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*TELECOMMUNICATIONS FOR ALL:  
DOES LIBERALIZATION HELP?*

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## 1. INTRODUCTION

Liberalization of the telecommunications sector has been taking place in industrialized and less developed countries (LDCs) alike as part of broader economic reforms initiated in the 1980s. The trend of sector liberalization has not manifested itself uniformly because its interpretation, rationale, goals and implementation vary across countries. Nonetheless, the 1997 World Trade Organization (WTO) Agreement on Basic Telecommunications (ABT) is a sign of the consolidation of this trend, with over 40 LDCs and all the industrialized countries making legally binding commitments to implement varying degrees of liberalization in their telecommunications sector over the next decade (WTO 1997). Furthermore, many other LDCs are pursuing sector liberalization policies outside the framework of the multilateral trading system.

At the same time, theorists and policy makers increasingly recognize the importance of widespread access to telecommunications in promoting social and economic development. Within a country, lack of access threatens to undermine social stability because restricted access to information fosters economic and social inequality (Hieronymi 1999, 77). Concurrently, an increasingly interconnected and interdependent global economy drastically limits the economic development opportunities for unconnected countries, and particularly for the unwired poor within those countries. However, improving access is not always an explicit rationale and goal of telecommunications liberalization in LDCs. The rationales and goals of liberalization differ across countries, but can be broadly grouped as follows:

- Ideology. The popularization of neoliberal ideology resulting from the diffusion of neoclassical economic ideas among the decision-making elites in LDCs and their interpretation as a justification for less state intervention has been one of the main driving forces behind the privatization and liberalization initiatives of the 1980s and 1990s (Singh 1999, 12).
- 1980s debt crises and global recession. The dismal international economic environment of the 1980s and the large fiscal deficits faced by many LDCs provided a pragmatic justification for reducing the burden on the state by scaling down the public sector, while at the same time raising revenues from the sale of state-owned telecommunications operators and licenses to additional operators to ease the state's financial crisis (Straubhaar *et al.* 1995, 235-236).
- Participation in the multilateral trading system. The inclusion of basic telecommunications in the framework of the WTO's General Agreement on Trade in Services (GATS) means some countries are increasingly willing to commit to sector liberalization to obtain concessions in trade terms for their other products.
- Integration into the global economy. In an increasingly interdependent global economy, the widespread availability of information technology (IT) is an important factor determining the competitiveness of nations, making a solid, technologically advanced telecommunications infrastructure a precondition for attracting investment into LDCs. Liberalization lowers the cost of keeping up with technological change and brings the managerial and technological expertise to implement it (Mody and Tsui 1995, 179).
- Underperformance of the sector. The documented inefficiencies of state telecommunications monopolies (see Straubhaar *et al.* 1995, 235 and Melody 1999,

13) and the rethinking of economies of scale in telecommunications (Wheatley 1999) have led liberalization to be viewed as a more efficient strategy of service provision. Thus, improving access is often low on the list of priorities of liberalization and the effects of liberalization on access are not well documented.

This dissertation takes liberalization of telecommunications as a given and focuses on examining its effects on access by analyzing quantitative cross-country data and conducting in-depth case studies of the liberalization process in Ghana, the Philippines and El Salvador. The ultimate aim is to determine what factors need to be considered by policy makers when formulating liberalization strategies so as to maximize the positive impact of liberalization on access in the context of a country's broader institutional environment. The rest of this dissertation is organized as follows: Section 2 presents a review of the liberalization and access literature in order to define them and identify the mechanisms governing their interactions; Section 3 presents the analysis of quantitative data; Section 4 presents the three case studies; finally, Section 5 summarizes the conclusions and policy recommendations.

## 2. LITERATURE REVIEW

Liberalization, access and the mechanisms through which the former impacts the latter are the three concepts central to this dissertation. The objective of this section is to review the theoretical and empirical telecommunications reform literature in order to define liberalization and access and to identify the mechanisms governing their interaction. In doing so, this section illustrates the lack of consensus that characterizes the definition of these concepts and the difficulty of constructing definitions which can serve as a basis for cross-country comparisons.

### LIBERALIZATION

Liberalization as a concept is subject to much ambiguity and is often confused with restructuring, which may or may not include liberalization. The ABT provides a generally accepted, if vague, definition of liberalization. Since the framework is the multilateral trading system established in the Uruguay Round and, more specifically, in the General Agreement on Trade in Services (GATS), the ABT defines liberalization in terms of market access for service suppliers and focuses on establishing competition, with foreign participation, beginning with an environment conducive to market entry primarily for the other members of the WTO (WTO 1997). An increase in market access is understood as the reduction or elimination of quantitative restrictions and other limitations such as caps on foreign equity participation (Article XVI) and competition refers to the existence of at least two suppliers for a given service or market segment (Schedules of Specific Commitments).

