



tax_{and} the digital divide



How new approaches to
mobile taxation can connect the unconnected



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Section 1

Building on the Benefits of Mobility

The GSM Association (GSMA) represents the interests of over 680 mobile operators across 210 countries worldwide. Spearheading technical, commercial and public policy initiatives, the GSMA works to enhance the value of mobile services globally. As an industry body, we pride ourselves at the fact that GSM technology accounts for over 75% of mobile phones, however we are also acutely aware that two thirds of the world's population do not have access to digital telecommunications.

It has long been established that one of the quickest and most cost effective ways to address the issue of this 'digital divide' is through wireless telecommunications. We strongly believe that the lowering of cost barriers such as the cost of handsets, services and taxes, coupled with the introduction of compelling consumer propositions in developing markets, are measures that will provide a sustainable pathway to eliminating the digital divide.

The GSMA is committed to lowering barriers to the accessibility of mobile communications in emerging markets and believe that public-private partnerships between the GSM industry and governments are critical to achieving this. Given the fact that the next billion mobile subscribers will come from the lower income market segment, the GSMA is striving to make mobile communications more affordable.

One key industry initiative to spread the benefits of mobility is the **GSMA's Emerging Market Handset Programme**, designed to provide low cost handsets and hence increase accessibility within emerging economies. The enormous success of this programme has further confirmed our belief that the mobile industry can help bridge the digital divide for the majority of the world's population, and without the need for extensive development aid.

We have also identified that lowering taxes on mobile communications can greatly enhance affordability in emerging markets. In light of this, this **Tax Report** seeks to place mobile taxation on the agenda of governments and other multi-lateral global institutions involved in regulation and development. In this report, we have sought to illustrate the current tax situation in 50 emerging economies and we have analysed how tax strategy could be revised in order to eliminate the digital divide, at minimal or even no cost to government.

This report is a result of the commitment of a number of individuals and organisations. We would particularly like to acknowledge Motorola and Nokia, both active supporters of this Social & Economic Benefits Programme, for their assistance in this report. We have assimilated the views from a range of authorities, from academia to operators, from government officials to regulators. While the emphases may have differed, the underlying message was the always same – we are all committed to ensuring that the benefits of mobile communications are understood and available to all.



Craig Ehrlich
Chairman
GSM Association



Robert G. Conway
CEO and Member of Board
GSM Association

Mobile Crosses the Digital Divide

The vast majority of the world now sees communication systems as a basic human right and yet over half of the world's population has no access to communications. The Telecommunication Development Bureau (BDT) of the ITU (The International Telecommunication Union) is therefore committed to extending this 'right to communicate' to all corners of the globe, eliminating the digital divide and ensuring that information and communication technologies (ICT) drive the development of all economies and societies.

Today, the reality sees the digital divide solidly in place across substantial parts of our world. Co-ordinated programmes that forge Public Private Partnerships are needed to create the right market conditions in a timely fashion. With its mandate and position as a conduit between governments and the communications industry, as well as a dedicated Development sector, the ITU is ideally placed to facilitate this activity.

As part of its Millennium Goals, the United Nations set a target that 50% of the world's population should have access to communications by 2015. It is estimated that between 75% and 80% of the world's population live in areas already covered by mobile communications systems, yet only 25% use the services. Closing the digital divide is not something that has to take decades; it needs to and is happening now, with unprecedented levels of ICT access made possible through the deployment of mobile communications. Indeed, 2005 has proved to be a pivotal year in the development of communications specifically for emerging markets.

There is no doubt that mobile communications represents the most effective means of bridging the digital divide, firstly for voice and later with data. It is opening up opportunities to reach markets for the first time. Recognising that cost is the primary barrier to take-up for the majority of the four billion people that have no access to communications, the mobile industry has taken huge strides to reduce the price of handsets.

This has been achieved by leveraging the economies of scale created by the global GSM community and a harmonised spectrum policy. Already, a new Ultra-Low Cost segment has been established in the mobile handset market, primarily as a result of the Emerging Market Handset Programme of the GSMA, one of the ITU's Telecommunication Development Sector Members. This is fully aligned with the ITU's mandate and a very real example of how the right conditions can be created to connect the unconnected.

However, governments must also recognise that they have an important role in creating the right environment for telecommunications to grow. As will be shown in the report that follows, in addition to the cost of equipment, operational and capital costs, other policy factors, including taxation policies, may have a significant impact on the price consumers pay for their mobile handsets and services – the same handsets and services that can drive up GDP.

Taxation policies that help create the environment needed to grow the mobile business have proved to directly benefit governments by increasing the total taxation revenue. The BDT of the ITU therefore welcomes the efforts of the GSMA in commissioning this study.

Sustainable growth, based on economically viable businesses, has been the basis for the developments in the mobile sector that target emerging markets. This is not about charity but about creating the market dynamics that encourage innovation and investment aimed at emerging markets – and that requires us all to work together.



Mr Hamadoun I. Touré, Director
Telecommunication Development Bureau (BDT)
International Telecommunication Union (ITU)



Section 1

Executive Summary

Earlier this year, the GSM Association (GSMA) set in motion a programme to help eradicate the barriers to accessing mobile communications for people in developing countries. This programme was the direct result of research that identified the cost of the mobile phone as one of several barriers to affordability in these nations.

The GSMA challenged the manufacturing sector to respond and deliver to the market an 'Ultra Low Cost' mobile phone. Initially this was achieved at a sub US\$40 cost, although through further innovation, the cost has since been reduced to sub US\$30. Thus a new low cost market segment, previously unaddressed by the industry, was created.

However, it has been clear that taxation would form a key additional component in the total cost structure of mobile products and services. To understand the full extent to which taxation has a direct impact on affordability, the GSMA commissioned this independent study across 50 developing countries.

The results are surprising in terms of the degree to which taxation acts as a barrier for users, preventing potentially hundreds of millions of people from affording mobile communications, and holding back economic growth and social development in many countries.

The study's key findings are:

1. Taxes are disproportionately high in many developing countries

- In 16 of the 50 developing countries in the study, taxes on mobile phones and services represent more than 20% of the total cost of ownership. In these 16 countries, which are home to hundreds of millions of people, the annual cost of taxes ranges from an average of US\$24 to US\$179 per mobile phone user.
- Nineteen countries even levy additional taxes, on top of standard sales taxes on mobile phone users. Some of these additional taxes are telecom specific, such as service activation taxes. These special taxes, average US\$13 per annum per subscriber.

2. The black market in handsets is booming as users try to avoid high taxes

- 39% of all handsets sold in the 50 countries in the study in 2004 were via the black market, representing a loss of US\$2.7 billion in tax revenues.

3. Cutting taxes on mobile handsets and services attracts new users

- If low-cost handsets were made exempt from import duties and sales taxes, up to 930 million additional low-cost handsets could be sold by 2010 in the 50 countries in the study, leading to an increase in mobile phone penetration and a rise in total tax revenues in some countries.
- If a government lowered taxes on mobile usage by *just one* percentage point, that could boost the number of mobile users in that country by more than 2% by 2010.
- Eliminating the special taxes could boost the numbers of mobile users in the 19 affected countries by 34 million (or 8%) by 2010.
- The removal of all sales and customs taxes on mobile handsets and services could prompt an increase in mobile penetration of up to 20 percentage points, according to an analysis by the London Business School of the data in this study

4. Lower taxes mean greater revenue opportunities for governments in the long term

- Cutting taxes on handsets would attract new mobile users. If taxes on usage remained the same, each new user could yield additional service tax revenues of US\$25 per year.

How can governments play a key role and drive accessibility in developing countries?

Mobile phones have the potential to give billions of people in developing countries access to communication and information technology, but only if governments work with the mobile industry to reduce the total cost of owning and using a mobile phone. The Indian government has already demonstrated this isn't just a theoretical notion. It has brought down handset import duty over the past three years, helping to boost mobile penetration from less than 1% to more than 5%. However, other fiscal barriers to mobile usage exist in India.

Previous studies have shown that mobile phones play a major role in reducing the cost of doing business and driving entrepreneurialism across the many developing countries without a widespread fixed-line infrastructure. Mobile phones make it much easier for farmers, fishermen and a host of other business people to find buyers and sellers for their products and services. In fact, an increase of 10% in mobile penetration boosts a country's annual economic growth rate by 0.6 percentage points, according to recent research by the London Business School.

The mobile industry has made considerable strides in driving costs down through lower handset costs and innovative service solutions for lower income groups, as well as extending mobile coverage to 77% of the world's population. More still needs to be done. In the light of the findings of this study, more governments now need to take up the baton and re-evaluate the impact of their tax policies on mobile communications. Governments and mobile operators should work together to determine the ideal tax levels for their particular countries.

The 'Digital Dilemma' for governments

High taxes on mobile services run counter to governments' commitment to improving access to communications. At the World Summit on the Information Society in 2003, 175 countries signed up to a commitment to give more than half the world's population access to information and communications technologies by 2015. If governments took the right approach to taxation, that goal could be achieved within five years, yielding huge benefits to developing countries and their people.

'The United Nations welcomes initiatives which help connect the unconnected to bridge the digital divide in developing countries.'

Amir A. Dossal
Executive Director
United Nations Fund for International Partnerships (UNFIP)



Section 1

Introduction

How should politicians tackle the digital divide? The steady advance of information and communication technologies in the developed world threatens to widen the economic gap between rich and poor countries. While people in the developed world enjoy easy access to information through the Internet, email and telephony, billions in the developing world do not.

Economists have long believed that the smooth flow of information between industry and individuals is essential to making an economy efficient and productive. Alan Greenspan, chairman of the U.S. Federal Reserve Board, even went as far as crediting the use of information technology in the U.S. in the late 1990s as spurring a surge in productivity and creating a 'new economy'. There is global agreement – most governments around the world have pledged to make it easier for their citizens to benefit from information and communication technologies. At the World Summit on the Information Society in 2003, 175 countries signed up to a commitment to give more than half the world's population access to information and communication technologies by 2015.

Given the prohibitive costs of building a country-wide fixed-line telephone network from scratch, the best hope of reducing the digital divide between rich and poor countries lies with wireless technologies, particularly mobile networks. After studying the growth rates of developing countries between 1996 and 2003, the London Business School concluded that a 10% increase in the proportion of a country's population with a mobile phone would boost the country's gross domestic product (GDP) per capita by 0.59% per year. Given that most countries' GDP per capita grows by about 2% a year, this could be a significant boost.

The actual uptake of mobile phones in the developing world varies dramatically. In Kenya, 14% of the population has a mobile phone, while in neighbouring Uganda just 5% have a handset. One of the key factors governing the usage of mobiles in a particular country is the approach of the government. The allocation of radio spectrum – the oxygen of mobile communications – and the level of tax levied by governments on mobile services are vitally important in determining whether citizens can afford to own and use handsets.

If governments make radio spectrum available in a fair and reasonable manner, and service taxes are low enough, the mobile industry could reduce and eventually eliminate the digital divide for millions of people in the developing world. By 2010, many experts predict that half the world's population – more than three billion people – could have a mobile phone, enabling them to benefit from voice and simple text. By 2015, key data services such as email and the Internet in these markets will also be much easier to access. Achieving that goal will depend on the mobile industry and governments working together to make mobile phones affordable for people living on just a few dollars a day.

The mobile industry has already taken some big steps in that direction. By drawing upon the economies of scale available to the vendors of mobile networks and handsets, the cost of network base stations and handsets is falling fast. The wholesale cost of the cheapest mobile phones is set to fall to US\$25 by the end of 2006 compared with US\$50 in early 2004, thanks in part to a programme run by the GSMA to encourage mobile phone manufacturers to produce low-cost handsets for the developing world.

Mobile operators in emerging markets are expanding their coverage rapidly. Even though the mobile industry is little more than 20 years old, 77% of the world's population live in areas covered by mobile networks, according to an estimate by the World Bank. However, three-quarters of the world's population still do not have a mobile phone. In many countries high taxes appear to be a significant barrier preventing more people from using mobile communications. Governments and global institutions with an interest in development need to focus on reducing this tax barrier.

Section 1

This taxation study is the first of its kind covering emerging markets and focusing on developing public/private partnerships between the mobile industry and governments to eradicate the digital divide. It aims to raise awareness of what policy makers can do to increase the use of mobiles and stimulate their economies, based on the assumption that a reduction in taxes will be translated into lower retail prices by mobile service providers and handset retailers. This in turn leads to improved affordability of mobile services, growth in the sales of legitimate handsets and ultimately, long-term benefits to the overall economy.

The objective of this report is to provide a framework for governments and industry to inform the process of policy change required to create the conditions that can close the digital divide. By considering the structure of tax regimes, it is possible to encourage and accelerate the use of mobile communications, enabling their economic and social benefits to be available to as many people as possible around the world, without the need for a cent of aid from richer countries.



Section 2: Study Approach and Methodology

This study covers two major areas:

- **A benchmarking and analysis of the cost of tax in 50 emerging markets**, using a collection and analysis of tax data and an assessment of its impact on mobile service affordability. The research served to map markets based on the share of tax in the price of mobile services and handsets. In addition, the results of the research were leveraged to illustrate the impact of optimal tax policy on mobile service adoption in emerging markets and ultimately, to demonstrate the pivotal role played by tax policy in reducing the digital divide.
- **An analysis of potential implications of tax reduction policies, at a global and regional level.** A cross-sectional statistical analysis of market data served as a basis for modelling and assessment of the impact of alternative tax policy approaches on mobile penetration, mobile services usage and legitimate market handset sales. The result of the study is an evaluation of the costs and benefits of possible new tax policies, as measured by mobile market growth and changes in government tax revenue collection.

Model

The basis for the analysis is a market model that details the impact of alternative tax strategies on mobile service usage and handset sales, combining the two to analyse the total cost of mobile ownership. Our measure of the annual cost of mobile ownership is derived from the following formula:

Annual cost of mobile ownership = cost of handset ÷ 3 + one-off subscription fee ÷ 3 + total annual cost of mobile usage (calculated from the reported Average Revenue Per User (ARPU) and forecast as effective per minute price x monthly minutes of users x 12).

In order to calculate the annual cost of ownership, we assume a three-year lifetime for handsets, and the same lifetime for a subscription due to churn.

To assess the impact of a reduction of the tax burden on mobile usage and adoption, we forecast traffic generated by new subscribers. This involves the use of estimates of both the relationship between call minutes and the price per minute, and the relationship between the price per minute and overall mobile penetration. For the impact on the handset market, we examine the implication for legitimate handset sales of a reduction in tax, based on market prices and the estimated elasticity of demand.

The section below provides further details of the parameters included in the tax model. The technical methodology appendix describes in additional detail the sampling and estimation techniques used to derive each of the elasticity estimates.

Elasticity Estimates

The three elasticity estimates (mobile penetration, mobile minutes and legitimate handset sales) were derived from the analysis of the sensitivity of demand for mobile services and handsets. To account for the difference in income level and the competitive situation in each market, the regression models included controls for cross-country differences in GDP per capita, the scale and cost of fixed-line networks in each country, as well as controls for the total number of mobile operators in each country. The technical appendix provides a detailed description of the methodology and samples used to estimate the three elasticities. It also outlines a number of caveats regarding the robustness of the elasticity estimates used in the model. The elasticity estimates used in the model are shown in **Table 1**.

The elasticity of demand for mobile minutes can take two values, depending on whether it is for post-paid customers (0.54) or pre-paid customers (0.76). Elasticity estimates for mobile penetration (as a function of price per minute and mobile) and mobile minutes are consistent with results found elsewhere in the literature¹. Furthermore, we find that these results are statistically significant at the 5% level or better.

Section 2: Study Approach and Methodology

Table 1: Elasticity Estimates used in the Model

Elasticity of demand between	Elasticity
Mobile penetration and variable costs [*]	0.50
Mobile minutes and price per minute	0.54, 0.76
Legitimate handset sales and price of legitimate handsets	1.04

^{*}Variable costs include subscription costs and the mobile price per minute. Further details of the data and estimation techniques used can be found in the methodology appendix.
Source: Frontier Economics

The result for legitimate handset sales is less robust, mainly because it relies on a relatively small sample (30 observations). We would recommend that further research into the relationship between the demand for handsets and handset prices be carried out. Overall, given the small sample size and the central role for handset prices in the tax model, it is recommended that the elasticity estimate of 1.04 be treated as being highly indicative.

Finally, we have also tested for a relationship between handset price and overall mobile penetration. However, the analysis did not yield a statistically robust estimate of such elasticity. We believe that it would not be appropriate to conclude that there is no relationship between the price of handsets and penetration, but rather that the data presented here is inadequate to allow us to establish a robust statistical relationship.

Data

Our model draws on several data inputs, such as tax data, major market indicators, tariff and pricing data points:

- **Tax data** was supplied by Deloitte & Touche LLP 'Deloitte' for any current indirect taxes that may apply to the purchase and use of mobile telephones in each of the 50 emerging market countries that are the subject of the study. The data was provided by tax professionals in local Deloitte affiliated offices in relevant countries.
- **Market data**, including historical number of prepaid and post-paid number of subscribers, prepaid and post-paid minutes of use (MOU) was collected by Pyramid Research through primary and secondary research. Pyramid also provided its market forecasts for the base case scenario.
- **Prepaid and post-paid tariff data**, including one-off subscription fees, monthly charges and per minute pricing data was supplied by Tarifica for 135 operators in all 50 countries.
- **Handset market data** for 2004 was provided by various sources in each market. It includes total handset sales, market shares of legitimate, secondary and black markets, and average handset price for each of these market segments.

The technical appendix contains further information and summary statistics on the market, tariff and handset data used in the analysis.

¹See, for example, the study by the New Zealand Commerce Commission 'Review of the price elasticity of demand for fixed-line and mobile telecommunications services', August 2003.



Section 2: Study Approach and Methodology

Countries

Our selection of the markets is a representative sample of the emerging markets in the four regions of Africa and the Middle East, Asia Pacific, Latin America and Russia, CIS and Central & Eastern Europe, which account for as much as 80% of the global population. The choice of the markets was determined by GDP per capita and mobile penetration level, and the final selection was determined by the availability of base data, much of which privately held operators consider sensitive. In the process, for example, we dropped such markets as Yemen, where insufficient data was available. Fifty emerging markets made it to the final selection, with 21 of these based in the Africa and Middle East regions. The remaining markets are distributed as follows: 11 in Asia Pacific, ten in Latin America, and eight in Central and Eastern Europe. The resulting range of GDP per capita is between US\$107 in Ethiopia and US\$6,450 in Mexico, and mobile penetration ranges between 0.2% in Ethiopia and 60% in Poland.

Exhibit 1: List of Countries covered by the Study

Africa & Middle East	Russia, CIS and Central & Eastern Europe	Asia Pacific	Latin America
Algeria	Azerbaijan	Bangladesh	Argentina
Angola	Kazakhstan	Cambodia	Bolivia
Cameroon	Poland	China	Brazil
Cote d'Ivoire	Romania	India	Chile
Democratic Republic of Congo (DRC)	Russia	Indonesia	Colombia
Egypt	Turkey	Malaysia	Ecuador
Ethiopia	Ukraine	Pakistan	Guatemala
Ghana	Uzbekistan	Philippines	Mexico
Iran		Sri Lanka	Peru
Kenya		Thailand	Venezuela
Morocco		Vietnam	
Mozambique			
Nigeria			
Senegal			
South Africa			
Sudan			
Syria			
Tanzania			
Tunisia			
Uganda			
Zambia			

Research Constraints

This study is one of the first attempts to accurately document and establish a link between tax policy and the adoption of mobile services in emerging economies, and the potential impact that tax policy can have on mobile penetration. To paint as accurate a picture as possible, the study focuses on representative developing markets, many of which have not been tracked historically. Owing to its uniqueness and the eclectic breadth of the sample markets, the research required tremendous effort in gathering and analysing tax and operational market data, as well as an intimate knowledge of domestic market dynamics. Key constraints were as follows:

- **Data availability:** The main limitation of the study was the availability of historical data points, owing to the late emergence of mobile communications in many emerging markets. The oldest GSM networks in the 50 sample emerging markets have been around for just over 10 years. Similarly, the poor quality of the data available was a constraint for the study.

