potential in emerging markets such as India, Indonesia and especially China, which could double its penetration by adding another 50 million PCs to its installed base.

Figure 3. PC market potential



2. Analysis of the dynamics of market potential by region, country

The top-down estimate of market potential presented here is essentially static, but the underlying model can be applied to analyze trends over time as well. Figure 4 shows that, between 1995 and 2004, the trend line for PC diffusion shifted upward as PC use expanded globally. Not only has the line shifted upward, but it has become more flat, as developing countries have seen faster penetration growth than wealthier countries. The patterns of individual countries represented by the arrows show that while the trend line is moving up, some country markets are growing faster because of higher growth in per capita income and/or because they have moved up relative to the trend line. Japan has had little income growth, but has moved from well below the trend line in 1995 to above the line in 2004. China has grown rapidly and also moved up to the trend line.

Figure 4. PC, cell phone and Internet penetration, 1995-2010

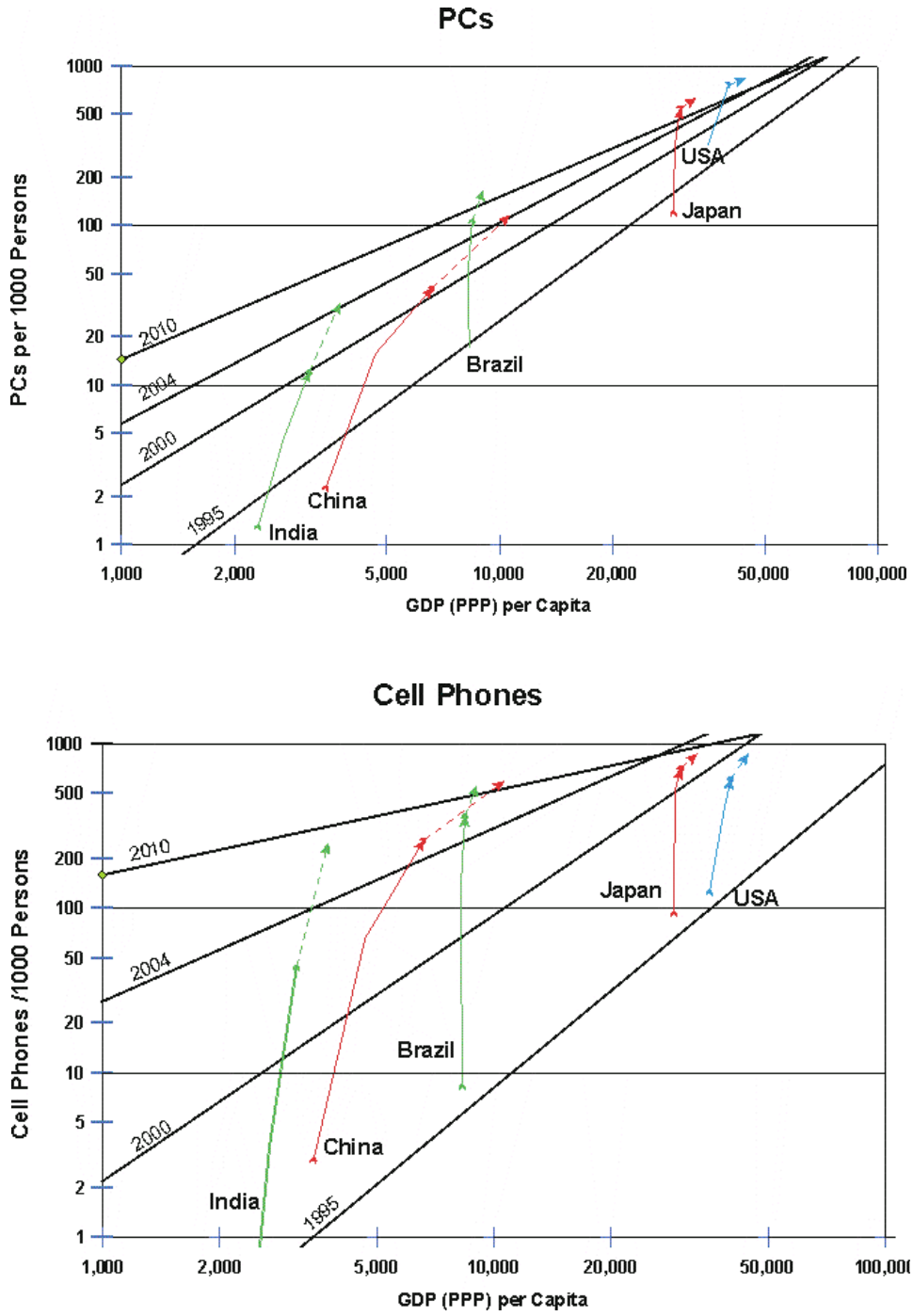
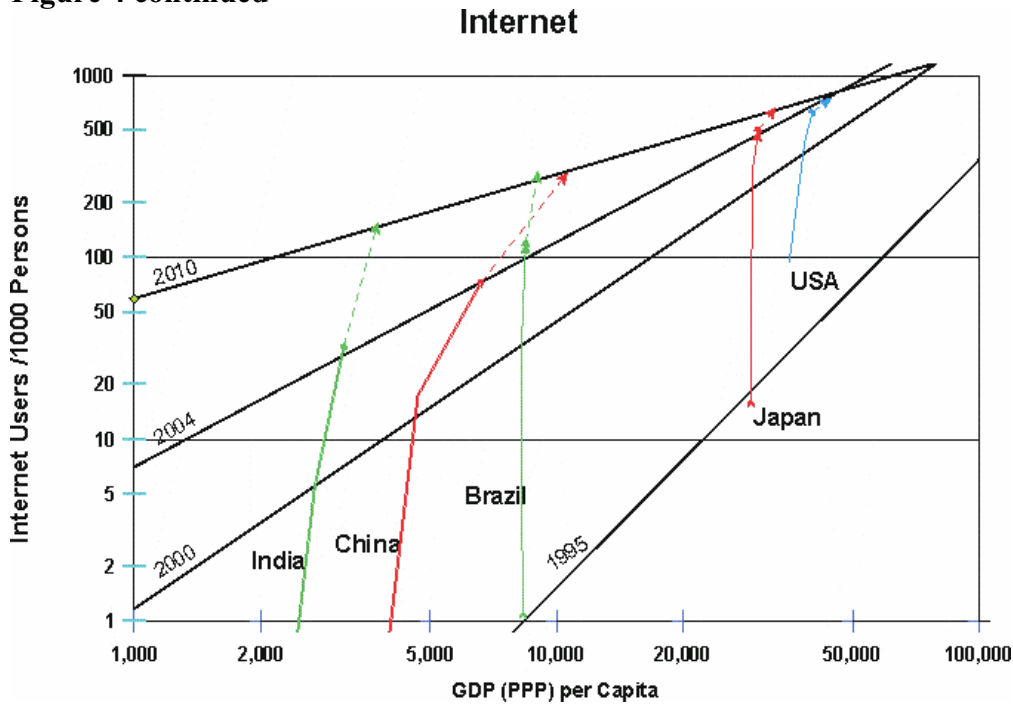