Section 2: Study Approach and Methodology

- Small number of observations, which ranged between 15 and 100 for the service model inputs, prevented us from conducting extensive time-series analysis. The results of the analysis can be used on a global level, but not on a country-specific level.
- Subjective nature of black and secondary handset market data: The data for the study was provided by handset manufacturers and distributors in the sample markets for the single year 2004. Based on this data, we were able to derive the cross-section based elasticity of handset sales and to estimate the total black handset market in the 50 sample markets. The size of the data sample, however, did not allow us to conduct a regression analysis for the change in black and secondary market demand or evaluate the exact impact of tax decrease on these latter market segments.
- Tax Data Consistency: The key difficulty in collecting and interpreting tax data was one of ensuring consistency. Deloitte spent a significant amount of time balancing the details of tax regimes in the individual countries studied with the need for simplicity so that the results could be effectively analysed and understood. The study did not involve research into, or consideration of, the practice of implementation and collection of the taxes, which are highlighted in the report. The study also did not include information on turnover/business taxes and was limited to taxes which are payable directly by the end-consumer/end-user.

As we have outlined above, a full description of the methodology and the model are available in the methodology Appendix 1.



Section 3: Analysing the Impact of Tax

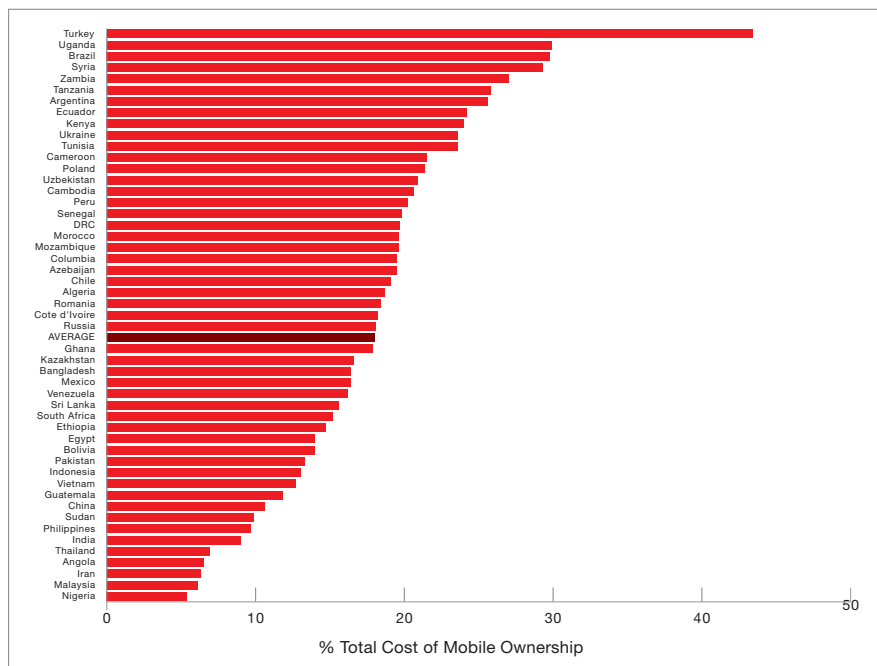
To adequately ascertain the weight of taxation in the overall cost of ownership for mobile services, the study included a review of various taxes attached to mobile services and handsets in the sample markets. The tax information for 50 emerging markets formed the cornerstone of and starting point for this research. It should be noted that the analysis is limited to taxes that are levied on end-users, therefore excluding any carrier contributions to Universal Service Funds, licence fees and contributions to regulatory authorities, taxes on profits or spectrum licence fees (unless these taxes are charged directly on mobile subscribers).² Specifically, the following taxes were included in the analysis:

- a) Fixed taxes paid at the time of subscription for both mobile and fixed telephone users.
- b) Fixed tax charges paid after subscription for both mobile and fixed telephone users.
- c) Traditional sales, variable taxes levied on mobile telephone use, e.g. VAT (or similar sales tax).
- d) Variable, telecoms-specific taxes levied on mobile telephone use.
- e) Fixed and variable taxes due on the importation and sale of mobile handsets, i.e. typically VAT (or similar tax) or customs duties.

3.1 Country Tax Benchmarks

The key task in this benchmarking exercise lies in comparing the cost of tax across 50 emerging markets. To carry out such a comparison, we calculated the share of tax in the total cost of mobile services (i.e. airtime), handsets and the overall cost of mobile ownership. Taxes on services and handsets are the two key variables in the overall tax burden associated to the cost with mobile ownership.

Exhibit 2 Tax as a Share of Total Cost of Mobile Ownership



Source: Pyramid Research based on Deloitte tax data (August 2005)

²Those additional charges were not included in this analysis.

Section 3: Analysing the Impact of Tax

To derive the estimated weight of taxation in the cost of ownership, the sum of variable and fixed indirect taxes was divided by the total annual spend of an average mobile subscriber. Calculations use average handset prices and blended ARPU data collected in the 50 markets, and assume that the life cycle of each handset and subscription is three years. Where handset pricing was not available, handset prices were assumed at a cost/insurance/freight (CIF) cost of US\$75, with an added 25% retailer margin and all customs and sales taxes.

3.2 The Impact of Tax on the Total Cost of Mobile Ownership

The analysis of tax levied on mobile services confirms tax policy as a key lever in the effort to drive mobile service adoption. As the findings of the benchmarking exercise plainly highlight, the role of taxation in the overall cost of ownership is unquestionably crucial:

- **On average, state tax collection agencies in the study's 50 sample markets keep 17.9% of the total end-user spend.**
- **When they are applied, telecom-specific and so-called special taxes are the main contributors to the heavy weight of tax**, in some cases accounting for a third to half of all mobile service tax levied by the state.
- **The top 10 markets with the highest share of taxes are Turkey, Uganda, Brazil, Syria, Zambia, Tanzania, Argentina, Ecuador, Kenya and Ukraine** (see Exhibit 2). The absence of Asia Pacific markets from this group is noteworthy: only Cambodia has a share of tax in the total cost of mobile ownership that is higher than the average of all 50 markets in our sample. Indeed, five of the Asian markets analysed are among the 10 markets with the lowest share of tax in our sample.

Turkey's combination of relatively high VAT on usage and purchase of handsets, its fixed charges on new subscriptions, as well as its annual wireless licence fees result in the highest overall cost of tax among the markets analysed, nearly 43.4% of the total annual cost of ownership. The biggest contributor to the tax burden is a 25% Special Consumption Tax (SCT) imposed by the Turkish government in 1999 as a temporary measure after the 1999 earthquake. The tax has become permanent, taking Turkey to the top of the table.

Closely following Turkey is Uganda, with overall non-recoverable taxes on importation of 27%, a VAT rate of 18% and an excise rate of 12%, all leading to a tax proportion of 29.9% in the total annual cost of mobile ownership. Similarly, Brazil and Argentina, along with Uganda and most other African governments in the study (with the exception of Nigeria and Angola), appear to apply high tax levies through a combination of taxes on both the usage and mobile phone sales. In India, Brazil and Turkey the complexities of the indirect tax system may also act as an obstacle to subscriber service adoption.

3.3 Taxes on Mobile Services

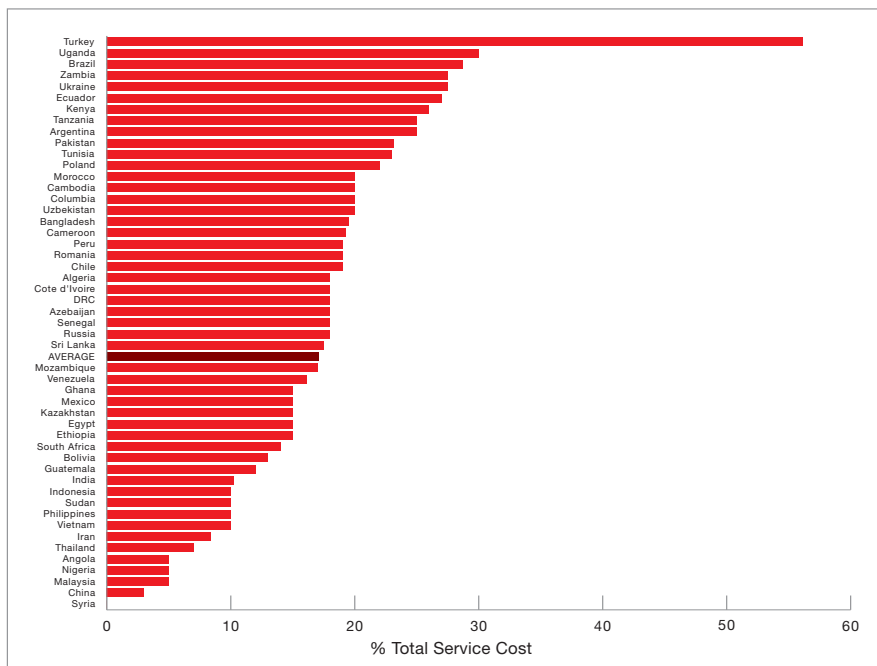
Taxes on mobile services account for a substantial portion of the overall tax burden on phone ownership. These taxes include consumption taxes and any tax charges on mobile subscription, rental charges and usage. Every country imposes some form of VAT, general sales tax (GST) or similar taxes on mobile phone usage; 35 of the countries studied impose rates between 10% and 20%. On average, 17.1% of total service revenue collected by mobile service providers in the 50 markets in this study goes to the state (see Exhibit 3).

- **At the high-end of this scale, Turkey stands out as the market with the highest cost of tax on mobile services** (see Exhibit 4). Its 56.1% share of tax in the total cost of mobile service is nearly twice as high as that of the nearest country, Uganda. While Turkey imposes a VAT rate on telecoms services that is relatively similar to the VAT applied in the other countries in the study, it carries the highest overall usage charges because of additional taxes on services, such as a special subscription tax and a special consumption tax. Brazil,



Section 3: Analysing the Impact of Tax

Exhibit 3 Tax as a Share of Total Mobile Service Cost



Source: Pyramid Research based on Deloitte tax data (August 2005)

Zambia, Ukraine, Ecuador and Kenya are additional markets with overall service taxes above 25% (for detailed tax tables, see Appendix 3).

- **At the low end of the range are China, Angola, Malaysia and Nigeria**, which all have VAT (or equivalent tax) rates at 5% or less. In fact, the majority of Asia Pacific countries have a VAT (or equivalent tax) rate lower than 10%; China's Business Service Tax is a mere 3%. Similarly, low VAT (or equivalent tax) rates of less than 10% are found in the Middle East (Iran and Syria), but fixed charges on activation in Iran and Pakistan lead to additional costs for the consumer. Iran has recently announced that it is moving towards a GST based system and this may affect its fixed charge.

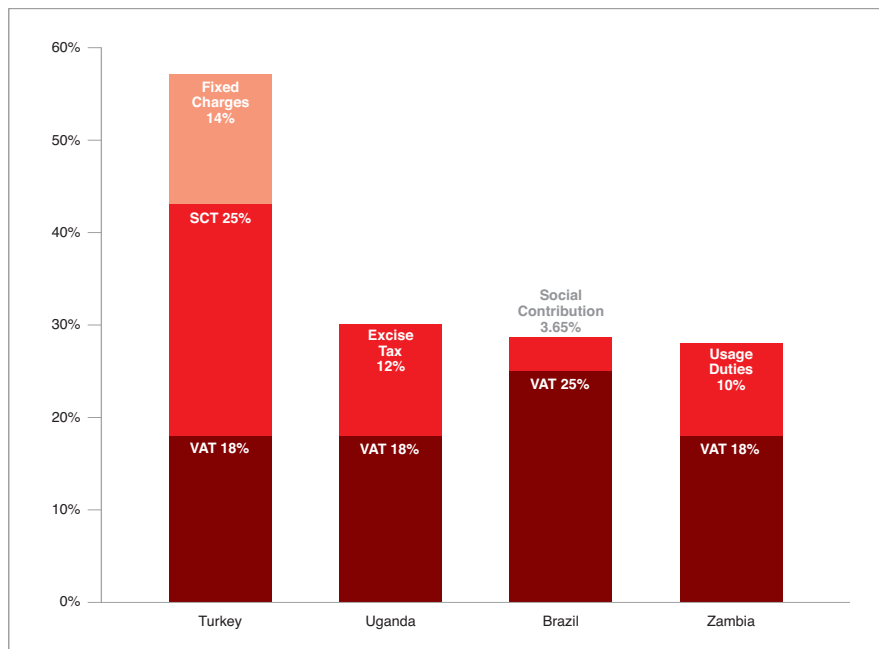
Most Significant Indirect Taxes

Most countries do not impose fixed taxes on mobile telephony. In the five markets that levy such taxes, this may be a significant additional constraint on the growth of mobile telephony. While mobile-specific taxes are generally established for social purposes, they can become an effective barrier to mobile uptake among low-income segments, consequently preventing full benefits for the overall economy. The countries in question are:

- **Turkey:** special communication tax of US\$16.52 and wireless licence fee of US\$7.39 at subscription plus wireless usage fee of US\$7.39 annually.
- **Pakistan:** SIM card tax of US\$8.36.
- **Bangladesh:** activation charge of US\$13.80.
- **Sudan:** higher education levy and 'wounded' stamp duty US\$1.48.
- **Iran:** new subscription tax and rural areas telecom development tax of US\$4.40 is levied on prepaid subscribers.

Section 3: Analysing the Impact of Tax

Exhibit 4 Examples of Countries with Special Mobile Service Taxes*



*Based on estimated ARPU during the first year.
Source: Pyramid Research based on Deloitte tax data (August 2005)

Taxes on Mobile vs. Taxes on Fixed

While mobile is widely recognised as equivalent to fixed communications in terms of providing connectivity, there are still significant differences in some countries in the tax treatment of these two communications platforms. Turkey and Uganda have the highest difference between fixed and mobile tax rates. Turkey is quite extreme: apart from a 10% higher special communication tax – 25% on mobile vs. 15% on fixed – mobile users need to pay a special communication tax of US\$16.52 and a wireless licence fee of US\$7.39 at subscription, plus wireless usage fee of US\$7.39 annually. In Uganda, the 12% excise duty is payable on mobile but not fixed telephony. In the 16 countries where fixed and mobile are treated differently, the indirect tax burden with respect to mobile telephony appears to be less than that in the fixed-line business only in Ghana and Syria.

3.4 Taxes on Mobile Handsets

Taxes on handsets are the second significant variable in the overall cost of mobile ownership. Taxes on handsets consist of import duties, which are built into the retail price of a handset, as well as a sum of sales and VAT taxes, and handling taxes paid directly by a consumer. On average, taxes account for 19.8% of total handset costs, with 25 markets levying higher taxes than average (see Exhibit 5).

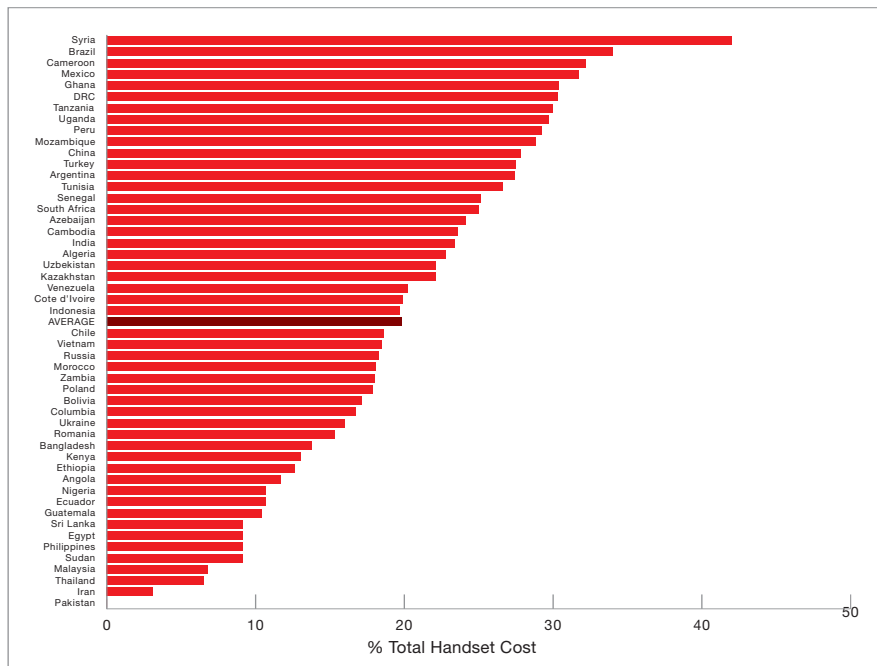
Nearly half of the markets reviewed levy higher than average taxes on mobile handsets.

- **At the high-end of handset taxes are markets such as Syria, Brazil, Cameroon, Ghana and Mexico** (see Exhibit 6). Syria charges between US\$14.3 and US\$33.4 in fixed taxes in addition to a combination of 20% consumption and expenditure tax and 45.6% customs duty – all of these add up to 52% of tax in the retail price of a handset. Syria is followed by Brazil, where the handset tax burden is even higher than that of service taxes. This is due to the combination of 22% VAT, 9.25% Social Contribution on Revenues tax,



Section 3: Analysing the Impact of Tax

Exhibit 5 Tax Share of Total Mobile Cost



Source: Pyramid Research based on Deloitte tax data (August 2005)

and 20% customs duty. Not all handsets sold in Brazil are subject to the customs duty, as there is a significant local manufacturing capability in the country; without customs charges Brazil falls to the number 17 place in the handset tax ranking. However, due to high service tax, even after the reduction of customs duty, Brazil retains its overall third place in the ranking. Cameroon, Mexico, Ghana, Democratic Republic of Congo (DRC) and Tanzania all have a share of handset taxes above 30% of the overall handset cost.

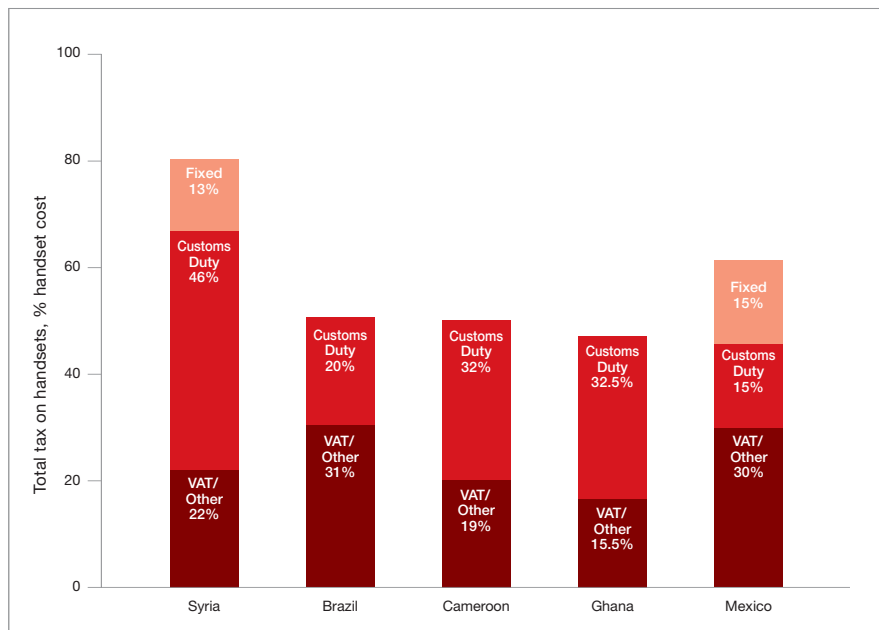
- **At the low-end of the taxation spectrum are 11 countries, whose governments do not impose any non-recoverable taxes** (customs duty and other non-recoverable taxes) on the importation of mobile handsets. The majority of European countries, for example, have a zero duty rate, as do Kenya, Guatemala, Thailand, the Philippines, Malaysia and Bangladesh. Central European markets have been the best examples illustrating the positive impact of zero duty: in Romania and Poland, the elimination of import duties as part of an effort to bring tax systems closer to the European Union (EU) framework in the late 1990s led to the establishment of legitimate handset markets and to a healthy growth in mobile penetration. Other markets at the low-end of the handset taxation scale include Iran, Sudan, Bangladesh and Pakistan, though in these countries the benefit at low handset taxation is reduced by other fixed charges.

3.5 Alternative Telecom Taxation Models

The headline data gathered clearly shows that the burden of tax on services, handsets and the overall cost of mobile ownership is substantial in a number of emerging markets. This would be expected to translate into a negative impact on mobile service adoption, driving the need for alternate taxation models if the digital divide is to be bridged.

Section 3: Analysing the Impact of Tax

Exhibit 6 Tax as a Proportion of Mobile Handset Cost in Sample Markets*



*Based on cost of mobile handsets during the first year.
Source: Pyramid Research estimates based on Deloitte tax data (August 2005)

While elements of this study may be used as a basis for policy suggestions, it should be acknowledged that such recommendations require further research and economic analysis beyond the scope of this study. However, in highlighting the impact of alternative tax models on overall mobile service adoption and tax revenue, this study seeks to establish a starting framework for identifying optimal, growth-oriented tax policy.

The study undertakes to analyse the impact of relatively small changes in VAT and customs duties on the overall cost of mobile ownership. More importantly, the study also considers two alternative tax approaches that governments in emerging markets can implement to accelerate service adoption in the lower-income segments of the population, thus contributing to a bridging of the digital divide:

- **A reduction of the rate of taxes applied to purchase and usage of mobile phones and the removal of telecom-specific taxes**, to spur mobile service adoption; an ancillary benefit would be a simplification of taxation policies, especially in markets that exhibit higher than average tax complexity.
- **Selective tax breaks to stimulate development of mobile markets**: One such scenario involves a reduction in customs duties on technology, a trend backed by World Trade Organisation initiatives; this is particularly important, owing to the greater sensitivity of demand for handsets, especially in the lower income segments of the population. This study therefore also analyses the elimination of taxes on low-end handsets, as these are perceived to be crucial for connecting the next billion mobile subscribers. Such tax breaks would allow for a specific targeting of low income groups that currently have limited or no access to mobile services.

The next section of the study examines the impact of these tax changes on the 50 markets analysed as part of this study.



Section 4: Impact of Tax Changes: Global Analysis

To ascertain the impact of alternative tax models on penetration, handset sales and tax collection, scenario analysis was conducted, using available data for all markets. This section analyses the following alternative scenarios for tax policy:

- A reduction of 1% in VAT for all 50 markets.
- A reduction of 1% in customs taxes in all 50 markets.
- A removal of telecom-specific taxes in the 19 markets where such taxes are applied.
- A removal of all customs and sales taxes on low-cost handsets, defined for the purposes of this research as handsets with a cost/insurance/freight (CIF) at US\$30.

The discussion of the impact of tax changes is conducted in greater detail at a global level, since only global elasticities could be derived from the data available and used for scenario projections. It should be noted that countries with lower levels of penetration are likely to have higher price sensitivity and therefore greater increases in penetration and usage as a result of changes in tax policy.

4.1 Analysis Framework

The above changes in tax policy are expected to have an impact on three key mobile operational indicators. Using the tax rates described in the previous section, as well as elasticities derived from the regression analysis, the impact of lower taxes on penetration, usage and handset sales is assessed as follows:

- A reduction in subscription taxes and usage tariffs leads to a higher uptake of new subscribers.
- Lower prices result in higher voice usage in the mobile services market.
- Finally, a reduction in handset tax spurs sales of legitimate handsets, and potentially minimises the size of the black market.

In order to compare the impact of various tax changes, a base case scenario was created for all 50 markets, which projects market development and tax revenue collection over the next five years, assuming a constant tax structure. All changes in penetration, handset sales, usage and tax revenue collection are compared against this base scenario and calculated for a five-year period (2006 to 2010). The base case scenario projects real market developments in the 50 sample markets, with a number of assumptions used to forecast penetration, usage and handset sales. Simultaneously, additional assumptions were made to enable the comparison of different scenarios:

- It was assumed that all changes in taxes would be translated into equivalent changes in prices, in addition to any market-driven tariff changes, e.g. competition and declining cost of infrastructure and devices.
- The analysis also assumed that all tax change measures are introduced in early 2006, and their full impact is felt by the end of the first year, although in reality the impact of the changes may be more delayed.

The results of the scenario assuming the reduction of telecom-specific and special taxes in 19 markets are presented alongside the results of scenarios applied to all 50 markets in order to allow for a side-by-side comparison of the overall impact of each change in the tax model.

Section 4: Impact of Tax Changes: Global Analysis

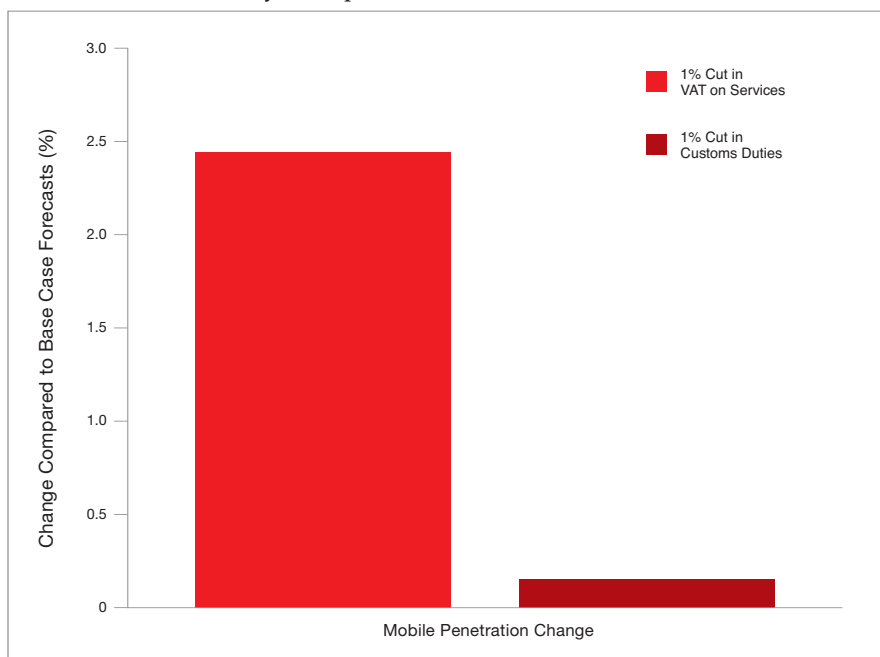
4.2 Global Analysis of Tax Changes

4.2.1 Evolution of Penetration and Impact of Tax Changes

The universe of 50 emerging markets chosen for our analysis has a population of 4.83 billion people, 80% of the total population worldwide. At the end of 2004, there were a total of 905 million mobile subscribers in these markets, accounting for nearly 50% of the global total. Their penetration level was only 19% compared to a global average of 30%. Our base market projections assume that growing competition and declining prices for handsets and infrastructure will become strong drivers of mobile adoption in the next five years in all of these markets; during this time, one billion new subscribers will be added by service providers, doubling penetration levels to 37% by 2010. What can the governments do to achieve an even greater subscriber growth?

The analysis of the scenarios showed that reductions in telecom specific/special taxes would have the biggest impact on growth in mobile penetration. Cutting telecom-specific taxes altogether in all 19 markets would save each consumer an average of over US\$13 in taxes per year (a reduction of 24% from the current level of US\$56) and increase the total number of mobile subscribers in the 19 markets that levy such taxes by 34 million, or 8% by year 2010. Two other scenarios, 1% reduction of VAT on mobile services and 1% reduction of customs duty, would lead to a lower projected mobile subscriber growth compared to the base case (see Exhibit 7).

Exhibit 7 Scenario Analysis: Impact on Penetration



Source: Pyramid Research



Section 4: Impact of Tax Changes: Global Analysis

The measurement of price and penetration

Measuring the relationship between handset sales and prices is a relatively simple exercise – the vendors record volume sales and these numbers can be added up per country or per region as required.

Penetration is an indirect measure, one that varies due to factors such as population size, distribution, network coverage, socio-economic profiles, and the black market – which can have a large impact. Handsets recorded as sold in one country may be used in another; handsets may be shared or resold.

This 50-market study is not at the level of detail to find a highly variable relationship between sales and penetration, or handset price and penetration. However, what we have found is a relationship between handset price and handset sales and usage cost and penetration. This suggests that a combination of exemption of handset taxes and reduction in usage tax would drive the market and in some cases have a positive impact on tax revenues.

Professor Leonard Waverman and Kalyan Dasgupta of the London Business School and LECG have used Pyramid Research data, in conjunction with available information on usage costs from the OECD and from private mobile operators in the developing world, to run an economic model of the impact of taxation on mobiles on economic growth.

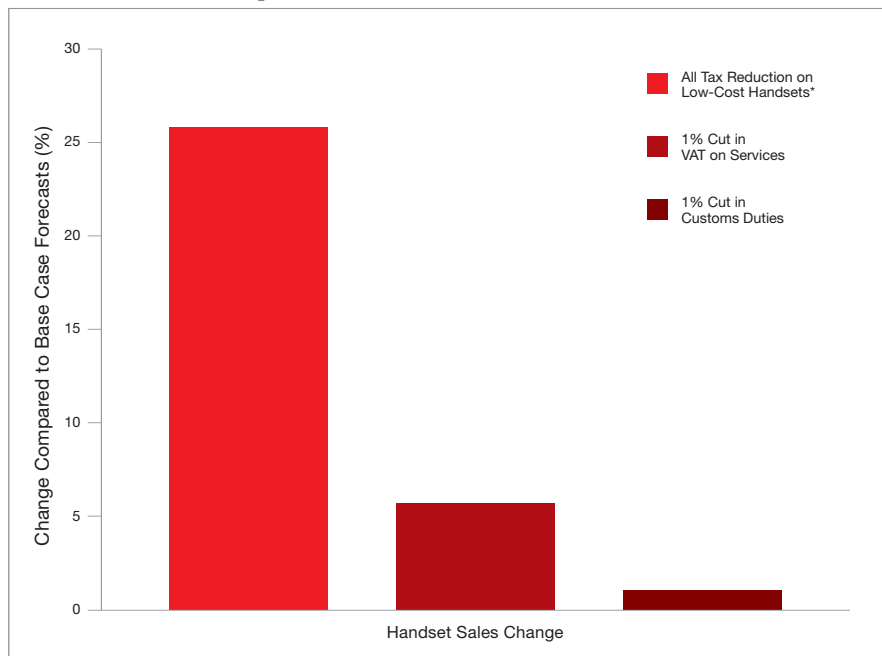
This work, together with other recent research, has established a positive and statistically significant relationship between long-run average economy wide growth and long-run average telecom penetration. The results estimate that making low-cost handsets and mobile phone services exempt from value added taxes and customs taxes would, over time, lead to an increase in mobile penetration of between 9.8 and 19.6 percentage points. Please refer to Appendix 4 for further information on the econometric model by Professor Leonard Waverman.

Section 4: Impact of Tax Changes: Global Analysis

The scenario of the reduction of all taxes on low-cost handsets was shown to have the biggest impact on handset sales in units and potential additional tax revenue for governments. Along with the telecom/special tax reduction scenario, it stands out for its potential impact on penetration. While it was not possible to prove statistically the relationship between tax cuts on low-cost handsets and mobile penetration growth due to the paucity of data, it is reasonable to expect that a large number of the low-cost handsets sold over the five-year forecast period will be purchased by new subscribers from low-income segments.

If all import duties and sales taxes were removed from low-cost handsets (priced at US\$30), an estimated 930 million low-cost handsets would be sold over a five-year period. Some of these sales can be expected to cannibalise a small portion of legitimate handset sales, but they will also substitute a portion of the black market sales. A completely new product in the market, many of these handsets will be purchased by entirely new low-income subscribers, with a potential of generating as much as 25% growth in global handset unit sales (currently estimated at 700-800m units annually) over the next five years (see **Exhibit 8**). As new low-income subscribers pay incremental service taxes, they will make up for the loss of revenue from reduced handset taxes, creating additional tax revenue potential between US\$25-45 billion over a five-year forecast period.

Exhibit 8 Scenarios: Impact on Handset Sales



*Represents increase in low-cost handsets only.
Source: Pyramid Research



Section 4: Impact of Tax Changes: Global Analysis

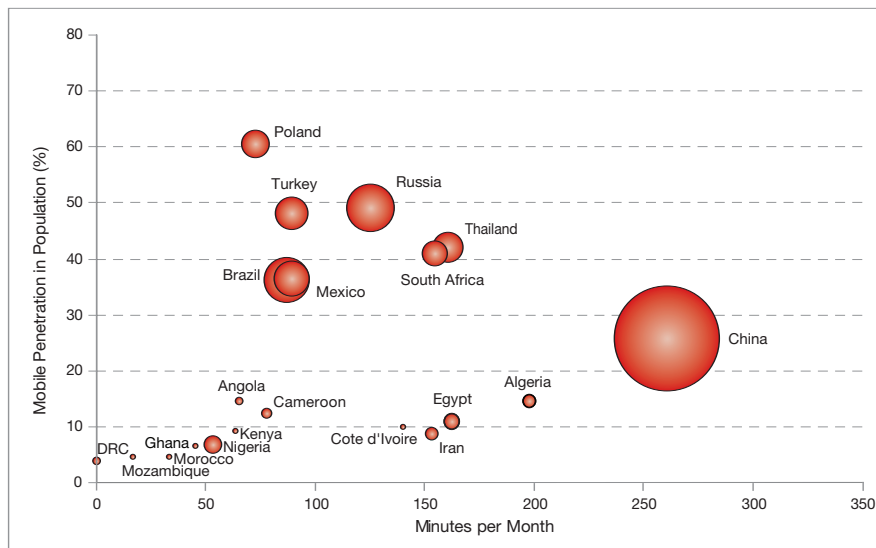
4.2.2 Evolution of Usage Patterns and Impact of Tax Changes

Average global minutes of use (MOU) in the above 50 emerging markets were as high as 171 in 2004; however, this is mostly due to the high mobile usage in Asia Pacific and a high share (two-thirds) of the region's population in the sample's total (see **Exhibit 9**). The main markets with high usage are India, China and Indonesia, where mobile usage has been given a boost by weak fixed-line infrastructure.

Usage in Africa & the Middle East, Latin America and Central & Eastern European markets, on the other hand, averaged only 100 minutes per month, with the lowest MOU at only 17 minutes in Mozambique. The base case forecast scenario projects that MOU will grow at about 3% per year in the next five years, driven by two contrasting trends. Firstly, the addition of new prepaid subscribers will drive MOU down. At the same time, in a number of markets with higher penetration levels, such as Russia, Brazil and Poland, MOU have already started growing in the last two years due to steep price declines and fixed mobile substitution. Average usage in these markets is expected to continue to grow throughout the forecast period.

As with penetration, a reduction of all telecom/special taxes would also be the catalyst with the biggest impact on the MOU: in 2010, this scenario would exceed the base scenario by more than 16%. In the scenario of reducing VAT on services by 1%, MOU is projected to grow by just over 5%, less than in the telecom/special taxes scenario, with even smaller growth yielded in the scenario of 1% customs duty reduction (see **Exhibit 10**).

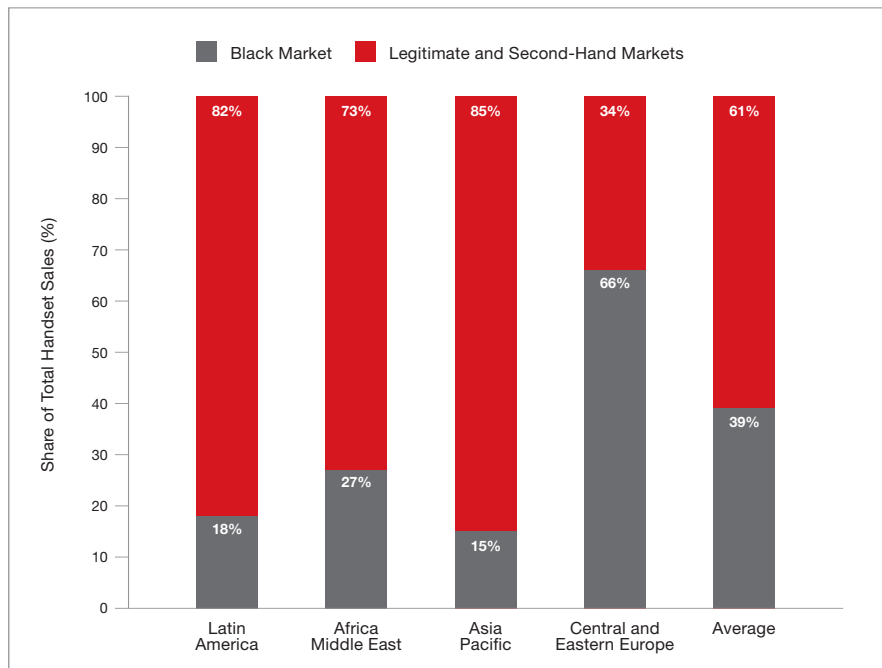
Exhibit 9 Sample Markets: Mobile Penetration and Usage, 2004



*The size of the bubble indicates the number of mobile subscriptions relative to the overall subscriptions in the region.
Source: Pyramid Research

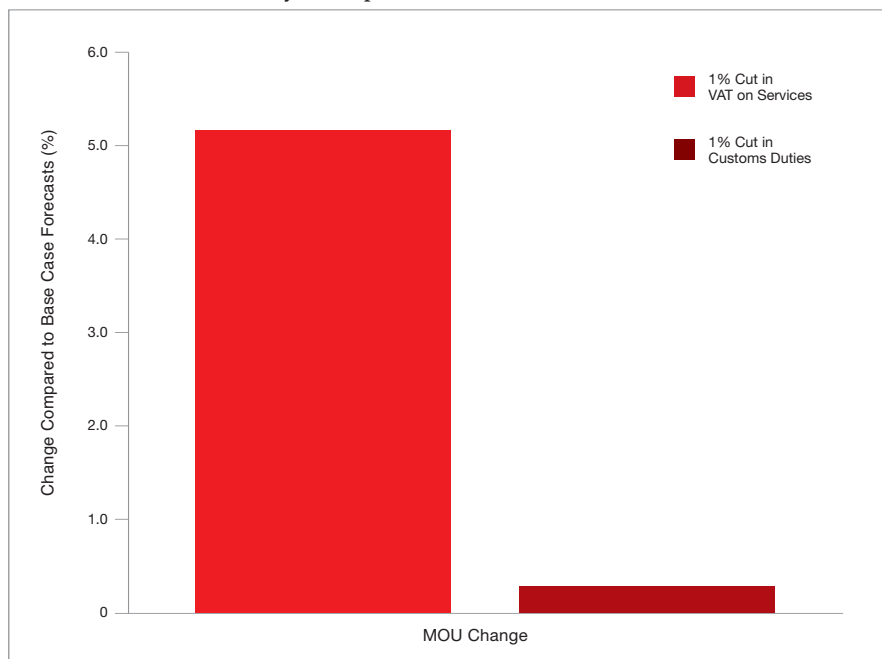
Section 4: Impact of Tax Changes: Global Analysis

Exhibit 11 Share of Black Market in Total Handset Sales, 2004



Source: Pyramid Research, local distributors

Exhibit 10 Scenarios Analysis: Impact on MOU



Source: Pyramid Research

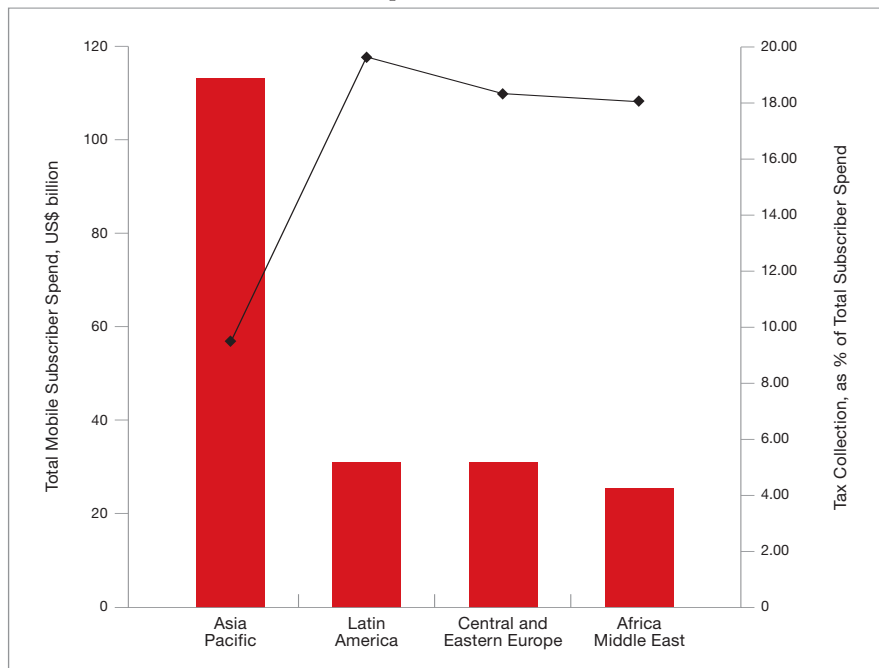


Section 4: Impact of Tax Changes: Global Analysis

4.2.3 The Black Market for Handsets and Impact of Tax Changes

The final important component of the analysis focuses on the black market for handsets. Black markets, in our definition, include handset sales that bypass official channels, therefore representing a loss in handset tax revenue for the government (see **Exhibit 11**). On average, only 61% of total sales are captured by the governments in the 50 markets analysed, with the highest share of (66%) in Central and Eastern Europe. This has translated into a revenue loss of US\$2.7billion in handset taxes globally in 2004 and into an anticipated loss of US\$24.5billion over the next five years.