Figure 4 continued



We extrapolate from those changes in the trend line to estimate a new line for 2010, and to predict growth in penetration levels for each country (the final arrow and dashed line in Figure 4). A similar analysis for mobile phones and Internet use shows a much faster upward shift in the trend line, as each has diffused faster than PCs.

Using this analysis, we can project penetration for different products in the future. Incorporating projected penetration rates with population data, we can estimate the number of each product likely to be in use in 2010 compared to 2004. This analysis is shown in Figure 5 for PCs, cell phones and Internet use.

Figure 5. Diffusion of PCs, cell phones and Internet use, 2004 and 2010 (projected)

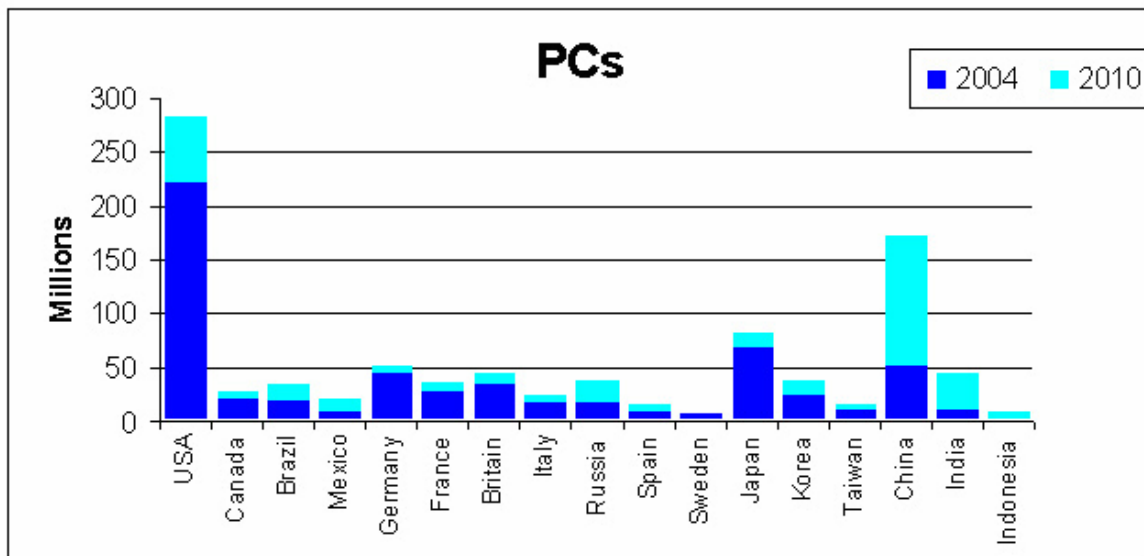
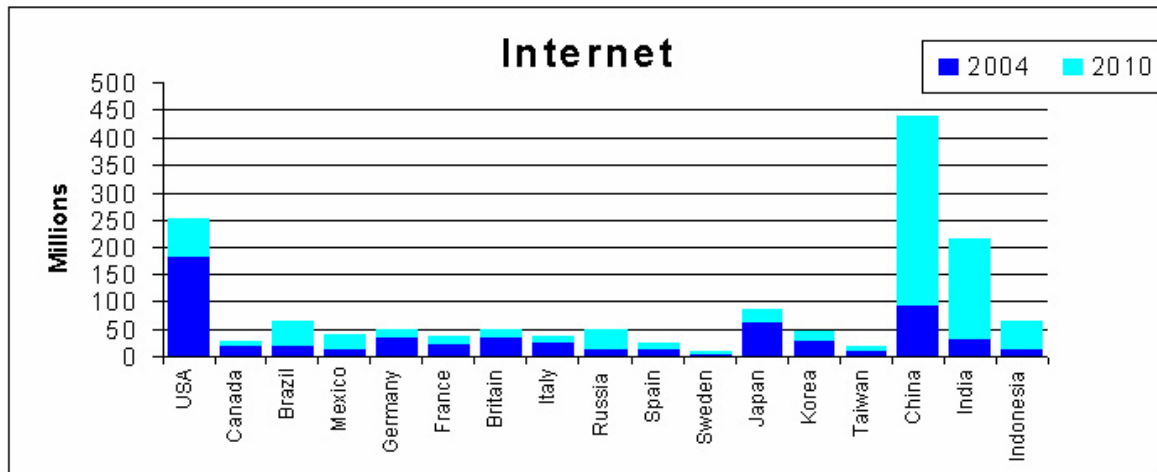
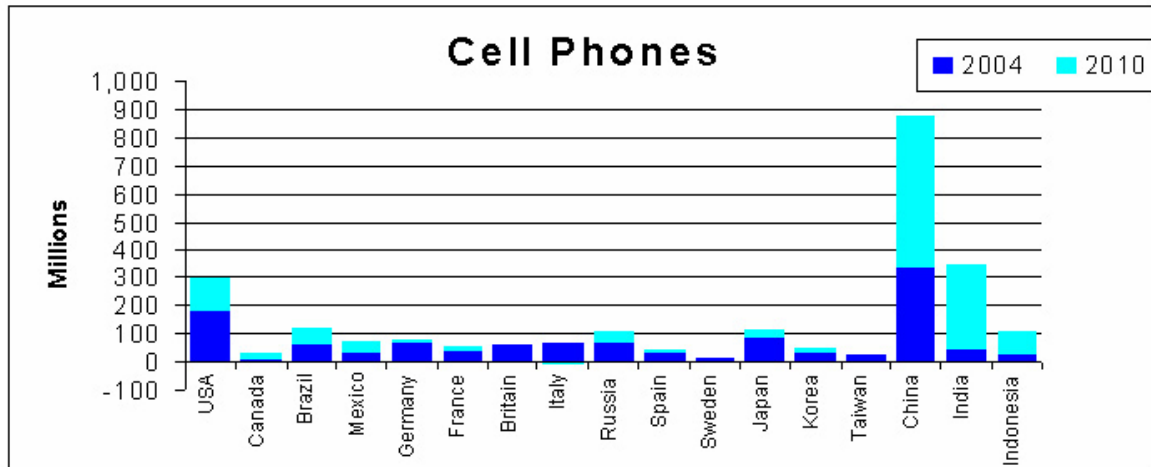


Figure 5 continued



The underlying data for country estimates in Figure 5 follow in Table 1. Table 2 presents total world figures broken down by region.

Table 1. PCs, cell phones, Internet users by country—2004 and 2010 (millions)

	PCs		Cell phones		Internet	
	2004	2010	2004	2010	2004	2010
USA	224	283	182	295	185	253
Canada	22	28	15	28	20	27
Brazil	19	35	66	117	22	63
Mexico	11	20	38	73	14	39
Germany	45	52	71	77	35	50
France	29	37	45	56	25	37
Britain	36	44	61	62	38	48
Italy	18	23	63	57	29	38
Russia	19	38	74	106	16	49
Spain	11	17	39	42	14	25
Sweden	7	8	10	9	7	8
Japan	69	83	91	113	64	87
Korea	26	39	37	48	32	46
Taiwan	12	17	23	26	12	19
China	53	172	335	873	94	439
India	13	45	47	345	35	217
Indonesia	3	10	30	106	15	65

Table 2. PCs, cell phones, Internet users by region—2004 and 2010 (millions)

	PCs		Cell Phones		Internet	
	2004	2010	2004	2010	2004	2010
USA/Canada	246	311	197	323	205	281
Latin America	53	99	177	346	65	192
Western Europe	185	228	366	385	184	258
Central & E. Europe	41	78	172	236	54	133
Sub-Saharan Africa	10	27	53	220	13	88
North Afr & Middle East	34	75	102	301	37	150
South Asia	15	52	53	389	36	227
East/SE Asia developing	71	214	448	1152	137	599
Asia/Pacific developed	134	174	190	235	132	188
Total	791	1260	1757	3588	862	2115

3. Analysis of income distribution and household market potential

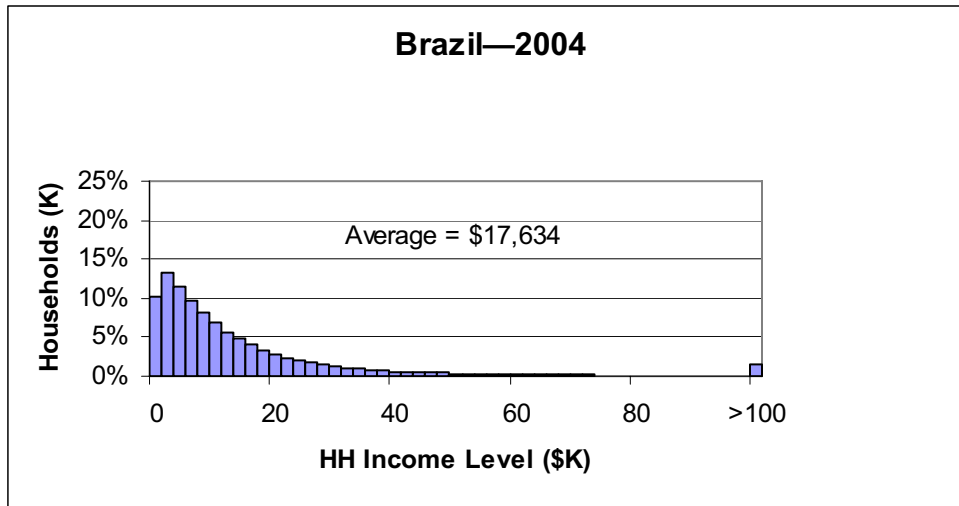
Analyzing market potential at a more detailed level requires breaking down the market according to target segments. Some products focus on the household, business, government or education market, while others target all of those markets. Here we look at household income as a determinant of consumer market potential for IT products.

Household market

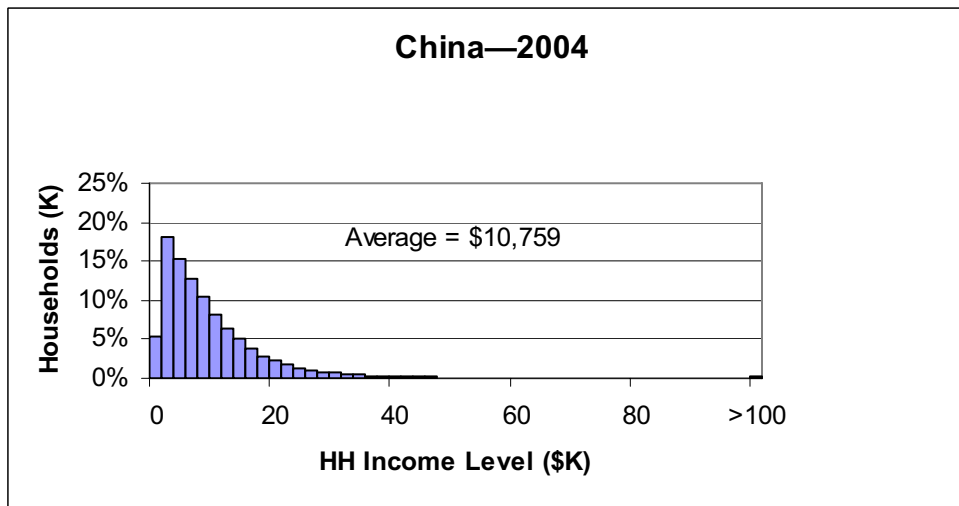
Quantifying spending power in a country's household market requires moving beyond average income to look at the *distribution of income* for all households. Some countries have very high-

income inequality, with a few wealthy households and many very poor ones, while others have a more even income distribution. Looking at a few countries in Figure 13, we can see that Brazil has a higher average household income than China or India, but it has by far the most unequal income distribution, with a sizable wealthy segment (over \$100K) and most households at very low-income levels. Brazil’s market potential might initially be greater as its wealthier households can afford more products, but the Brazilian market will be saturated faster once those households have adopted the product or service. China’s income distribution has become more unequal as its economy has grown, but more of its households are in the middle ranges. India’s income distribution is the most equal, although its larger average household size means there are more people to feed and clothe on an income similar to China’s.