Exhibit 12 Total Mobile Subscriber Spend and Tax Collection Share, 2004



Source: Pyramid Research

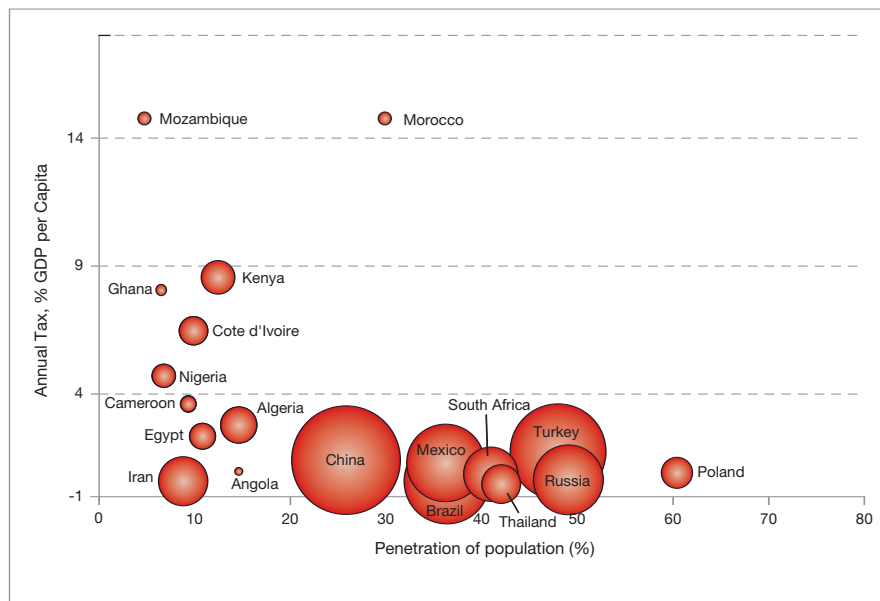
Section 4: Impact of Tax Changes: Global Analysis

4.2.4 Tax Revenue Collection and Impact of Tax Changes

In 2004, total end-user spend on mobile handsets and services in the 50 sample markets reached US\$193billion, of which the 11 Asia Pacific markets accounted for 57.7% (see Exhibit 12). In the same year, government tax agencies collected over US\$21billion in taxes. The share of tax payments in the total spend was the highest in the Latin America region at 19%, while Asia Pacific had the lowest share of tax contribution (6%).

In addition to the tax share in the total cost of mobile ownership, the share of annual tax payments by an average mobile subscriber as a percentage of GDP per capita was taken to assess the connection between tax and penetration. It is worth noting that the share of tax in the overall GDP is also indicative of an overall cost of mobile service and handset, which in itself is a function of the competitive situation and maturity of each market. The graphical analysis above (see Exhibit 13) shows that a negative relationship exists between the absolute annual tax payment and penetration.

Exhibit 13 Penetration and Share of Tax in GDP per Capita, 2004



The size of the bubble indicates the size of each market's share of tax collection in GDP relative to the global average.
Source: Pyramid Research



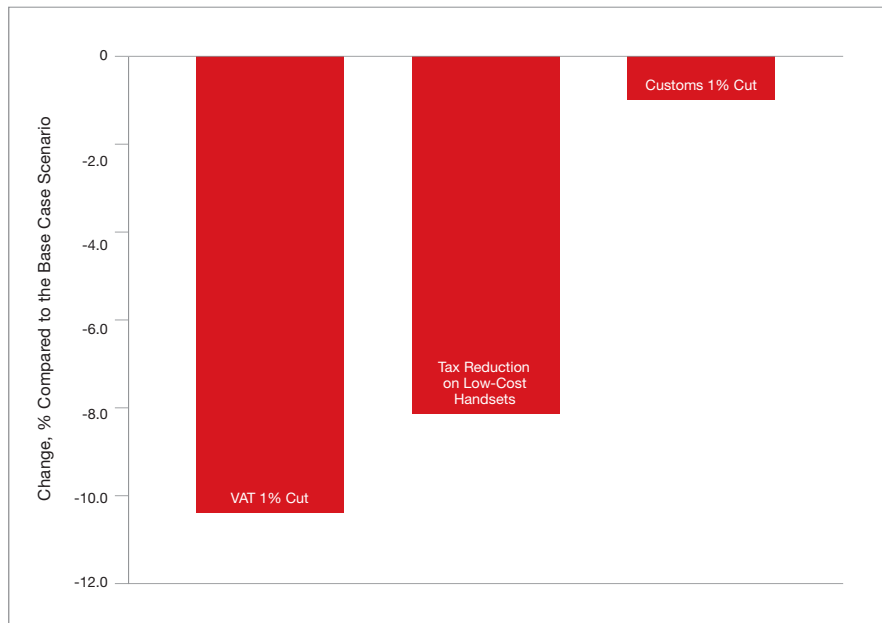
Section 4: Impact of Tax Changes: Global Analysis

Scenario Summary

All scenarios have been shown to result in lower short-term tax collections compared to the base case scenario (see Exhibit 14). A reduction in 1% customs duty is the least costly of all 50-market scenarios, as the proportion of customs duties in the total cost of mobile ownership is relatively small. Similarly, the tax shortfall is low if all telecom-specific and special taxes are eliminated in markets that levy such taxes, with strong market growth compensating for the loss of telecom/special tax revenue. In all scenarios, the shortfall is not as high as could be expected, between a high of -0.04% of GDP in the tax cut on low-cost handsets and a low of -0.004% of GDP in the 1% customs tax reduction scenario. Even these losses are now always certain, as markets with lower penetration levels and higher price sensitivity could be expected to grow at a faster pace and make up for the tax reduction. Each market requires separate independent analysis to derive definitive results.

The customs duty reduction scenario had the least impact on market growth, due to its comparatively low share in the total cost of mobile ownership. The reduction of telecom/special taxes, on the other hand, proved that the suggested new tax strategies are an effective tool that governments have to increase teledensity and if adequately executed, their impact could be both rapid and far-reaching.

Exhibit 14 Scenario Impact on Change in 5-Year Tax Revenue Collection, Compared to Base Case Scenario



Source: Pyramid Research



Africa & Middle East



Section 5: Impact of Tax Changes: Regional Analysis

This section presents our projections of the base case scenario for four regions covered in the study.

5.1 Africa & Middle East: Lowest Penetration and High Tax Burden

5.1.1 Sample Market review: Least penetrated among sample markets in the study

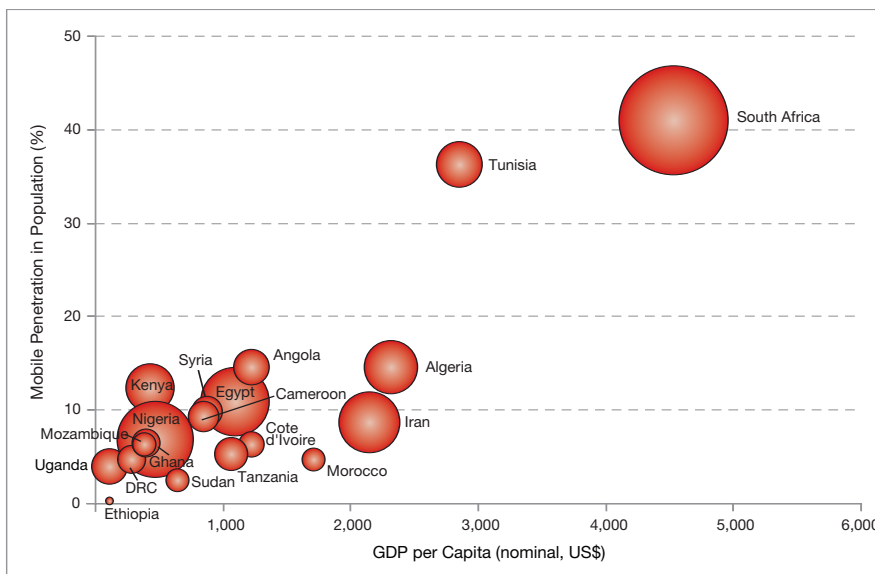
For the purposes of this study, we analysed a sample of 21 markets across Africa and the Middle East. The markets examined have a total population of about 780 million, nearly 90% of the region's total population. The African mobile subscriber base in these markets amounted to about 81 million at the end of 2004, and similarly accounts for more than 90% of Africa and the Middle East's total mobile subscriber base. Overall penetration in the sample markets is estimated at about 10%, the lowest of all the regions analysed as part of this study (see Exhibit 15).

We anticipate strong subscriber growth in these markets throughout 2010, all things being equal, with competition continuing to drive subscriber adoption. By 2010, we estimate that penetration will rise to nearly 25%, a level that would still omit three-quarters of the population in that region. Indeed, a number of markets such as Ethiopia and Mozambique would remain below the 20% penetration threshold.

Traffic in the examined markets is moderate, with average monthly usage slightly below 100 minutes. This average reflects the strong proportion of prepaid customers in the sample (more than 75%) and their relatively lower usage levels. Over the base case forecast period, the influx of new prepaid, generally low-income subscribers will only be partially compensated by higher usage from existing subscribers.

The overall handset market in the sample countries is estimated at about 55 million units, with a total sales value of around US\$4.7billion. Nearly 20% of this revenue is generated in the handset black market, with the estimated loss of tax revenue of US\$265million in 2004.

Exhibit 15 Penetration and GDP per Capita for Selected African and Middle East Markets, 2004



The size of the bubble indicates the number of mobile subscriptions relative to the overall subscriptions in the region. Source: Pyramid Research



Section 5: Impact of Tax Changes: Regional Analysis

5.1.2 Taxation regime in Africa and the Middle East: Five Markets Amongst Top Ten with the Highest Tax Burden

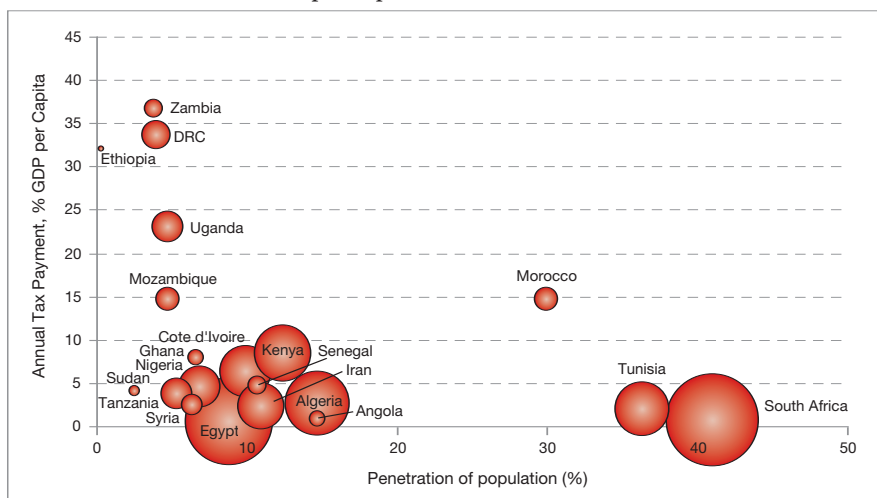
Africa and Middle East markets with an average GDP per capita of only US\$1,090 and 13 out of 21 markets in this study below the average worldwide stand to benefit the most from lowering the cost of mobile subscription. The majority of the markets analysed in the region have tax share ratios in the 15%-20% range, with a few outliers such as Angola and Nigeria seeing tax burdens below 10% (see Exhibit 16). In 2004, governments in the 21 markets included in our sample collected US\$3.8billion in tax revenues from indirect taxes, which represented a tax share of around 17%, the second lowest among four regions, and contributed 0.44% toward the total nominal GDP. Nearly 80% of the tax is collected from recurring mobile services, with the balance being generated from taxes on handset sales.

Despite moderate average share of tax for the whole Africa and Middle East region, five out of 10 markets with the highest overall share of tax in the total cost of ownership belong in the Africa and Middle East region – among them Uganda, Syria, Zambia, Tanzania and Kenya. Mapping the Africa and Middle East markets according to their mobile penetration and total share of tax spend as a proportion of GDP per capita shows that markets with the highest share of tax tend to have the lowest level of adoption. Penetration levels in South Africa, Tunisia and Morocco are explained by higher GDP per capita.

It can be argued that taxes are not the only driver of high prices on handsets and services: Ethiopia's only mobile operator ETC, for example, charges US\$97 to connect a contract subscriber and US\$52 to connect a prepaid user; no taxes are charged on this amount. However, it is worth noting that ETC is state-owned, thus all of its revenues pass to the government.

A reduction in telecom-specific/special taxes applies to eight Africa and Middle East markets – Algeria, Ghana, Iran, Kenya, Tanzania, Tunisia, Uganda and Zambia. Altogether, these markets have a population of 241million and an average mobile penetration of 10%.

Exhibit 16 Tax Share in GDP per Capita and Penetration



The size of the bubble indicates the size of each country's mobile tax revenue relative to the overall tax revenue in the region.
Source: Pyramid Research



Section 5: Impact of Tax Changes: Regional Analysis

Africa – Certainty and clarity of taxation will encourage investment

The key requirement for an investor putting capital at risk in any country is a fair measure of certainty. From a taxation perspective, an investor would require certainty on the treatment of operating profit, management fees, royalties and technical fees and the eventual gain or loss on disposal of the investment.

Some African governments appear to take cognisance of the fact that infrastructure deployment is key to the continued development of many African countries and, as a result, recognise the need to attract foreign direct investment and are willing to reward an investor who, either directly or indirectly, contributes to the development of this infrastructure.

It is also encouraging to note that most African jurisdictions have adopted the VAT system, and thus aligned themselves with current tendencies in the global economy.

There are, however, some areas where domestic tax laws differ from the internationally accepted treatment. These include input tax credits, which should be allowed where, reverse charge VAT is imposed on an imported service:

VAT on interconnect cost paid, which should also be allowed as an input tax credit, as this cost is an integral part of doing business in this industry, and excise duties on the sale of airtime. Whilst it does create revenue for the government, it also increases the cost of a call, which may be counter-productive to the interests of these governments in promoting growth.

Certainty is also required as to how licence fees would be treated from an income tax point of view, what capital allowances will be available on network equipment, and which costs could be deducted in relation to the acquisition of existing subscriber bases from other companies.



‘Overall, there have been some very positive developments with respect to investment in the African continent, driven by the African countries’ governments’ recognition of the need to attract and maintain direct foreign investment.

‘There are, however, still some barriers to investment created by the fiscal policies in some countries, which if addressed, can only enhance the investment climate in these countries.’

Phuthuma Nhleko
CEO, MTN Group



Section 5: Impact of Tax Changes: Regional Analysis

Africa – Climate must encourage healthy cycle of investment

Economic growth in Africa could soar if governments took a more far-sighted approach to taxation. Cellular telephony is one of the most taxed industries on the continent, and has been one of the biggest obstacles to higher teledensity. The challenge is to persuade governments to shift their focus from the short-term benefits of taxation to the long-term and more lucrative benefits of boosting economic growth through telephone penetration.

In the study 'Africa: The impact of Mobile Phones' by Vodafone it was found that economic growth in a developing country could be boosted by as much as one per cent with a cellphone penetration of just 27%.

In South Africa alone, Vodacom is subjected to a wide range of direct and indirect taxes on income, spectrum, revenue, imports and sales, amongst others. Excluding the standard income tax on companies of 29%, Vodacom has to date paid over 3 billion Rand in service and spectrum licence fees and in contributions to universal service and human resources funds, which has increased our effective tax rate to 37%. In addition, Vodacom has numerous other licence obligations such as a subsidised community phone service that now generates 80 million minutes on 25,000 phones every month.

Government policies in the past have often been inconsistent. In one country, Vodacom's network investment was encouraged by removing import duties on equipment, but a 25% duty was subsequently imposed on the import of handsets.



'High taxes reduce return on investment, limiting investors' interest in capital-intensive network expansion. And when there's no network growth, telephone penetration doesn't increase and prices remain high.'

'A climate that nurtures economic growth encourages the healthy cycle of investment, network expansion, higher telephone penetration and an affordable service. This is the cycle that can help Africa to bridge the digital divide and achieve sustainable economic growth.'

Alan Knott-Craig
CEO, Vodacom Group



Bringing down the Digital Divide – How Mobile Communications will Underpin the Economic Uplift of the World's Aspiring Poor

It is clear that the defining change in the world's poorest economies will be led by revolution in access to communications and not, as in the world's most advanced economies, by the evolution of IT. Economic and rapid network build times and high consumer demand combine to make mobile communications not a replacement for PC and fixed-line telecommunications but the only way by which billions of people in the world will access not only voice and simple text services but ultimately the whole range of content and applications that are enjoyed in developed economies.

This transformation will drive the growth of these economies. Communications is as much a part of the underlying infrastructure upon which economic and social advancement depends as roads, schools and banks. Governments must create the conditions for the rapid and complete access to communications that society needs.

The mobile industry has already done a lot of the work in seeking business opportunities and profits at the bottom of the pyramid. Initiatives like the GSMA's Emerging Market Handset programme reducing the entry level cost of handsets, individual operator strategies like the Grameen Village Phone and the implementation of micro pre-pay top-ups make the industry possibly unique in its leadership and focus in this sector. Governments now must match what industry has started.



*C K Prahalad is the Harvey C. Fruehauf Professor of Business Administration at the University of Michigan Business School, specialising in corporate strategy. His books include *The Fortune at the Bottom of the Pyramid: Eradicating Poverty through Profit*, selected as one of the best books of 2004 by *The Economist*, *Fast Company* and *Amazon.com*. He was a member of the UN Commission on Private Sector and Development, and serves on the Board of Directors for NCR Corporation, Hindustan Lever Limited and the World Resources Institute.*



Asia Pacific



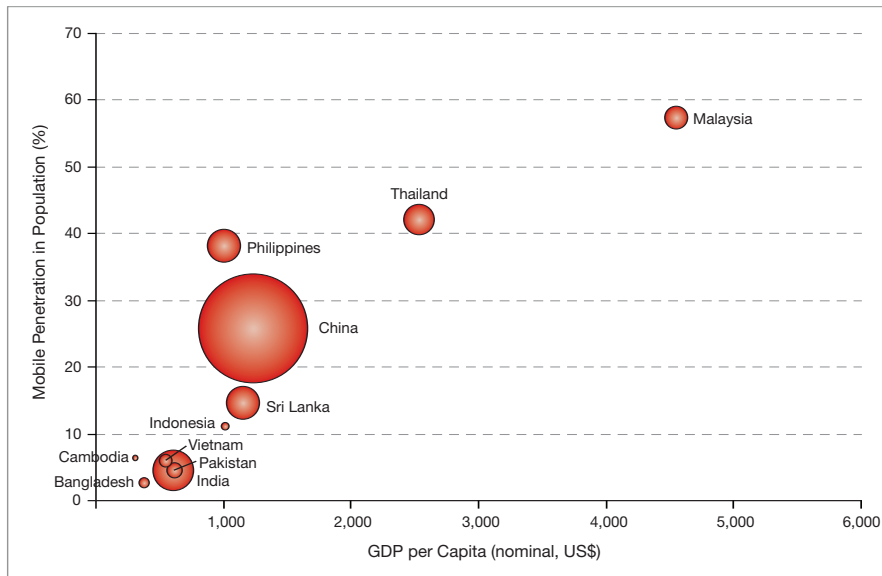
Section 5: Impact of Tax Changes: Regional Analysis

5.2 Asia Pacific Data Analysis

5.2.1 Sample Market Review: Largest Mobile Region with the Highest Usage

Eleven emerging Asia Pacific markets represent the largest sample population included in our study, covering 3.4 billion people, or 93% of total Asia Pacific's population. At the end of 2004, these markets had 510 million mobile subscribers, the second lowest penetration of 16% among the four analysed regions (see Exhibit 17).