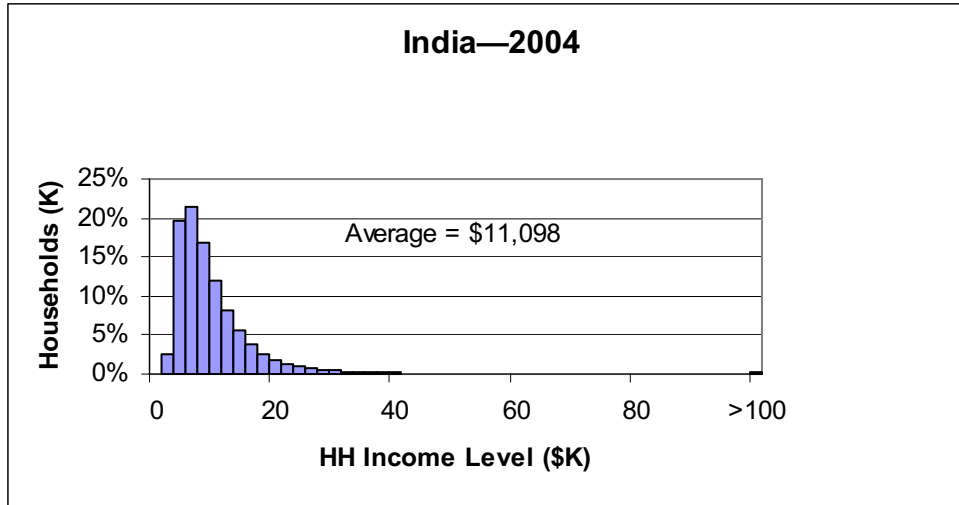
Figure 6. Household income distributions in three countries



Ratio of top 20% to bottom 20%: 27.5



Ratio of top 20% to bottom 20%: 10.8



Ratio of top 20% to bottom 20%: 4.9

In order to measure the potential household market for a product, we start with data on household usage at different income levels. This enables one to develop a market potential curve that can be applied to each country according to its own income distribution. Figure 14 shows the household product potential curves for cellular phones, PCs, Internet service and broadband in the U.S. and China. The curves are all higher for the U.S. market, with the exception of cell phones, where usage in China is actually slightly higher at any given income level.

Figure 7. Product penetration curves for USA and China: PCs, cell phones, Internet, Broadband

USA

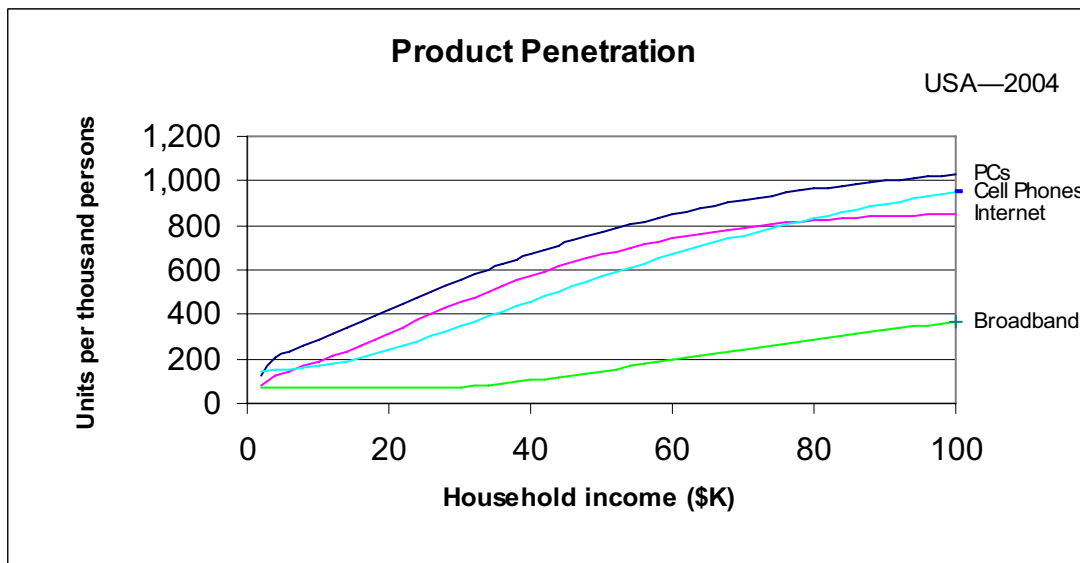
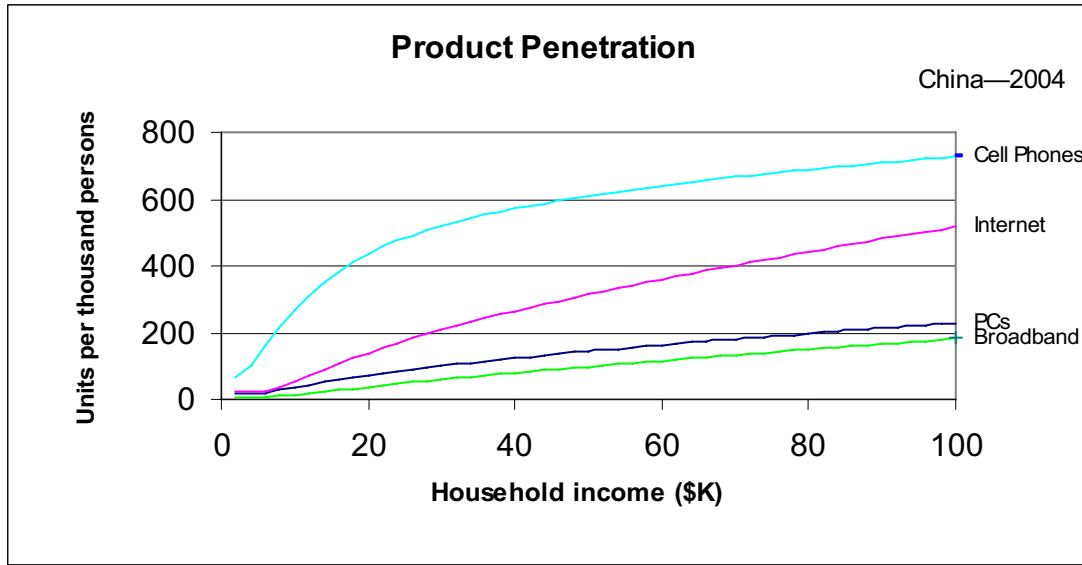
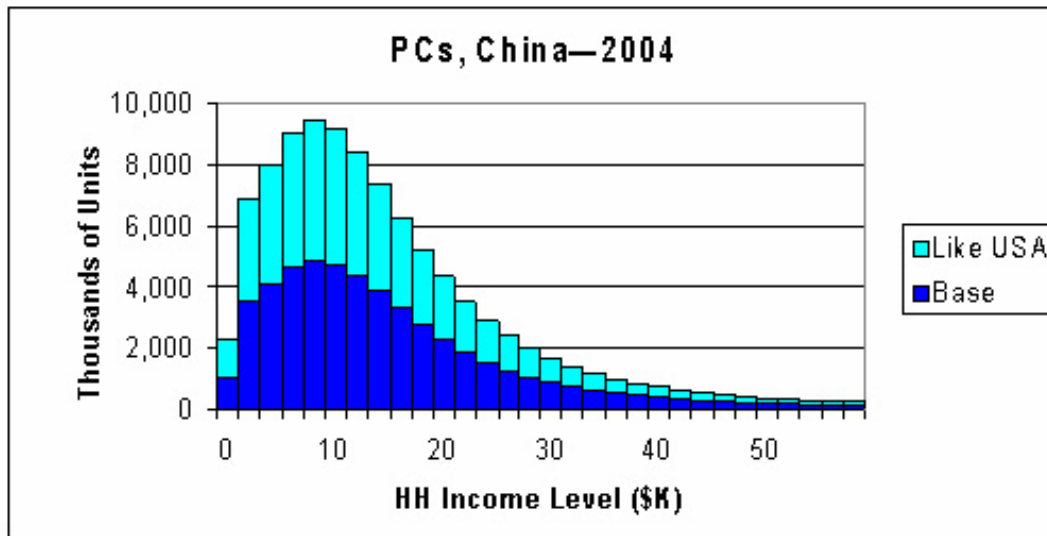


Figure 7 continued
China



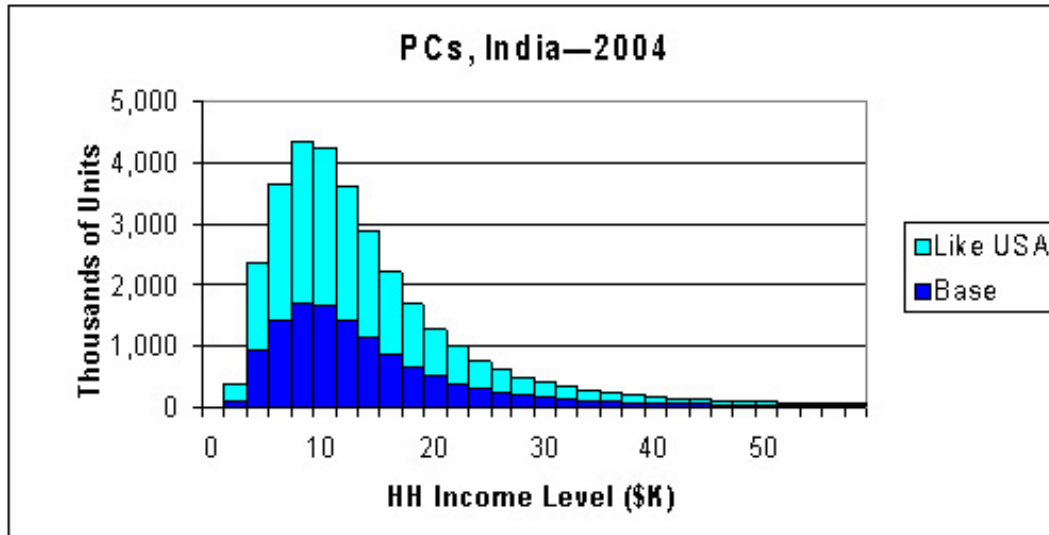
Using product penetration curves, we can analyze the actual and potential PC penetration for different countries. For instance, we can look at current penetration of PCs in China and India, and then measure what the curve would look like if households at each income level in those countries had the same usage as their counterparts at the same income in the U.S. (Figure 8).