Exhibit 17 Penetration and GDP per Capita for Emerging Asia Pacific Markets, 2004



The size of the bubble indicates the number of mobile subscriptions relative to the overall subscriptions in the region.
Source: Pyramid Research

Asia Pacific emerging markets have low overall penetration, which is likely to imply that high-end users constitute the majority of all subscribers. As a result, 11 of the sample Asia Pacific markets have the highest MOU among four regions in this study: 225 minutes per user per month. The most notable exception to the rule is the Philippines, with MOU as low as 27 minutes – this is partly due to the Philippines having the highest level of SMS substitution of voice in the world, with an average 146 SMS sent by its mobile subscribers monthly. Our base scenario forecast assumes MOU growth of 5%, primarily due to the growth in China and India, fixed-mobile substitution.

Finally, the black market is estimated at US\$4.45 billion in 2004, 27% of total handset sales. This share, however, is higher without China and India, where black market sales are estimated at 5% and 20% respectively. In five out of 10 of the remaining Asia Pacific markets, black market handset sales account for more than 55% of the total, translating into a tax loss of US\$310 million.

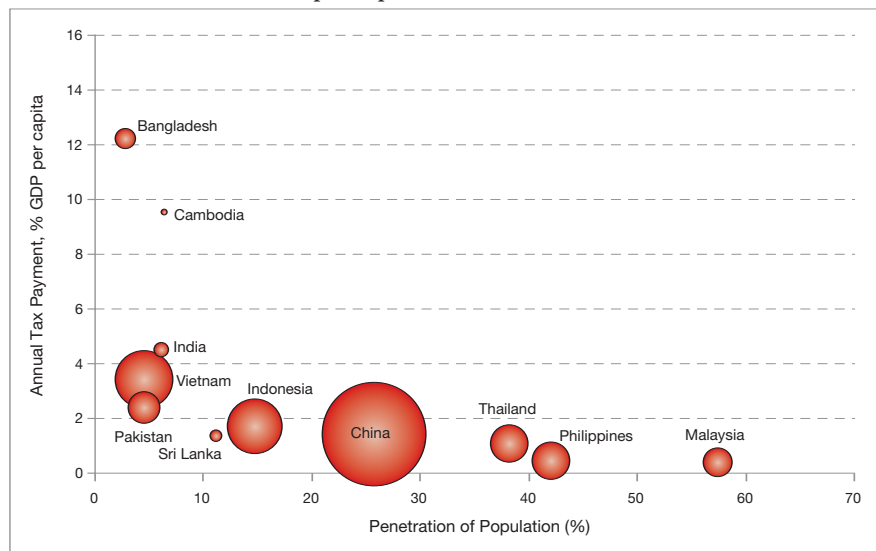


Section 5: Impact of Tax Changes: Regional Analysis

5.2.2 Taxation Regime in Asia Pacific

Asia Pacific sample countries have the lowest average tax share of 6.9% amongst the four studied regions, with all the markets in the sample at less than global average (see Exhibit 18). Four markets in the Asia Pacific region (Malaysia, the Philippines, Thailand and Pakistan) have no customs duty, and the Philippines, with a similar GDP per capita to Tanzania in Africa, had a mobile penetration of 7.5 times higher at the end of 2004.

Exhibit 18 Tax Share in GDP per Capita and Penetration, 2004



The size of the bubble indicates the size of the total tax revenue relative to the overall tax revenue in the region.
Source: Pyramid Research

As a result of relaxed taxation regimes, total indirect tax collection for the 11 markets amounted to US\$6.65 billion in 2004, which contributed 0.21% towards the total nominal GDP – the lowest contribution among the four regions.

This could be a primary explanation of the lower mobile penetration in the sample Asia Pacific markets compared to those in Africa and the Middle East, despite the lowest regional GDP per capita in the global sample of US\$967. Nevertheless, telecom-specific/special taxes are imposed in two markets with the lowest income level of less than US\$400 – Bangladesh and Cambodia. In Bangladesh, the government also recently introduced a US\$4.6 SIM card tax on prepaid and post-paid subscriptions, which can become an additional deterrent for new subscribers.

Despite the lowest overall tax burden, emerging Asia Pacific markets have a high share of black market sales. This also occurs in markets which have the lowest handset taxes, for example Malaysia and the Philippines. It is impossible to recommend an effective tax policy to tackle this challenge, although a focus on enforcement and growing per capita incomes are likely to improve the situation.

Instead, the focus of the analysis has been on telecom-specific/special taxes, which affect four particular Asia Pacific markets: Bangladesh, Cambodia, Pakistan and Sri Lanka. Cambodia and Sri Lanka levy specific mobile taxes on monthly rentals and usage, while Bangladesh and Pakistan charge a fee on the activation of mobile SIMs. These four markets have a population of 337 million and the average mobile penetration of the group is as low as 2.8%.



Section 5: Impact of Tax Changes: Regional Analysis

Bangladesh – The opportunity to build on proven benefits

Bangladesh, with its widely dispersed population of 144 million, is a country where the economic advantages of mobile telecommunications have already been proven.

Its largest operator, GrameenPhone, developed the universally admired Village Phone Program, implemented to provide access to GSM communications in rural Bangladesh. Administered by GrameenPhone's not-for-profit shareholder Grameen Telecom, the programme creates new opportunities for income generation through self-employment, and its rural user base doubled during 2004. Many other countries have shown interest in the model, promoting Bangladesh's innovative approach to catalysing economic growth through telecommunications.

When GrameenPhone was launched in 1997, Bangladesh had teledensity of less than one per cent, a major constraint to the development of the economy. GrameenPhone's investment in its network and services, plus the arrival of competition from other operators, strengthened the telecoms sector, and GrameenPhone has achieved year-on-year growth of 100 per cent.

The consumers' sensitivity to initial cost of ownership was shown clearly when the government recently established a SIM card tax for all new subscriptions. As the prices went up, the growth rate of the Bangladeshi market was cut to less than 40%. It is now estimated that 1.5million fewer people will be connected by the year-end if taxes remain at their current level.

GrameenPhone, with its 85 per cent population coverage, offers the majority of people their only chance for access to communications, and to the Internet.



'GrameenPhone, along with the other cellular operators in Bangladesh, has established that the mobile phone is a valuable tool that can achieve and accelerate economic growth for the nation.'

'We hope that with a thorough understanding of the revenue potential, and the long term tax gains generated by encouraging steady growth of the national subscriber base, the government will enable everyone in Bangladesh to benefit from the mobile industry.'

Erik Aas
CEO, GrameenPhone, Bangladesh



Section 5: Impact of Tax Changes: Regional Analysis



DAYANIDHI MARAN
MINISTER OF COMMUNICATIONS &
INFORMATION TECHNOLOGY

Message from India

“Wireless” has become the predominant technology for the spread of telecom services and is playing a crucial role the world over for the enhancement of teledensity. Ensuring affordable wireless service is therefore of significant importance.

‘In light of this, I would like to appreciate the initiatives taken and the work done by the GSM Association for the development of low cost handsets for emerging markets. In India, we have been taking several steps over the last few years to enable the spread of affordable wireless service. The result has been a fall in tariff from Rs 16 a minute in 1997 to less than Rs 0.50 per minute in 2005. Duties on handsets have also been lowered progressively through these years as a result of which the cost of handsets has fallen significantly.

‘Mobile telephony in India has moved from being an elitist product to an effective and affordable communications tool for the masses. Affordability has made mobile service a key plank for economic growth and development. The UPA government is keen to ensure the spread of affordable 3G in India and all necessary policy initiatives are being taken in that direction.

‘I wish and hope that this study commissioned by the GSM Association on cost of ownership/take-up of mobile service in emerging markets will highlight international best practices and help in setting benchmarks which could be used by many of the developing economies to enhance their telecom infrastructure.’



Thiru Dayanidhi Maran
Honourable Minister of Communications & Information Technology
Government of India

ELECTRONICS NIKETAN, 6, C.G.O. COMPLEX, NEW DELHI-110003
PHONE : 24329191, 24369191 FAX : 24362333



Emerging or Established Economies – The Wireless Age has just begun

It is only relatively recently that studies on the impact of telecommunications on the economy have been possible. Fixed-line penetration in much of the 'developed' world was low until late in the last century – in France in 1970 fixed lines reached only eight per cent of the population – similar low levels of communications infrastructure existed elsewhere, for example in Portugal and Greece.

Today, landlines in established economies are common – but mobile phones are fast becoming the communications medium of choice. It is an easy statement to make: 'The presence of mobile communications enables economic growth' – but the equations and the factors are complex.

In many developing economies, mobile phones are not simply replacing or augmenting a fixed infrastructure, they are enabling the country to bypass it altogether. Mobile networks are faster and cheaper to install, more secure, and much easier to access. Mobile phones are not simply communications tools – in some countries they provide the only means of tangible identity for the homeless, the only means of earning a living for the poor. They bring social cohesion, access to information, and are much simpler to learn and maintain than a computer. Thus it is not surprising to envision a key strategic role for mobile phones in the developing world and one analogous to what fixed lines did in the EU in the 1970s and 1980s.

Without doubt, the mobile phone will bridge the digital divide. It is the key to communications in much of the world. Even in mature economies, we are still at the beginning of the Wireless Age – we have only really begun to see the potential of mobile communications.



Leonard Waverman is a Director at LECG Ltd and Professor and Chair of Economics at the London Business School. His research centres on documenting the role of telecommunications in advancing income and growth. His most cited paper is 'Telecommunications Infrastructure and Economic Development: a Simultaneous Approach' with Lars Hendrik Roeller, American Economic Review, September 2001.



Russia, CIS and Central & Eastern Europe



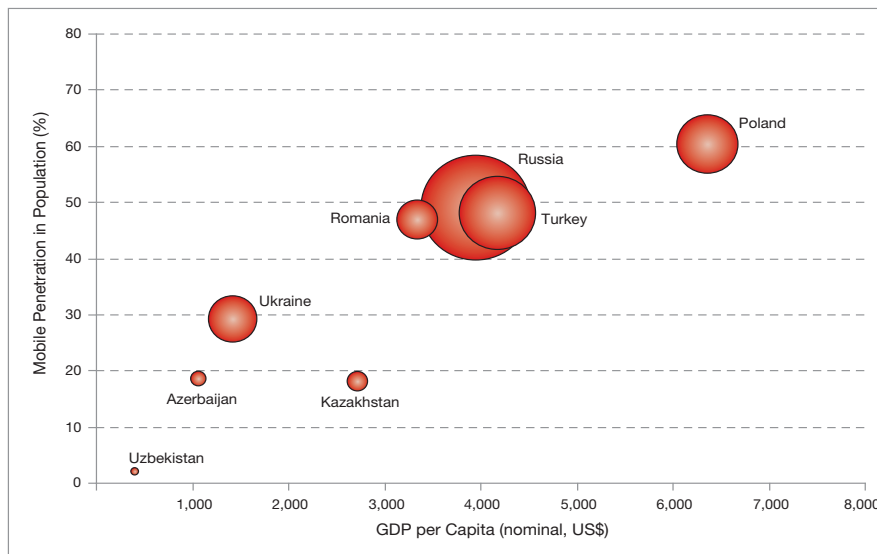
Section 5: Impact of Tax Changes: Regional Analysis

5.3 Russia, Commonwealth of Independent State (CIS) and Central & Eastern Europe Data Analysis

5.3.1 Sample Market Review: Highest Mobile Penetration and Black Markets

The sample of Russian, CIS and Central & Eastern European countries represents the smallest region in our study with 370million people and 157million mobile subscribers. This corresponds to the highest average regional penetration of 42%. The number of total mobile users, however, is estimated to be lower, due to a high share of multiple SIM owners in Russia, the biggest market in the sample (see Exhibit 19).

Exhibit 19 Penetration and GDP per Capita for Emerging Russian, CIS and Central & Eastern European Markets, 2004



The size of the bubble indicates the number of mobile subscriptions relative to the overall subscriptions in the region. Source: Pyramid Research

Recent economic advancements imply that many of the Russian, CIS and Central & Eastern European markets are no longer strictly classifiable as 'emerging.' For example, Poland, along with Mexico in Latin America, has the highest GDP per capita in the sample of 50 markets of US\$6,400. Nevertheless it is important to consider these more developed markets along with others to examine and compare the impact of its adopted tax regimes to those in the markets of the CIS.

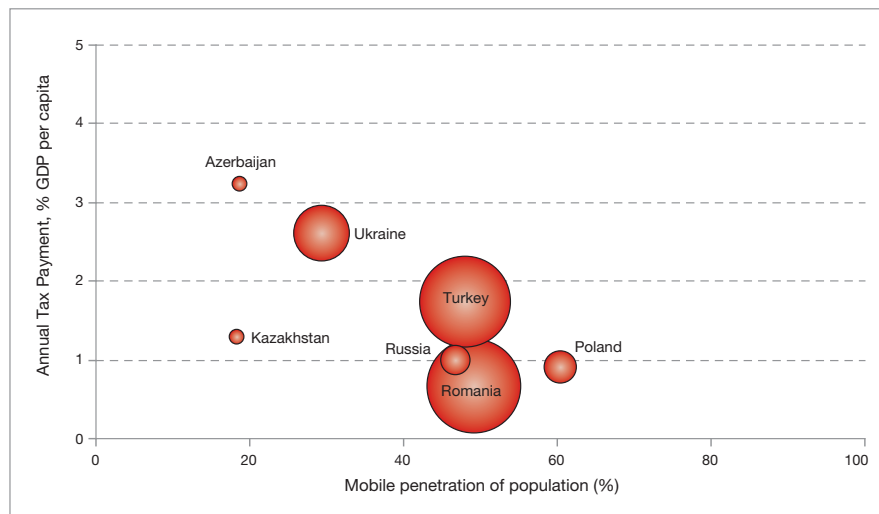
With prepaid subscribers constituting over 73% of the total subscriber base, the average MOU is a relatively low 87 minutes per user per month. Although new prepaid subscribers will put additional downward pressure on MOU during the forecast period, particularly in Russia and Poland where prepaid segments are still a relatively low share of the total, the overall usage in the maturing Russian, CIS and Central & Eastern European markets is forecast to grow by at least 1% per year throughout 2010, thanks to a strong fixed-mobile substitution effect.

The Russian, CIS and Central & Eastern European region has the largest black market constituent amongst the four regions, with the total tax loss estimated at US\$1.8billion in 2004 – three-quarters of the total of the four regions. Russia and the Ukraine have the largest share of black market sales: 90% and 85% respectively. Improved enforcement and GDP growth are likely to be the ultimate solutions to this problem.



Section 5: Impact of Tax Changes: Regional Analysis

Exhibit 20 Tax Share in GDP per Capita and Penetration, 2004



The size of the bubble indicates the size of the total tax revenue relative to the overall tax revenue in the region.
Source: Pyramid Research

5.3.2 Taxation Regime

The Russian, CIS and Central & Eastern European regional sample had the second highest average tax share of 17.2% in 2004, mostly due to high taxes in Ukraine and Turkey, the latter with the highest tax burden in the world (see Exhibit 20). Out of the total regional end-user revenue of US\$29.5 billion in 2004, just over US\$5 billion of tax was collected. Of this, 80% were taxes from mobile services, with the remainder comprising taxes from handsets.

Two markets in our study – Poland and Romania – do not impose any form of customs duty or telecom-specific/special taxes, presenting good examples of transparent tax regimes. The markets where the cost of tax in the total cost of ownership is the highest are Turkey and Ukraine. Turkey charges a fixed subscription tax as well as a monthly tax, with the total share of tax in the cost of mobile service as high as 56.1%. Both Turkey and Ukraine charge variable special taxes.



Section 5: Impact of Tax Changes: Regional Analysis

Turkey – Lower taxes mean higher usage

'Mobile operator Turkcell makes a considerable contribution to the Turkish economy. The company has invested over US\$4.1 billion to date in Turkey, attracted significant foreign investment, created 20,000 jobs, originated the market for mobile communications (now standing at more than 50% penetration), and developed a thriving business network through its partnerships and joint ventures with Turkish companies.'

'Turkcell has over 25 million subscribers and 467 roaming agreements with 180 countries. Turkcell has also been a strong contributor to Turkey's tax base: in 2004 alone, Turkcell paid over US\$2.1 billion in taxes (over 60% of the company's revenues), accounting for 3.3% of Turkey's total tax revenues and nearly 1% of GDP.'

'Turkcell believes this high tax rate represents a significant obstacle to growth in this country. For example, as continued improvement in the Turkish economy is spurring increased demand for wireless services, Turkcell's average MOU was 65 minutes in 2004, the lowest among other global emerging market operators. Turkcell believes the industry-low customer usage is due to Turkey's high taxation rate on mobile communications, the world's highest at more than 50%, compared to a maximum of 30% globally.'

'Given the strategic importance of the mobile communications sector to economic growth, Turkcell believes it is important to remove the obstacles that limit the growth of the GSM market, primarily a tax rate that far exceeds industry standards. The positive impact of a lower rate of taxation will be far reaching, not only stimulating increased mobile usage but also promoting growth throughout Turkcell's business network, a development that could therefore increase in the country's overall tax base.'



Muzaffer Akpınar
CEO, Turkcell, Turkey



Section 5: Impact of Tax Changes: Regional Analysis

Russia – Strength and stability enables rural development fund

Network operator Vimpelcom provides mobile services in Russia and Kazakhstan and has seen steady growth in subscribers since 1999, with a leap from 5million users in 2002 to some 35million by mid-2005. A beneficial tax situation has enabled the establishment and consolidation of the mobile telecommunications market by ensuring the total cost of ownership remains at manageable levels.

The massive increase in Vimpelcom's subscriber base in latter years is broadly representative of countries where mass market mobile is becoming the norm. However, Vimpelcom has achieved its success despite Russia's geographical size requiring one of the largest network infrastructures in the world, spanning 11 time zones, and demanding substantial capital investment. Moderate taxes have helped to enable this investment, giving Vimpelcom subscribers some of the most advanced systems in the world.

In addition, reasonable rates of personal taxation mean more personal disposable income, enabling the mass market to enthusiastically adopt the mobile phone. The handset is now seen as a 'must-have badge' of acceptance, not a luxury service only available to the highest income bracket.



'Our subscriber figures have been achieved without resorting to handset subsidies. People are willing to pay for colour screens and Internet access. With more than 3million of our subscribers accessing the worldwide web via their mobiles, we are one of the biggest ISPs in Russia.'

'However, there remain some 20million people in Russia for whom telecommunications are beyond financial reach. The stability of the existing mobile market has enabled the government to levy a percentage of operator revenue as a contribution to Russia's Universal Service Fund, established to assist development of telephony services in remote rural areas.'

Alexander Izosimov
CEO, Vimpelcom, Russia





Latin America



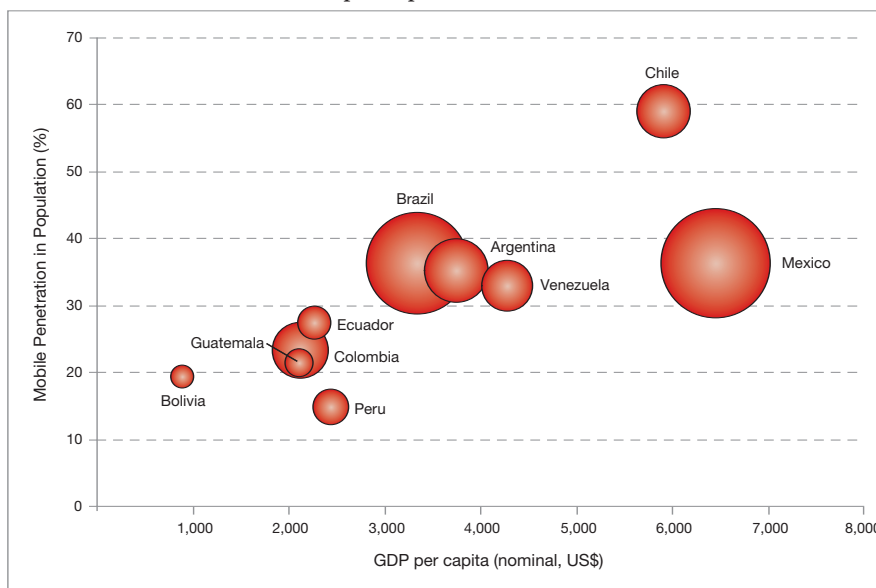
Section 5: Impact of Tax Changes: Regional Analysis

5.4 Latin America Data Analysis

5.4.1 Sample Market Review

For the Latin American market we used a sample of 10 countries, with a total population of 474million. These markets had an aggregate subscriber base of about 158million, which translates into an average penetration of 33%, the second highest among the four regions reviewed in this study (see **Exhibit 21**). Latin America is expected to continue to expand through to 2010, although some markets are starting to show signs of a relative slowdown. Ultimately, however, market penetration should reach around 55% by 2010, buoyed by the performance of such markets as Brazil. Overall, the largest and more penetrated markets have been those with the highest GDP per capita, even smaller markets such as Peru have passed the 10% penetration threshold.