Figure 8. Household PC market potential



	Units ('000s)	Penetration (Units / Households)
Potential (like USA)	101,348	27%
Present (base)	52,990	14%
Unfulfilled potential	48,358	13%

Figure 8 continued

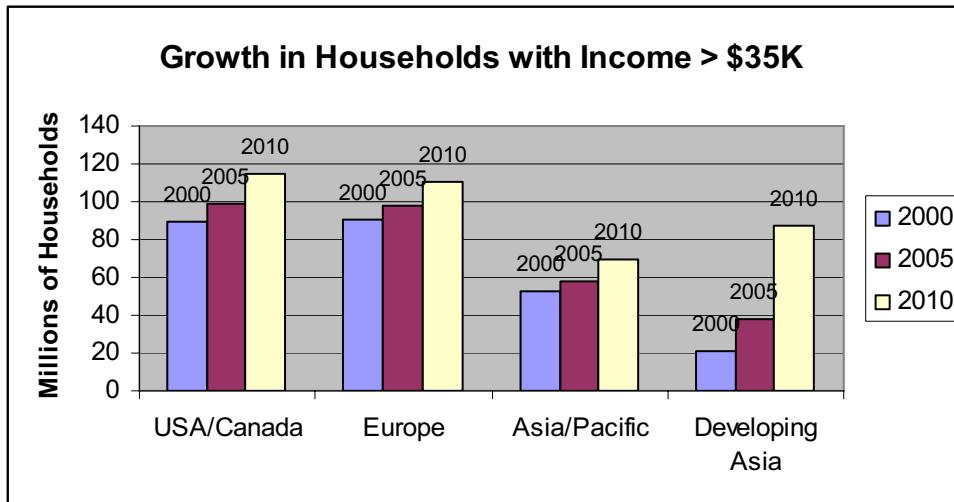


	Units (000s)	Penetration (Units / Households)
Potential (like USA)	33,152	17%
Present (base)	13,030	7%
Unfulfilled potential	20,122	10%

4. How shifts in income distribution affect household market potential

This analysis again is static, but income distributions continue to change over time with economic growth and in some cases income redistribution. As distributions change, more consumers become able to afford these products and services, so market potential could increase dramatically. To illustrate, consider a simple measure—the number of households with over \$35,000 annual income in 2000, 2005 and 2010 (forecast) by world region (Figure 9).

Figure 9. Household income growth by region



As Figure 9 shows, the developing countries of Asia were well below the other regions in the past, but saw dramatic growth by 2005, as economic growth in China, India and elsewhere pushed nearly 20 million households above the \$35,000 level. Going forward, because of the distribution of income and the ongoing economic growth in the region, we forecast that another 50 million households will pass this threshold by 2010.