Exhibit 21 Penetration and GDP per Capita for Selected Latin American Markets, 2004



The size of the bubble indicates the number of mobile subscriptions relative to the overall subscriptions in the region.
Source: Pyramid Research

The overall handset market in the sample countries is estimated at about 100million units, with a total sales value around US\$3.7billion. Nearly 18% of that revenue is generated in the handset black market, the lowest proportion of all regions examined, a fact mostly due to a vibrant second-hand market. Nevertheless, this meant a tax loss of US\$185million in 2004.

5.4.2 Taxation Regime in Latin America

In 2004, the tax burden in the selected markets was around 19% of the total cost of ownership, the highest level among all the regions (see **Exhibit 22**). The governments in the 10 sample markets collected about US\$5.6billion in tax revenues from indirect taxes, a contribution of 0.2% towards the total nominal GDP. Nearly 85% of the tax is collected from recurring mobile services, with the balances being generated from taxes on handset sales. Although the majority of the markets analysed in the region have tax burden ratios in the 15%-20% range, at the high end of the spectrum, Brazil has a tax burden ratio close to 30%, the third highest

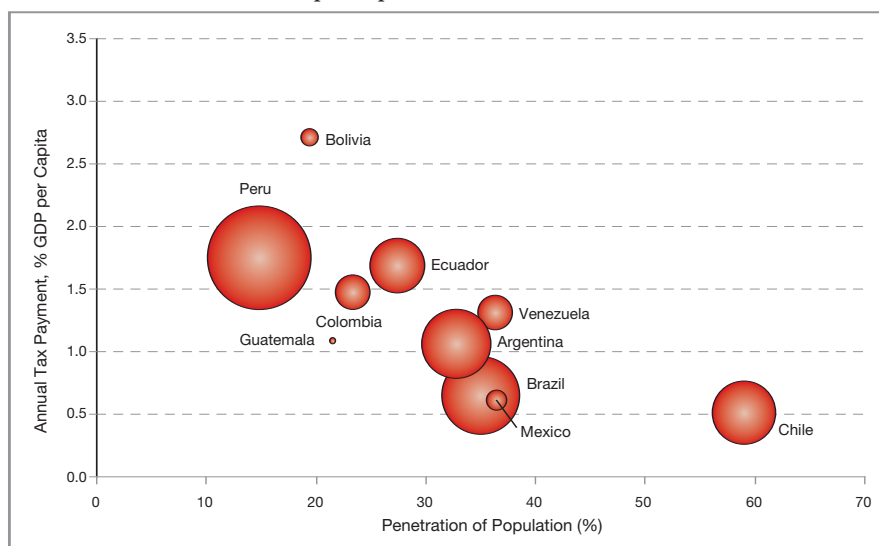


Section 5: Impact of Tax Changes: Regional Analysis

among the 50 markets in this study. Argentina, with a total cost tax burden of 25.6%, is ranked in seventh place globally. At the low end of the scale, Guatemala offers a tax share ratio of about 12%, being one of 11 markets in the study to charge no customs duty on handset imports.

Overall, the Latin American markets with the lowest tax burden as a proportion of their GDP per capita tend to show the highest penetration rates; while this is partly due to relatively high incomes, it nonetheless highlights the potentially negative impact on mobile penetration that an over-reliance on mobile services for tax revenue can have.

Exhibit 22 Tax Share in GDP per Capita and Penetration, 2004



The size of the bubble indicates the number of mobile subscriptions relative to the overall subscriptions in the region.
Source: Pyramid Research

Traffic in the markets examined will continue to expand in line with the subscriber base. Overall, however, we anticipate that average usage levels will stabilise at around 110 minutes per user per month, despite the large additions of prepaid subscribers. The analysis of the average monthly usage and the tax burden on mobile services further emphasises the point above. Low-income markets with relatively high tax burdens (e.g. Ecuador) are more likely to see low levels of traffic than peers with low tax burdens (e.g. Guatemala). The lowering – or better, outright elimination – of high taxes on mobile services would thus appear as a prerequisite in driving up service usage in a developing economy.

Four of the Latin American markets – Argentina, Brazil, Ecuador and Venezuela – were subject to the reduction of telecom-specific/special taxes in our analysis. The total number of mobile subscribers in these markets was 91million in 2004, a penetration of 35%.



Section 6: Conclusions

The economic benefits of mobile communications growth are now broadly accepted. However, as shown above, a number of governments still levy special taxes on mobile services and ancillary products, the sale of mobile handsets and services and, in some cases, impose higher taxes on mobile than fixed telephony. Mobile is often a key contributor to their budget: in Lebanon, for example, the mobile industry accounts for the third biggest share in the government's revenue after income tax and duties.

Direct Effects

Our study shows the restrictive nature of such measures on mobile development, and reviews alternative tax policies that could relieve the tax burden on low-income groups and increase mobile service affordability. Alternative models are possible. Examples of targeted preferential treatment exist in other industries: tax exemptions and tax holidays are a common tool in growing export industries; country-specific examples include Brazil, where the government recently introduced a tax exemption on PCs that cost less than US\$1,000, following the success of similar measures in the automotive segment seven years ago. Such policies can not only help governments to bridge the digital divide; they have a potential to spur a wave of mobile service growth that will have positive repercussions for the overall economy.

Analysis conducted in the course of this study has shown that all reviewed tax change policies can positively contribute to stronger mobile service adoption; all bring tangible results in the form of higher mobile penetration and handset sales growth.

The reduction of telecom-specific/special taxes, which create the highest tax burden in the total cost of mobile ownership, has been found to result in the highest positive changes in penetration and usage. At the same time, these changes will be limited to the 19 markets out of 50 analysed in this study. The reduction of customs and sales taxes on all low-cost handsets has been found as the most attractive scenario that will bring the benefits of tax cuts to the segments of the population that most need it.

The tax changes analysed in our scenarios come at a cost of short-term revenue loss, but when results of the study are extended to a single market, we expect that tax revenue changes will be neutral and even positive, if price elasticities are higher than in our global study. Provided that the tax reduction is passed through to the consumer, the decrease in price stimulates additional demand for telecommunications through increased affordability. This additional expenditure, on which taxes are levied, has been shown to significantly lessen the decrease in tax revenues.

Indirect Effects

Additional demand for telecommunications services brought about by tariff decreases will increase the level of network build-out, leading to indirect benefits. Telecommunications investment has long been positively associated with economic development. Studies by the United Nations, ITU and World Bank all attest to a modern telecoms sector being an essential element of a country's infrastructure and a precursor to economic growth³. The economic benefits of investment in the sector are far larger than the returns on the investment itself due to significant positive spill-over effects⁴. A recent study suggests that both fixed and mobile penetration rates are positively linked to foreign direct investment (FDI)⁵. In many emerging markets, capital is scarce and foreign direct investment provides an important source of essential capital. Therefore, the long-term positive impact of telecoms development should also be considered when assessing the impact of tax reductions.

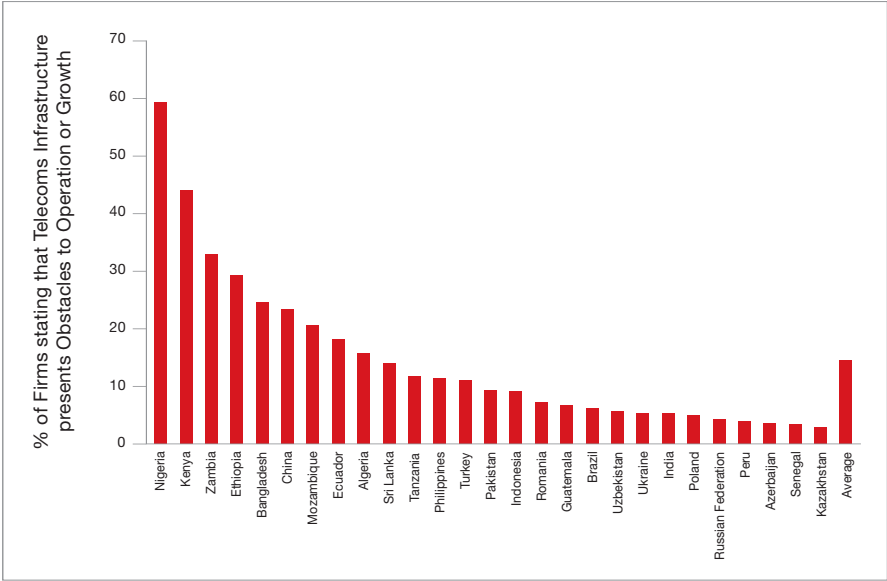
³ Studies include those by: United Nations Economic Commission for Europe, 1987; The Telecommunications Industry: Growth and Structural Change by the ITU, 1980 and Information, Telecommunications and Development by R.Saunders, J.Warford and B.Wellenius commissioned by the World Bank, 1983.

⁴ Roller, Lars-Hendrick & Waverman, Leonard. Telecommunications Infrastructure and Economic Development: A Simultaneous Approach. American Economic Review, September 2005.

⁵ Lydon, R and Williams, M. Communication Networks and Foreign Direct Investment in Developing Countries. Communications & Strategies, 2nd Quarter 2005.

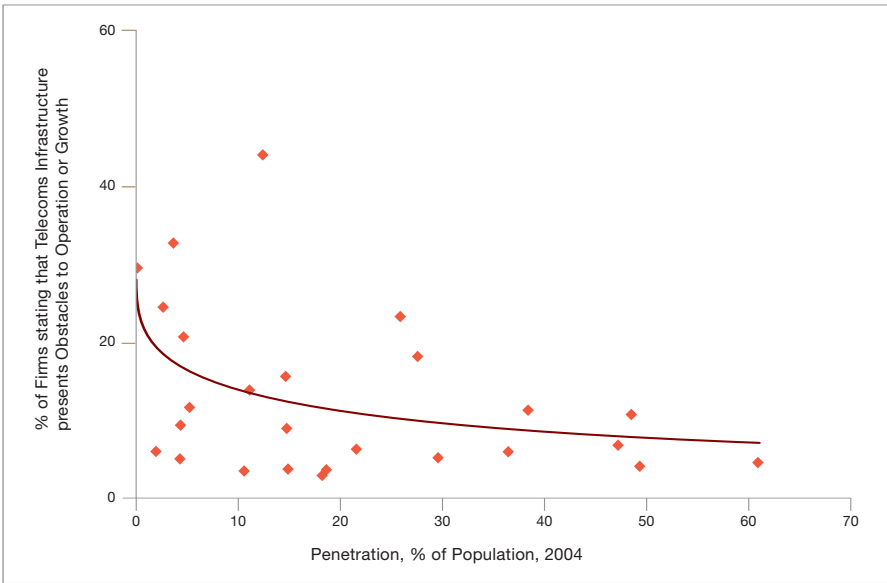
Section 6: Conclusions

Exhibit 23 Impact of Telecommunications Infrastructure on Business Operations



Source: Deloitte analysis based on Investment Climate Survey (2002 data), World Bank, 2004

Exhibit 24 Relationship between Penetration and Impact of Telecommunications Infrastructure on Business Operations and Growth



Source: Deloitte analysis based on firms' opinions presented in Investment Climate Survey (2002 data), World Bank, 2004. GDP per capita, World Bank, 2002



Section 6: Conclusions

The World Bank investment climate survey suggests that on average 12% of firms in developing countries believe that the shortcomings of telecommunications infrastructure in their country present major obstacles to the operation and growth of their businesses⁶ (see **Exhibit 23**). The percentage of firms hindered by lack of telecommunications infrastructure appears to decrease as the level of mobile penetration increases (see **Exhibit 24**). Therefore, providing incentives for additional infrastructure development is likely to lead to growth of businesses in other sectors of the economy that rely upon telecommunications.

This study focuses solely on first-order changes in tax revenues from telecommunications services. It does not consider the increase in tax revenues associated with additional inward investment and economic growth from a growing telecommunications sector. However, these revenues will further dampen the effect of a reduction in the telecommunications tax burden, and could potentially result in a situation where a decrease in the tax burden leads to an increase in tax revenues in some countries.

Reducing the tax burden on telecommunications services may stimulate both economic growth and tax revenues in developing markets. The extent to which this happens in the short to medium term is a function of a number of factors including the responsiveness of demand to tax reductions and the speed and extent of related infrastructure improvements. This relationship requires further investigation in order to quantify the long-run impact of a tax reduction on a country-specific basis.

Mobile Telephony and Taxation by the World Bank

Taxation of mobile telephony is a subject of growing importance worldwide. Rapid growth of information infrastructure has been accompanied by rapid growth in revenues. According to ITU data for about 60 developing countries, telecommunications revenues as a percentage of GDP have increased from 1.2 to 3.9 per cent over the period 1990-2002. As a result of this expansion, the sector became an increasingly important source of general corporate tax revenues. When combined with an early perception that telecommunications services were the restricted privilege of the wealthy, this growing revenue stream attracted the particular attention of policymakers facing budget shortfalls and encouraged some countries to impose sector-specific taxes on phone usage, infrastructure, handset and terminal equipment and phone use.

However, telecommunications services are no longer a luxury. The spread of mobile services worldwide has opened up the possibility for ever more people to benefit from access to modern information and communication technologies (ICTs). With as much as 77 per cent of the global population under the mobile footprint, the great majority of the world's citizens could now benefit from the increased business opportunities, fairer prices for their produce and better provision of services that are the proven results of access to telecommunications, provided the cost of service could be brought down to affordable levels. Because of such benefits of access, poor people in developing countries are willing to spend considerable sums to use the telephone. In Chile, the poorest 20 per cent of the population spend about 3.5 per cent of their income on telephone services, compared to about 2.5 per cent for the richest quintile of the population.

As mobile telecommunications services are being accessed by an ever greater percentage of the population in developing countries, with a significant impact on income earning potential and service delivery, governments are struggling to find the right balance between generating sufficient revenues to support social and economic goals, while encouraging rollout to the next tier of subscribers, in particular, rural and low income groups. There are about 2 billion mobile phone subscribers worldwide today. This leaves 4 billion people without a phone subscription. At least 1.4 billion of those people live outside the coverage footprint of a mobile signal, beyond any access to modern ICTs. Hence, designing tax regimes that would allow for extending access to the

⁶ Investment Climate Survey, data based on responses in 2002, World Bank 2004.

Section 6: Conclusions

1.4billion currently living in areas with no signal whatsoever and the 4billion currently without their own phone, becomes an important social and economic goal.

Regarding usage for those under the mobile footprint, taxation on handsets is likely to significantly influence the number of people who can afford their own phone. While few of the poorest people in developing countries could afford to buy their own phone even absent of taxation, they could afford access through street vendors reselling time, village phone operators or fixed mobile public phones. How much time they can buy clearly depends significantly on pricing of services, which in turn is affected by the level of taxes on the sector, and many calls will go unmade if taxes rise. As the Chilean example makes clear, taxing telephony may in fact have a regressive impact in many countries with the poor likely to spend a greater percentage of income than the rich on phone tax payments.

Regarding rollout of infrastructure to those areas where it is yet to reach, financial viability will be significantly determined by taxation and on duties on infrastructure equipment destined for rural areas. A person living on two dollars a day who spends three per cent of his or her income on telephone services will be able to afford about US\$20 in services each year. At an aggregate taxation rate of 50 per cent of telecoms costs, US\$20 in payments will provide only US\$10 in net revenues for the telecoms operator. For marginal areas of developing countries, with lower population densities and poorer users, this lower net revenue base (US\$10 per person per year rather than US\$20), compounded by a lower overall subscriber base if considerable taxes are applied to handsets, may mean the difference between sustainable service provision and no coverage at all.

Extending access to the excluded is likely to involve a combination of policy and regulatory reforms with specific access programmes including subsidies for provision. In some countries it is also likely to involve a review of taxation policies covering the sector. While telecommunications companies should pay for their use of spectrum, and should provide their fair share of general government revenues through corporate taxes, poorly designed special taxes on the sector will slow rollout and deny access to powerful tools in the fight against poverty to the very people who need those tools the most.

Creative taxation policies covering special taxes on infrastructure, handsets and terminals and service might allow for differentiation to ensure rollout and a progressive impact. Perhaps expensive, new handsets could be taxed at a higher rate than cheaper, older models. Lower taxes on wholesalers who resell time to village phone operators or on providers rolling out access to previously unserved areas might be appropriate. Beyond tax-breaks, rollout can be assured by creative use of subsidy schemes. The specific design of such taxation and subsidy mechanisms is sure to depend on the stage of development of the economy and the sector, but should reflect the growing importance of information infrastructure to rich and poor alike in developing countries.

To conclude, for governments that are keen to increase the impact of information infrastructure on the economy, it is important to balance the opportunities for greater tax revenues presented by a vibrant sector with the cost of slower network rollout and lower network use that may result. Taxation policies for the sector should be designed not only to maximise revenues but also to minimise the disincentive to roll out services and to ensure such taxes are not regressive, hitting poor consumers more than the rich. After all, the ultimate objective of governments goes beyond ensuring proper fiscal management to maximising social and economic benefits to societies.

Mohsen A Khalil
Director
Global ICT Department
The World Bank Group

Charles Kenny
Senior Infrastructure Economist
Global ICT Department
The World Bank Group



Appendix 1: Methodology

This study analyses the implications of tax reduction on mobile communications services and handsets in 50 emerging markets on a global and regional level. The starting point of the analysis is the benchmarking of total taxes paid by end-users in these 50 markets during the purchase of a mobile handset and during the life cycle of a mobile subscription. To account for the replacement of handsets and churn, we estimate that life cycles of a handset and a mobile subscription are three years. Based on the data collected and analysed by Deloitte, we have compared the share of tax in the total cost of mobile ownership in all of the sample markets, identifying and ranking the markets according to the highest overall tax burden.

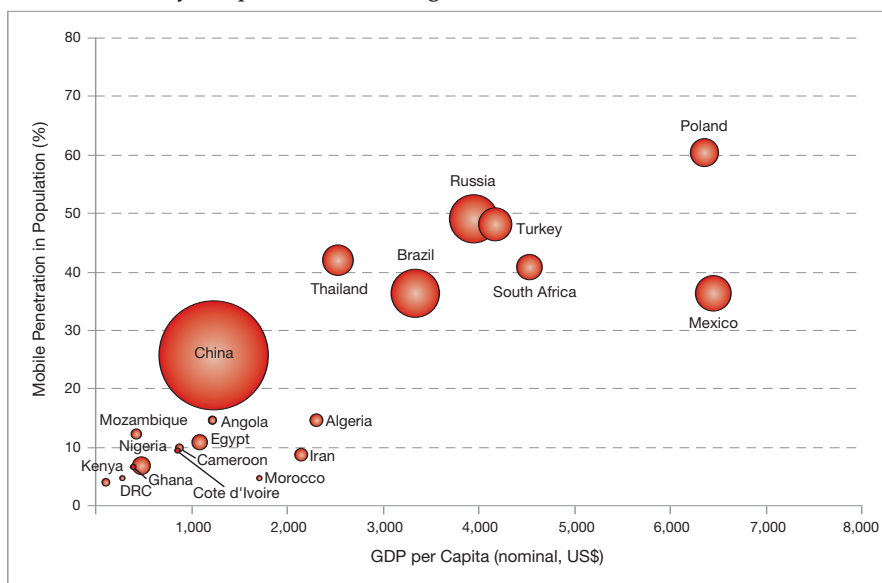
Our further analysis is driven by the hypothesis that cutting certain categories of taxes will improve the affordability of mobiles for the low-income population segments, at the same time benefiting overall economies through increased foreign direct investment (FDI) and growing investment in infrastructure. To assess the affordability of mobiles in each market, we require a detailed income breakdown for each market, which is outside the scope of this report. Instead, we focused on the analysis of total cost of mobile ownership:

Total cost of mobile ownership (TCMO) = cost of handset ÷ 3 + one-off subscription fee ÷ 3 + total annual cost of mobile usage (calculated from the reported ARPU and forecast as effective per minute price x monthly minutes of users x 12).

Decreasing the total cost of ownership for prepaid subscriber segments is key to improving mobile affordability and ownership in the emerging markets. It is worth noting that service providers and handset distributors are exploring different options of lowering barriers to subscriber acquisition through offering alternative payment mechanisms, such as micro-credit. While these are valuable measures, their overall impact in the emerging markets is limited to the growth in mobile subscriptions and sales of handsets, leaving out any impact on mobile usage.

In order to achieve the most impact in improving mobile affordability, we believe a public-private partnership is required, where the government is in a position of lowering the cost of mobile ownership by selectively

Exhibit 25 Study Sample Markets: A Range of GDP and Penetration



The size of the bubble indicates the number of mobile subscriptions relative to the overall subscriptions in the region.
Source: Pyramid Research

lowering taxes. Recognising that the impact of such tax reductions has a cost to the governments in the form of potentially lower revenue collection, we undertake the task of calculating this cost as the change in the tax revenue collection.

Data Requirements

Countries

Our selection of the markets for the study is based on GDP per capita and mobile penetration level in four regions globally. Final choice of the countries was determined by the availability of base data, much of which privately-held operators consider sensitive. In the process, for example, we removed such markets as Yemen, where insufficient data was available. Fifty emerging markets made it to the final selection, with 21 of these based in the Africa and Middle East region. The remaining markets are distributed as follows: 11 in Asia Pacific, 10 in Latin America, and eight in Central and Eastern Europe (see a complete list of countries in the Appendix). Despite the definition of 'emerging market' the selected countries stretch across a wide range of GDP per capita and penetration rates (see **Exhibit 25**).

Market Data

Our model draws on several key inputs, balancing the need for in-depth data and efficiency of the study. The following indicators make the basis of our study:

- **Tax rates:** Deloitte undertook an information-gathering exercise to identify indirect taxes that currently apply to the purchase and use of mobile telephones in each of the 50 emerging market countries that are the subject of this study. The data was provided by tax professionals in local Deloitte-affiliated offices in the relevant countries.
- **Market data** includes the historical number of prepaid and post-paid subscribers, prepaid and post-paid minutes of use (MOU) and average revenue per user (ARPU). This data, collected through primary and secondary research, was provided by Pyramid Research. Pyramid also forecasted the base case scenario for the market development.
- **Prepaid and post-paid tariff data**, including one-off subscription fees, monthly charges and per minute pricing data was supplied by Tarifica for 135 operators in all 50 markets.
- **Handset market data** was provided by handset distributors in each market for total handset sales in 2004, as well as market share for legitimate, secondary and black markets, and average handset price for each of these market segments.

Limitations of Data and Analysis

Like most studies, this analysis faced a number of constraints:

- **Data Availability:** The main limiting factor on this study has been a small number of historical data points, explained by the fact that mobile services are a recent phenomenon in many emerging markets. The oldest GSM networks in the 50 sample emerging markets have been around for just over 10 years – among the earliest competitive entries in the sample 50 countries are Turkish operators Turkcell and Telsim, who launched services in February/March 1994. A small number of observations, which ranged between 15 and 100 for the service model inputs, prevented us from conducting time-series analysis. Instead, we conducted a cross-section analysis, the results of which can be used on a global and regional level, but not on a country-specific level.



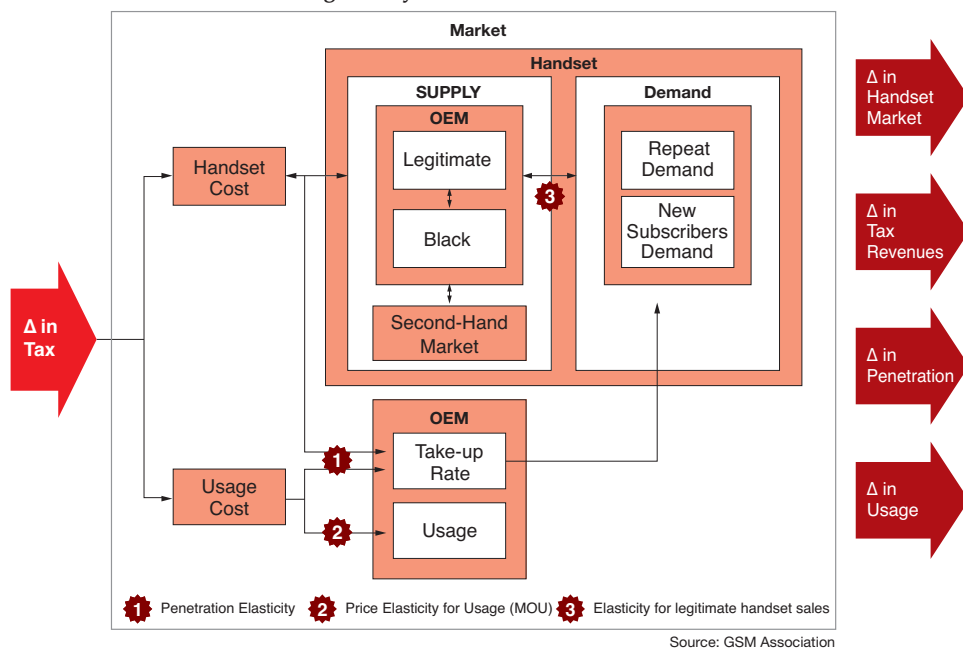
Appendix 1: Methodology

- The subjective nature of black and secondary handset market data and the basing of the study on data provided by market experts for a single year (2004). The sample size for the handset analysis averaged 30, sufficiently large to allow for the estimation of the sales of the handsets outside the official tax system, but not to conduct regression analysis for black and secondary market sales or evaluate the exact impact of tax decrease on both market segments.
- Tax data: The key difficulty in collecting and interpreting data was one of ensuring consistency. Deloitte spent a significant amount of time balancing the details of tax regimes in the individual countries studied with the need for simplicity so that the results could be effectively analysed and understood. Initial results were questioned where there were queries or responses required further clarification. Where it was unclear if a response provided by a country was really a tax or some other cost associated with subscription or usage this was questioned. It should be noted, however, that it is ultimately an impossible task to reach unequivocal agreement on matters of this type and we therefore recognise that different countries may attach a different meaning to what is referred to as a tax.
- In addition, the fact that a tax is on the statute book of a particular country does not always mean it is imposed or collected. The study did not involve research into, or consideration of, the practice of implementation and collection of the taxes that are highlighted in the report. Similarly, the study was also limited to the legislative system in place in relation to indirect taxes and therefore consideration of the black market is also beyond the scope of Deloitte's data collection.

Market Model

To address the dual nature of the market analysis, our model consists of two modules: it provides analysis of the impact of tax reduction on mobile service and handset markets, combining the two to analyse the total cost of mobile ownership (see Exhibit 26).

Exhibit 26 Tax Change Analysis Model



Appendix 2: Estimates of Elasticity of Demand for Mobile Services

Introduction

In order to evaluate the precise market impact of tax changes, Frontier Economics conducted the analysis of the price sensitivity of demand for mobile services in developing countries. The methodological approach and elasticity estimates are described in the Frontier methodology appendix that follows.

This note presents Frontier Economics' estimates of the elasticity of demand for mobile services in developing countries. The results presented here are based on data provided by all research partners, including Pyramid Research and Tarifica, as part of a project by the GSMA looking into taxation of mobile services in developing countries.

In line with the existing economic literature on the demand for mobile services, we examined both usage and penetration elasticities. The results we get are broadly consistent with elasticities that have been reported elsewhere; see, for example, the New Zealand Commerce Commission Study⁷ on the demand for mobile services. In addition, we have also estimated a 'handset' sales elasticity based on data provided by the GSMA.

Data Received

Pyramid Research has provided the data for the analysis, covering 50 countries, across four regions (Asia Pacific, Central and Eastern Europe, Latin America, and Africa and the Middle East) over a period of up to four years. The dataset covers three main areas (which are described in more detail in the tables that follow): minutes of usage, handsets and the overall average cost of consuming mobile services.

There are a number of key characteristics of the dataset that place significant limitations on the type of analysis we can do. The key limitation of the dataset is the relatively small sample size for much of the estimation. In particular, we have a small number of observations on subscription costs and call price per minute⁸. Another important feature of the dataset is that not all the variables are available for all the countries, and for most of the key variables, such as handset costs, we only have one year of data. As a result, the actual estimation dataset will often vary for different parts of the analysis, depending on the price and quantity measures of interest. All these limitations also mean that our confidence in the robustness of the results is varied, and we indicate this in the relevant sections.

Minutes of Usage Database

Table 2 summarises the main variables regarding the usage of mobile phones, with a summary of their basic characteristics. Pre-paid contracts account for the majority (70% on average) of subscriptions in the countries studied.

Table 2: Adoption, Usage and Price Data

	Observation	Mean	Minimum	Maximum
Penetration (%) – pre-paid	478	22	0	84
Penetration (%) – post-paid	478	5	0	43
Minutes of Usage (per month) – pre-paid	227	83	16	439
Minutes of Usage (per month) – post-paid	214	301	48	860
Average Revenue Per Subscriber (US\$ per month) – pre-paid	153	10	5	30
Average Revenue Per Subscriber (US\$ per month) – post-paid	157	40	5	155
Price per Minute (US\$) – pre-paid	84	0.207	0.032	0.553
PPM (USD) – post-paid	48	0.139	0.042	0.350

Source: Frontier Economics, raw data provided by Pyramid Research

⁷The study by the New Zealand Commerce Commission 'Review of the price elasticity of demand for fixed line and mobile telecommunications services', August 2003.

⁸In practice in the analysis we actually use average revenue per subscriber/average minutes per subscriber as our measure of the unit price of calls.



Appendix 2: Estimates of Elasticity of Demand for Mobile Services

Handset Database

The handset data on prices and sales is available for 2004 only. Sample size is restricted to between 23 and 37 countries, depending on the variable in question. Table 3 gives the summary statistics for the handset data.

Table 3: Handset Prices and Sales Data for 2004

	Observations	Mean	Minimum	Maximum
Price (US\$) – legitimate	34	108	65	230
Price (US\$) – black market	24	93	50	200
Price (US\$) – second- hand	23	57	20	100
Sales (millions) – legitimate	37	5.64	0.00	93.46
Sales (millions) – black market	37	1.47	0.00	24.30
Sales (millions) – second-hand	37	1.53	0.00	20.77

Source: Frontier Economics, raw data provided by Pyramid Research

We have not carried out an audit of these figures, and there are certain characteristics of the dataset – many missing observations, little variation across countries – that make us sceptical about the reliability of some of these figures, and in particular, the black market data.

It is also our understanding that the handset price variables are field estimates rather than actual retail figures, and that the sales variables are estimated, as true figures are unknown. In the absence of an alternative dataset to validate the data, the estimates we present here for the elasticity of demand for handset sales should therefore be interpreted as highly indicative, and in our view, should be used cautiously as the basis for any policy recommendations or conclusions.

Average Cost of Consuming Mobile Services Database

Pyramid Research has provided an overall ‘affordability’ measure for mobile services (or average ‘cost of consuming mobile services’) for 2004. This is the total cost of owning a mobile phone, comprising the three main cost components: handset prices, subscription costs and price per minute.

Elasticity Estimates – Minutes of Use (MOU)

Table 4 presents the elasticity estimates (shown in bold) for pre-paid and post-paid minutes of use for the full sample and for each of the four regions⁹. The first column shows the results for pre-paid minutes of use; elasticity of -0.76, and the second column shows the results for post-paid minutes of use, elasticity of -0.54.

Table 4: Regression Analysis Results for Pre- and Post-Paid Minutes of Use

Explanatory variables (logged)	Dependent variable: log (average pre-paid MOU per month)	
	Pre-paid regression: Coefficient (t-statistic)	Post-paid regression: Coefficient (t-statistic)
Average pre-paid price	-0.76 (15.85)	-0.54 (8.51)
Pre-paid penetration	-0.19 (3.67)	-0.32 (6.17)
GDP per capita	0.16 (2.67)	0.38 (4.80)
Observations, R-squared	98, 0.73	100, 0.44
Regions (t-statistic) Asia Pacific	-0.97 (10.27)	-0.50 (5.49)
CEE	-0.71 (12.02)	-0.38 (2.61)
Latin America	-0.55 (5.98)	-0.20 (2.52)
AME	-0.89 (4.60)	-0.24 (0.60)

Source: Frontier Economics

⁹The elasticities for each region are based on a bivariate regression, i.e. the regressions include no other control variables. This is because at the regional level the sample size is considerably reduced and degrees of freedom are limited.

Appendix 2: Estimates of Elasticity of Demand for Mobile Services

The price variable used in the regression analysis is the average monthly revenue per subscriber divided by average monthly minutes of use.

We have also estimated elasticities at the regional level, as reported in Table 4. The sample sizes for the analysis at the regional level are small – ranging from 9 to 48 observations for prepaid, and 10 to 45 observations for post-paid. We would therefore not recommend that these estimates should be used for policy purposes.

Robustness of Results

The elasticity estimates using ARPU MOU as a price measure are statistically significant at the 5% level or better. Overall, we find that the estimated elasticities are insensitive to inclusion of additional control variables, such as penetration (negatively correlated with usage)¹⁰ or GDP per capita (positively correlated with usage).

We also estimated a model with the average price per minute (as reported by operators) as the measure of average price of usage in the regression. For pre-paid we obtain an elasticity estimate of -0.40 (t-statistic 4.04) and for post-paid we obtain an elasticity estimate of -0.62 (2.22). However, we would note that these estimates are based on relatively small sample sizes, 56 observations for pre-paid and 18 observations for post-paid.

As a further test of the robustness of the results we estimated the minutes of use regression, with ARPS/ARPU/MOU as the explanatory variable, in first differences. The results were broadly unchanged: the pre-paid elasticity is -0.80 (t-statistic 14.15) and the post-paid elasticity is -0.71 (9.59). We would note that the estimated elasticities from this across-country sample are fairly consistent with elasticities reported elsewhere¹¹.

Table 5: Regression Results for Handset Sales

Explanatory variables (logged)	Dependent variable legitimate handset sales (logged)
	Coefficient (t-statistic)
Average price legitimate	-1.04 (2.41)
GDP per capita	1.37 (7.90)
Population	1.08 (8.64)
Observations, R-squared	30, 0.68

Source: Frontier Economics

Elasticity Estimates – Handsets

The handset database we received is stratified by market type. Due to the number of observations varying between the different markets, our analysis is limited to the legitimate market only. The full set of regression results is shown in Table 5.

The own price elasticity of around -1.0 indicates that there are significant own price effects for the price of handsets on legitimate sales. However, there are also likely to be significant indirect or cross-price effects, i.e. as the legitimate price changes this will also affect the demand for handsets in the black. The data supports this hypothesis as we find a strong positive correlation between the unofficial/black plus second-hand market share and the price of legitimate handsets (correlation coefficient of 0.53, significant at the 1% level). In other words, the higher the retail price in the legitimate market, the higher the market share of ‘unofficial’ and second-hand sales in total sales. The limited data availability does not allow us to separate the pure ‘own’ price effects from the ‘switching’ price effects.

¹⁰The negative correlation with usage could be explained by noting that as penetration increases, the marginal subscriber is perhaps more likely to be a lower-usage customer.

¹¹For a survey of elasticity estimates in mobile telecommunications see the study by the New Zealand Commerce Commission ‘Review of the price elasticity of demand for fixed line and mobile telecommunications services’, August 2003.



Appendix 2: Estimates of Elasticity of Demand for Mobile Services

Robustness of the Regression Results

As this is an important elasticity estimate, we have undertaken significant testing of the result, in view of the relatively high magnitude of the estimated elasticity. Given a sample of just 30 observations, it is quite possible that a small number of outlier observations could be driving the estimated elasticity results. However, a graphical analysis of the data indicates that this is not the case.

We have also tried several alternative specifications to our preferred specification in Table 5. In particular we estimated a regression including overall mobile penetration on the right-hand side, in order to control for the maturity of the market. We found that the inclusion of this and other variables had little effect on the estimated elasticities.

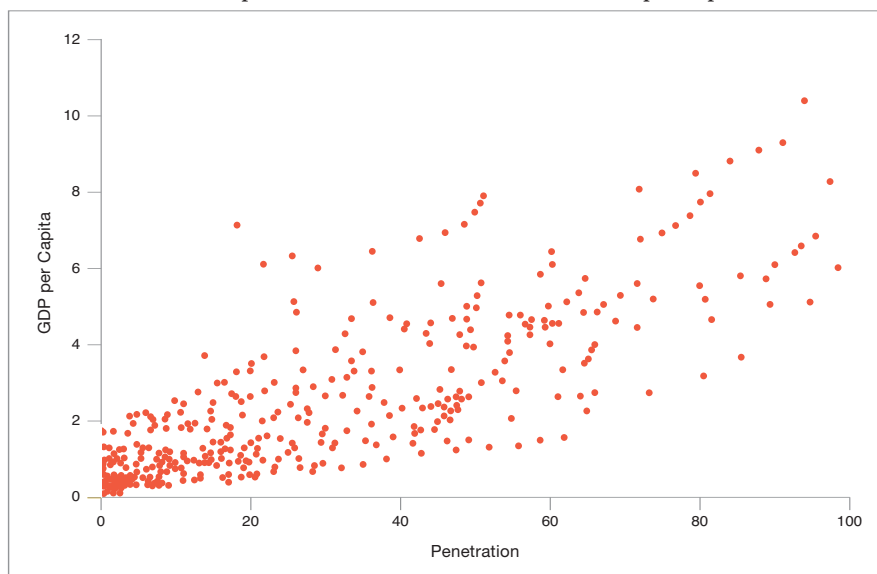
The testing seems to suggest that the estimate is reasonably consistent across different specifications, and does not seem to be the result of a few individual data points. As indicated in the introduction however, as the sample size is relatively small, and the handset price and sales data is estimated, the elasticity of demand for handset sales should be interpreted as highly indicative. In our view, this elasticity should be used cautiously as a basis for policy recommendations or conclusions.

These results, however, certainly warrant further research into the relationship between the price of handsets and handset sales, as this could be a critical element of the design of an effective taxation policy in relation to mobile handsets. This is particularly the case as the potential elasticity for the lower end handsets could be (absolutely) higher than average, having significant implications about the potential impact on tax revenues of a lowering of taxation of the lower end handsets.

Elasticity Estimates – Market Penetration and Average Cost of Mobile Services

The main driver of differences in penetration between countries is GDP per capita (see Exhibit 27). This is a standard result in the literature that looks at the determinants of mobile penetration; see, for example, Lydon and Williams (2005)¹².

Exhibit 27 Relationship between Mobile Penetration and GDP per Capita



Source: Frontier Economics

Appendix 2: Estimates of Elasticity of Demand for Mobile Services

As well as GDP per capita, we have considered whether other country characteristics, in addition to affordability, also affect the degree of mobile penetration in a country. The main driver of the differences in penetration that we observe across countries is the difference in GDP per capita. We find that over 60% of the variation in mobile penetration between countries is explained by differences in GDP per capita¹³.

Several other factors, such as the cost and quality of fixed line substitutes and the characteristics of mobile market players, e.g. number of operators, also explain some of the differences that we observe¹⁴. The regression results, excluding the impact of the cost of mobile services are reported in Table 6¹⁵.

Table 6: Regression Analysis Results for Penetration, excluding Mobile Cost Characteristics

Explanatory variables (logged)	Dependent variable: log (mobile penetration) Coefficient (t-statistic)
GDP per capita	1.04 (15.18)
Total number of mobile operators	0.40 (3.33)
Faults per 100 fixed lines	0.12 (2.04)
Average cost of a local call fixed line call	0.31 (4.24)
Year 2001	(omitted)
Year 2002	0.31 (1.78)
Year 2003	0.6120 (3.48)
Year 2004	0.93 (5.41)
Year 2005	1.12 (6.53)
Constant	-3.08 (8.62)
Observations, R-squared	151, 0.79

Source: Frontier Economics

We have also considered the extent to which differences in penetration can be explained by the overall cost of mobile services (measured using the data on the price of handsets, subscription changes and the average call cost per minute). The regression results are shown in Table 7¹⁶.

Information on the handset prices is only available for one year (2004) for each of the countries in the sample. Furthermore, due to missing observations on some of the explanatory variables, the regression sample includes just 37 of the 50 countries in the sample.

We find a significant negative relationship between call costs (call cost per minute plus subscription costs) and penetration, an elasticity of -0.49 and significant at the 2% level. However, we fail to find a statistically significant relationship between the average annual cost of handsets and the average level of penetration in the country. We believe that it would not be appropriate to conclude that the price of handsets does not affect penetration. Rather, the data used is inadequate to allow us to test for a robust statistical relationship.