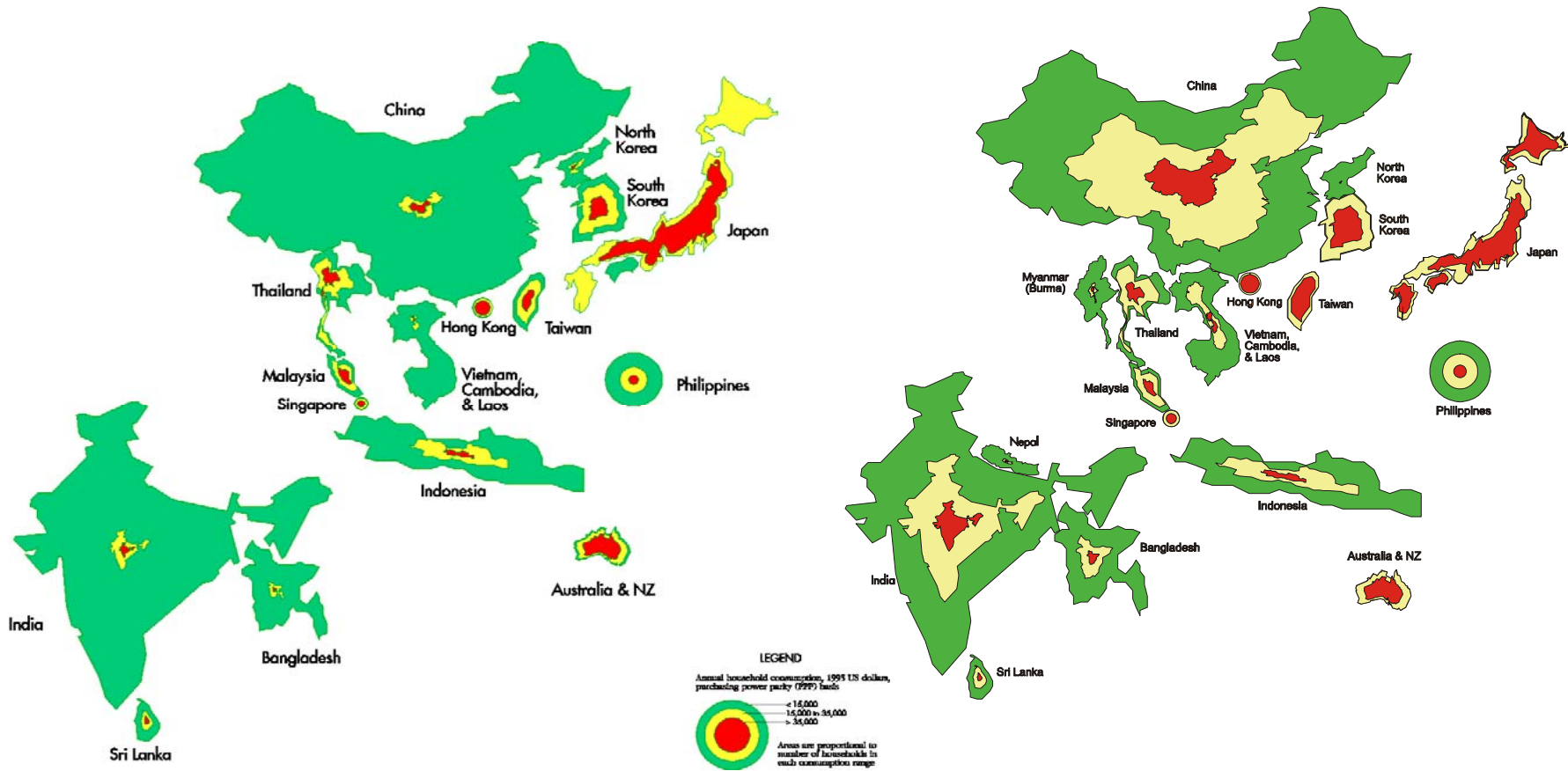
As more households move into this middle class range, the number of potential consumers for many IT products and services expands. Also, some of the demand for existing products will move up from the cheapest products and services to mainstream and even high-end offerings. At the same time, millions more will reach the income level where they can just start to afford the basic products. The maps that follow show growth of households above \$35,000 and above \$15,000 from 1995 to 2010 in the Asia-Pacific region. These illustrate the vast migration of households up the income distribution in the region.

In order to visualize the size and distribution of incomes in key Asian markets, we use a mapping technique that scales the size of a country according to the number of households at different income levels. In the first map, we see the size of these markets in 1995; in the second we see estimates for 2010.

Note first that larger countries such as China and India appear largest, but most of their income in 1995 is in the under-\$15,000 category (green areas). Meanwhile, richer countries such as Japan and Australia/New Zealand have most of their households in the over-\$35,000 category (red areas). But then see the changes that are occurring and how these countries will look by 2010. In India, and especially in China, a much larger share of households have moved up in the \$15,000 to \$35,000 (yellow areas) and over-\$35,000 categories, representing the rapid growth in the middle classes in those countries. Meanwhile, Indonesia and the Philippines have had slower growth, especially during the financial crisis of the late 1990s, and given their uneven income distributions, fewer households migrated to the middle class.

Asia's household markets, 1995

Asia's household markets, 2010



CONCLUSIONS

We have developed concepts and systematic methods for estimating market potential for information and communications products and services. The value of market potential analysis to the ICT industry is in development of market strategies that focus on hidden opportunities that can be exploited for new revenue growth. Top-down analysis can be used to identify market leaders and laggards and potential break-out markets, as well as to study trends over time to do mid-range and longer-range forecasting.

Bottom-up analysis of household markets can provide specific insights into the potential for consumer products based on wealth and income distribution. Comparing product penetration at any income level to household penetration at a similar level in other countries shows how much untapped potential there is, at least based on wealth. As income grows and income distribution changes, market potential can grow quite dramatically, especially in large markets where a few percentage points can represent millions of households.

Market potential analysis should be augmented by the judgments of country experts to determine what conditions are needed for a country to reach its potential, what strategies a company can employ to help create those conditions, and how products and services can be tailored to provide the most utility in those markets. As such, it is highly valuable in guiding national and multinational companies in deciding where to invest resources in order to achieve the highest returns in markets for computers and other information technologies.