¹² 'Communications Networks in and Foreign Direct Investment in Developing Countries', R. Lydon and M. Williams, Communications & Strategies, No. 58, 2nd Quarter 2005, pages 43 - 61.

¹³ That is, the R-squared from a bivariate regression of the log of penetration on the log of GDP per capita is 0.60, the coefficient is 1.09 with a t-statistic of 17.90.

¹⁴ We would note, however, that the true relationship between mobile penetration and the number of operators will not be captured by our simple regression model, as we have failed to take account of the fact that the relationship goes both ways, i.e. the number of operators may be positively correlated with mobile penetration, but mobile penetration will also affect the decision of other operators to enter the market.

¹⁵ Initially, we do not include the variables that capture the average cost of mobile services. This is because the regression that includes these variables only includes 40 observations and is available for 2004 only. Therefore, not only is the sample size small, but using the data for 2004 only would mean we are not able to look at average time trends over the 2001 - 2005 period.

¹⁶ The regression results reported in Table 7 do not control for the quality of the fixed line network (faults per 100 fixed lines) in a country. This is because there are only 28 observations of the 40 included in the regression that have data on fixed line faults. Furthermore, the specification in Table 6 does not include a time trend (year dummy variables) as the sample is for 2004 only.



Appendix 2: Estimates of Elasticity of Demand for Mobile Services

Table 7: The Relationship between the Average Cost of Mobile Services per annum and Mobile Penetration

Explanatory variables (logged)	Dependent variable: log of mobile penetration
Average annual handset costs	0.34 (1.34)
Average annual call costs	-0.49 (2.51)
GDP per capita	0.79 (10.39)
Total number of mobile operators	0.01 (0.01)
Average cost of a local fixed line call	0.22 (2.37)
Observations, R-squared	37, 0.82

Source: Frontier Economics

Conclusion

As part of a project by the GSMA looking into the effect of taxation on mobile services in developing countries, Frontier Economics was asked to estimate the price elasticity of demand for mobile services. The findings can be summarised as follows:

- There is statistically significant negative price elasticity between demand for calls (usage) and price of calls. The estimated elasticity is between -0.54 (post-paid) and -0.76 (pre-paid). For some regions, the data supports a larger elasticity of -1.0.
- There is statistically significant negative price elasticity between the demand for legitimate handsets and the price of legitimate handsets. The estimated elasticity is -1.0. The data also indicated a negative link between prices in the legitimate handset market and the market share of legitimate handset sales in total handset sales (equal to legitimate sales plus black market sales plus second-hand sales). However, due to data restrictions, we have been unable to quantify the statistical significance or magnitude of this trade-off.
- The level of mobile penetration in each country, which ranges from around 3% to over 60% in the sample, is largely explained by the overall level of development of that country, as reflected in GDP per capita. However, we do also find a negative and statistically significant relationship between overall penetration and the price of usage of mobile services – the elasticity estimate is around -0.5.
- Finally, the results indicate that while the price of (legitimate) handsets seems to affect negatively (official) sales of handsets, it does not seem to affect mobile penetration rate. It seems unlikely that the price of handsets does not affect a subscriber's decision to join a network. However, data limitations are such that it has not been possible to identify such a relationship statistically.

Appendix 3: Tax Rate Tables

The information below was collected and interpreted by Deloitte using tax professionals in local Deloitte-affiliated offices. The scope of the study did not include information on turnover/business taxes and was limited, with the exception of customs related taxes, to taxes which are payable directly by the consumer/end user. The information below (see Table 8) is presented in a simplified format to ensure that the results are understood and comparable.

Table 8: Taxes on Handsets

	VAT or similar taxes	Customs-related taxes ¹	Other taxes	Fixed taxes (US\$)
AFRICA and MIDDLE EAST				
Algeria	17.0%	15.0%		
Angola	10.0%	5.0%		
Cameroon	19.3%	31.5%		
Cote d'Ivoire	18.0%	5.0%	2.5%	
DRC	13.0%	33.0%	2.0%	
Egypt	10.0%			
Ethiopia	15.0%	10.0%		
Ghana	12.5%	32.5%	3.0%	
Iran		4.0%		
Kenya	16.0%			
Morocco	20.0%	2.5%		
Mozambique	17.0%	25.0%	1.0%	
Nigeria	5.0%	10.0%		
Senegal	18.0%	15.0%	1.5%	
South Africa	14.0%	22.1%		
Sudan	10.0%			
Syria	20.0%	45.6%	2.0%	14.27-33.42
Tanzania	20.0%	25.0%		
Tunisia	10.0%	3.0%	5.0%	0.15
Uganda	18.0%	27.0%		
Zambia	17.5%	5.0%		
ASIA PACIFIC				
Bangladesh		15.0%		4.60
Cambodia	10.0%	25.0%		
China	17.0%	20.0%	3.0%	
India	4.0%	4.0%		
Indonesia	10.0%	17.5%		
Malaysia	10.0%			
Pakistan				
Philippines	10.0%			
Sri Lanka		15.0%		
Thailand	7.0%			
Vietnam	10.0%	15.0%		
LATIN AMERICA				
Argentina	21.0%	18.0%		
Bolivia	13.0%	10.0%		
Brazil	22.0%	20.0%	9.3%	
Chile	19.0%	6.0%		
Colombia	16.0%	5.0%		
Ecuador	12.0%			
Guatemala	12.0%			
Mexico	15.0%	15.1%		15.10
Peru	19.0%	24.5%		
Venezuela	15.0%	15.0%		
RUSSIA/CIS/CENTRAL AND EASTERN EUROPE				
Azerbaijan	18.0%	15.0%		
Kazakhstan		15.0%		
Poland	22.0%			
Romania	19.0%			
Russia	18.0%	5.0%		
Turkey	18.0%		20.0%	
Ukraine	20.0%			
Uzbekistan	20.0%	10.2%		

¹ For some countries the customs related taxes figure includes import VAT which may be recoverable depending on local legislation and the taxpayer's circumstances.
Source: Deloitte, August 2005



Appendix 3: Tax Rate Tables

Table 9: Taxes on Services

	VAT or similar taxes	Other taxes	Fixed taxes (US\$)
AFRICA and MIDDLE EAST			
Algeria	17.0%	1.0%	
Angola	5.0%		
Cameroon	19.3%		
Cote d'Ivoire	18.0%		
DRC	18.0%		
Egypt	15.0%		
Ethiopia	15.0%		
Ghana	12.5%	2.5%	
Iran	6.0%		4.44 for prepaid 170 for post-paid
Kenya	16.0%	10.0%	
Morocco	20.0%		
Mozambique	17.0%		
Nigeria	5.0%		
Senegal	18.0%		7.53
South Africa	14.0%		
Sudan	10.0%		1.48
Syria	3.0%		
Tanzania	20.0%	5.0%	
Tunisia	18.0%	5.0%	
Uganda	18.0%	12.0%	
Zambia	17.5%	10.0%	
ASIA PACIFIC			
Bangladesh	15.0%		13.80
Cambodia	10.0%	10.0%	
China	3.0%		
India	10.2%		
Indonesia	10.0%		
Malaysia	5.0%		
Pakistan	15.0%		8.36
Philippines	10.0%		
Sri Lanka	15.0%	2.5%	
Thailand	7.0%		
Vietnam	10.0%		
LATIN AMERICA			
Argentina	21.0%	4.0%	
Bolivia	13.0%		
Brazil	25.0%	3.7%	
Chile	19.0%		
Colombia	20.0%		
Ecuador	12.0%	15.0%	
Guatemala	12.0%		
Mexico	15.0%		
Peru	19.0%		
Venezuela	15.0%		0.68-2.74
RUSSIA/CIS/CENTRAL AND EASTERN EUROPE			
Azerbaijan	18.0%		
Kazakhstan	15.0%		
Poland	22.0%		
Romania	19.0%		
Russia	18.0%		
Turkey	18.0%	25.0%	23.91
Ukraine	20.0%	7.5%	
Uzbekistan	20.0%		

Source: Deloitte, August 2005

Appendix 4: Impact of Taxation of Mobiles on Economic Growth

Leonard Waverman and Kalyan Dasgupta, London Business School and LECG

Recent research including our own has established a positive and statistically significant relationship between long-run average economy-wide growth and long-run average telecom penetration. This research¹⁷ suggests that for a group of 'low-income' countries, country B would have a long-term average GDP per capita growth of 0.59 per cent a year higher than otherwise identical country A, owing solely to a 10 per cent difference in the average penetration rate of mobile phones.¹⁸ Thus telecommunications infrastructure, and crucially its spread across the population, is a significant driver of economic growth.

Taxes increase the effective price of mobile telephones and thus reduce penetration. In doing so, taxes on communications equipment and/or services can also have a harmful impact on economic growth. Thus, countries that tax communications less should enjoy higher growth rates in the long run than otherwise similar countries that tax more highly.¹⁹ There are three types of taxes for which we have information: VAT, customs, and fixed taxes, the last being one-off charges on service in a few countries. Here we define the tax burden as proportional or variable taxes. Fixed one-off taxes are comparatively rare.

We obtained data from Pyramid Research on taxation levels – on handsets and on service – as well as handset prices in 50 developing countries. On handsets, many countries impose custom taxes as well as VAT; both being proportional to the value of the handset (such equipment is typically imported). In our analysis, we consider the costs of handsets as well as the costs of using the services.

We have used these data in conjunction with available information on usage costs from the OECD and from private mobile operators in the developing world. The OECD provides prices for a basket of mobile phone services (calls, text messaging, downloads etc) for 'low', 'medium' and 'high' mobile phone usage categories. 'Low user' customers are defined as those who make 25 outgoing calls and send 30 SMS messages a month, for example. The OECD average cost of such a basket is US\$150 per year, exclusive of the handset but inclusive of VAT.²⁰ We also have ARPU data from mobile operators such as Orascom and Celtel. These data suggest that OECD 'low' user data can be used as a benchmark for studying the impact of taxes in developing economies. In the table below we provide two estimates of the total annual costs of a mobile phone: we allocated the handset cost over a period of four years, and then to this annualised handset cost added service costs based on (a) the OECD's 'low user' mobile basket for services (\$150), and (b) reasonable estimates of ARPU (around \$300 per year), somewhat lower than the OECD's 'medium user' basket.²¹ Taxes – VAT and customs – are incorporated into both the handset element and the usage/service element. We then calculate (for the average of the sample that we have) the effect of stripping out taxation.

¹⁷ Fuss, Melvyn, Meloria Meschi and Leonard Waverman, 'The Impact of Telecoms on Economic Growth in Developing Countries', Vodafone Policy Paper Series, Number 3, March 2005.

¹⁸ The average being considered over the same period. Penetration is defined as the number of mobile phones per 100.

¹⁹ We are not criticising taxation per se as taxes are necessary to pay for government services. However, where taxes are levied will affect growth. In the example here we are examining the case of lowering taxes on communications – this presupposes that the loss in tax revenue is compensated by increasing taxes elsewhere. We do not consider here any negative impacts of those alternative taxes.

²⁰ See Argo Telecom Management Consultants BV, Appendix I, of Report on the Competitiveness of New Zealand Mobile Services, prepared for the New Zealand Commerce Commission, May 2005.

²¹ It has been estimated that in South Africa some households spend 10 to 15 per cent of their total budget on mobile telephony. Source: Presentation of Neil Gough, 'Socio-Economic Impact of Mobile in Developing Markets,' http://www.infodev.org/files/1601_file_Vodafone_InfoDev_Partner_Mtg.ppt



Appendix 4: Impact of Taxation of Mobiles on Economic Growth

Average Variable Tax (mostly VAT) on Service	17%
Average Customs plus VAT on Handsets	31%

	Handset Annual Cost	Low End User Cost	Total Cost (Low-End)	High End User Cost	Total Cost (High-End)
With VAT and Customs	34	150	184	300	334
Without VAT and Customs	23	125	148	250	273
Change in Annual Cost	11	25	36	50	61
% Change in 'Price'			19.6		18.3
% Change in Penetration	(Elasticity=0.5)		9.8		9.1
	(Elasticity=1)		19.6		18.3
% Impact on Long-Term Growth per Capita GDP %	(Elasticity=0.5)		0.6		0.5
	(Elasticity=1)		1.2		1.1

The annual cost of a handset is based on the following calculations: for the sample that we obtained from Pyramid Research, the average 'legitimate' price of a handset was roughly US \$113. This includes a 'total tax share' (on average) of 31 per cent. Without taxes, the average annual cost of a handset would fall to \$78. We assumed that handsets have an average life of four years in developing countries, and that since these were relatively expensive for many consumers in developing countries, there would be an opportunity cost for using handsets – equivalent to an interest charge of 20 per cent.

Taking this into account, the average 'annual' cost of a handset (with tax included) was around \$34 (\$113 plus 20 per cent interest, split evenly over four years) per year. Without VAT and customs tax, this average would fall to \$23.

The impact on GDP growth of all proportionate taxes – those on handsets (customs and VAT) and those on services (usually VAT) – was estimated using the 'coefficient' of 0.059 obtained from our earlier work reported in the Economist, March 12, 2005.²² That coefficient represents the shift in the long-run average rate of growth in per capita GDP in 'low-income countries' caused by the increased deployment of mobile telecommunications networks.

The coefficient informs us how much higher growth (averaged over a long period of time, such as 20 to 25 years) would be in country B, compared to an identical country A, were there an average difference (taken over the period in which mobiles were present) of one more mobile phone per 100 inhabitants in country B relative to country A.

We have assumed two different 'elasticities' of penetration (mobile phones per 100 people) with respect to price – 0.5 and -1.0.²³ The demand price elasticity in this context is the percentage increase in penetration caused by a percentage fall in price. The effect of taxation is to increase the effective price to consumers by 20 per cent in the case of low-end users; and 18 per cent for high-end users. Therefore taxes on mobile phone equipment or usage lowers the percentage of the population that acquires and uses phones. Since access to modern communications helps economies grow, taxing mobile phones lowers growth. This is a negative impact of the ways in which economies raise necessary tax revenue.

²² See leader and Economics Focus section.

²³ Demand elasticities are negative as an increase in price, all else being equal, lowers demand.

Appendix 4: Impact of Taxation of Mobiles on Economic Growth

The impact on long-term annual average growth varies from 0.5 to 0.6 per cent if we assume an elasticity of penetration with respect to price of 0.5. That is, removing the average tax burden on mobile phone acquisition and use would add 0.5 to 0.6 per cent economic growth to a developing economy – not an inconsequential addition. These impacts double if we double the price elasticity of demand.²⁴

We would need a much more detailed and sophisticated econometric analysis of how demand (defined in terms of penetration) is related to price, and how indeed we should measure ‘price’ for a product such as mobile telephony in order to obtain truly robust estimates of the impact of taxation. However, the estimates that we provide here are at least suggestive of the potential importance of taxation of mobile telephony in reducing demand and thus reducing economic growth.

²⁴ An elasticity of -0.5 with respect to price is consistent with the -0.51 demand elasticity estimate for the US that Hausman obtains. Further, Hausman calculates a net deadweight loss (i.e., even counting the benefits from the extra tax receipts that the government gains by taxing wireless telephony) of \$2.56 billion per annum for the US economy as a whole. See Hausman, Jerry A., ‘Efficiency Effects on the US Economy from Wireless Taxation’, National Tax Journal, Volume 53, No.3, September 2000. Since expenditure on mobile telephony is much higher (as a share of income) in developing nations than in the US, a similar deadweight loss exercise for developing nations might well reveal a proportionately substantially greater deadweight loss. Also the positive network externalities from mobile deployment in developing nations are probably much larger than any externalities from mobiles in developed nations. We would imagine that the value of an initial connection to the network, both for the connecting party and the rest of society, would be much larger than the value of an ‘optional’ second connection. Mobiles are providing the initial connectivity to consumers in many developing nations today.



Project Contributors



The GSM Association (GSMA) is the operator-led trade association representing the global mobile industry. Encompassing technical, commercial and public policy initiatives, the GSMA focuses on ensuring wireless services work globally, thereby enhancing the value of mobile services to individual customers and national economies while creating new business opportunities for operators and their suppliers.

The Association embraced more than 670 operator members serving 1.5 billion customers across more than 210 countries and territories. More than 150 manufacturers and suppliers support the Association's initiatives as key partners. The GSM community accounts for 75% of the digital mobile phone market worldwide.

For further information, please contact:

Mark Smith

T +44 207 759 2300

F +44 207 759 2301

E press@gsm.org

www.gsmworld.com



Pyramid Research

Pyramid Research helps clients in the converging communications, media and technology industries stay ahead of market trends, understand competitive threats and develop sound strategies to capitalise on growth opportunities. We advise vendors, service providers, equipment manufacturers, and content providers on how to implement best practices and build offensive growth strategies, enabling them to anticipate shifting market dynamics and drive profitability.

Unlike other firms in the research and advisory space, our focus is firmly on convergence-related issues for the communications market and our reach and expertise is truly global. We employ the most comprehensive research methodologies, analysing markets from the bottom up, with coverage of over 90 countries worldwide, and with in-depth expertise in emerging market opportunities. Our research and advisory services enable our clients to sleep easier at night, knowing they truly understand their business and how to compete effectively in this volatile marketplace.

Pyramid Research collected the market data used in the taxation study; conducted market growth projections and scenario analysis; and wrote the methodology, tax benchmarking and analysis sections of the final report.

For further information, please contact:

Elle Hoxie

T +1 617 494 1515

E info@pyramidresearch.com

www.pyramidresearch.com



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The data collection and analysis for this report was conducted by the UK tax TMT, based in London. This team provided details of the current indirect taxes that may apply to the purchase and use of mobile telephones in each of the 50 emerging market countries that are the subject of the study. The data is subject to various assumptions and limitations, which are highlighted in various sections within the report.

For further information, or if you would like to talk to one of our experts on Telecommunication or Tax matters please contact:

Global: John Ruffolo T + 1 416 601 6684 E jruffolo@deloitte.ca

EMEA: Richard Baxter T +44 207 007 3818 E rbaxter@deloitte.co.uk

Asia Pacific: Nigel Mellor T +65 6224 8288 E nmellor@deloitte.com

Latin America: Carlos Iannucci T +54 11 4320 2736 E ciannucci@deloitte.com

www.deloitte.co.uk

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Project Contributors



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Our approach is always to combine in-depth knowledge of the sector with rigorous economic analysis to offer the best possible advice. The telecommunications practice is actively involved in the application of best practice in the regulation of all aspects of the telecommunications industry. The clients of the practice include operators, governments and regulators, from the UK, Europe and around the world. Further details of the type of work Frontier does, as well as company publications, can be found on the Frontier website.

Frontier has worked closely with GSMA on this study to estimate the elasticity of demand parameters for mobile services.

For further information, please contact:

Dr George Houpis

T +44 207 031 7000

E george.houpis@frontier-economics.com

www.frontier-economics.com



Tarifica is the London-based communications pricing consultancy and a leading brand of Access Intelligence. Tarifica, which was established in 1976 as the first consultancy to track telecommunications tariffs, offers a unique repertoire of tariff-related products covering fixed and mobile services in Europe, The Middle East, Africa, Indian subcontinent, Asia Pacific and Latin America.

The latest product launches include the 3G/UMTS Manual, the Tarificator – an interactive pricing tool available over the Internet, and the weekly Mobile Tariff Alert covering the latest tariff trends.

Tarifica was the provider of the current and historical tariff data that has been used for the taxation study. The historical information has been extracted from Tarifica's archives and the latest information has been obtained from its long-established contacts around the world.

For further information, please contact:

Margrit Sessions

T +44 207 692 5292

E consult@tarifica.com

www.tarifica.com

Project Contributors

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Alan Knott-Craig, CEO, Vodacom Group

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Muzaffer Akpinar, CEO, Turkcell

Phuthuma Nhleko, CEO, MTN Group

Richard Baxter, Deloitte

Ruby Dhillon, Deloitte

Richard Mills, Deloitte

Reamonn Lydon, Frontier Economics

Schellion Horn, Deloitte

Svetlana Issaeva, Pyramid Research



GSMA London Office

1st Floor, Mid City Place, 71 High Holborn, London WC1V 6EA, United Kingdom

T +44 (0) 20 7759 2300

GSMA Dublin Office

Block 2, Deansgrange Business Park, Deansgrange, Co. Dublin, Ireland

T +353 (0) 1 289 1800

www.gsmworld.com