At the same time, the use of the term in the academic literature originates in the tradition of neoclassical economics and implies some degree of economic competition managed or moderated through a 'free' market. It is often used interchangeably with 'deregulation' so as to emphasize the 'decrease' in government intervention, understood as government interference with relative factor prices, which should occur in a movement toward free markets. Yet, because this interpretation of markets is based on the assumption by neoclassical economic theory of perfect information which rarely obtains in the real world, scholars in varied traditions such as international political economy (see Vogel 1996; Cemy 1993) and New Institutional Economics (NIE) (see North 1990) have suggested that liberalization often involves a change, not a decrease, in the nature of regulation, and therefore, of state involvement, because markets must be regulated to function efficiently. Scholars of telecommunications and policy makers have acknowledged this fact as is evident by the widespread literature on the role and design of regulation of the sector (Melody 1997; Petrazzini 1995; Sinha 1995), and by the emphasis on developing effective regulation contained in the WTO Reference Paper on Basic Telecommunications, which establishes a series of guiding principles to ensure that regulation is conducive to market entry.

Here, liberalization is defined as increased market access in different sub-sectors by suppliers of telecommunications services, implying the introduction of some degree of competition and the modification of the sector's regulatory framework. Thus, the quantitative and qualitative analysis presented in sections 3 and 4 pays special attention to the relative impact of competition and regulatory reform on access.

## ACCESS

According to Markus, "universal access in interactive communication media such as the telephone is the ability of any member of the community to reach all the other members through the medium" (1990, 222). This translates differently into concrete definitions of what constitutes acceptable levels of access and therefore how access is measured varies across countries, resulting in corresponding variations in the policies adopted to increase it. For example, in industrialized countries universal access is normally equated with universal service (i.e. as close as possible to one mainline per person or a teledensity of at least 90 mainlines per 100 people). In the past, these definitions of access have often specified the technology which must be used for providing the service (i.e. analogue wireline as opposed to digital wireline, wireless local loop (WLL), etc.). This has changed as the pace of technological innovation has intensified making it possible, for example, to provide fixed telephone access in remote areas using fixed cellular or satellite technology. Nevertheless, teledensity continues to refer only to the number of mainlines and does not include mobile phones.

For developing countries, many of which have teledensities of less than two mainlines per 100 people, universal service is considered a remote dream, and the policy focus is to provide community access to basic telecommunications. In addition to teledensity, the number of households with a telephone is a measure of access often used in LDCs, though the accuracy of this measure is often disputable due to the quality of statistical data in LDCs. Other common ways of defining community access goals include one telephone in every town of a certain minimum number of inhabitants, a telephone within a specific distance or traveling time for every person, and/or a certain number of payphones per inhabitant (Minges 1998). Collecting reliable statistics to



measure progress towards these goals is difficult, and like the teledensity measure, they are normally counted in terms of mainlines, while ignoring mobile phones.

Thus, definitions of access are fairly narrow, technical and often inflexible relative to the changing technological environment. Clearly, a trade off exists between defining detailed objectives for the diffusion of telecommunications and information technology in a society and measuring progress toward these objectives: the more complex and detailed the objectives, the more difficult it is to measure progress toward them accurately so that policies can be fine-tuned or objectives redefined in the face of changing circumstances. An example of this is the difficulty of broadening the definition of access to reflect the changing communication patterns of society, which increasingly include communicating through the Internet. Variations in Internet access have received increasing attention in industrialized societies and is now often referred to as the Digital Divide. Most industrialized countries and some of the more developed LDCs are beginning to define access to include connection to the Internet.

Arguably, developing countries should also broaden their definitions of access to include access to the Internet and other information and communications technologies (ICTs). However, this dissertation focuses on access to basic telecommunications because in most LDCs basic telecommunications services are so scarce and unreliable that their lack is one of the primary obstacles to the diffusion and widespread adoption of ICTs. This is not to say that developing countries should not address other obstacles to ICT diffusion such as low literacy levels. Yet, widespread access to basic telecommunications must be achieved not only to provide the physical infrastructure for connecting to the Internet, but also to achieve the critical mass of users required for the majority within a community to perceive ICTs as a necessity, so as to attract the

remaining members to join the user group (Onwumechili 2001, 220), and create a communications culture which incorporates the use of increasingly advanced technology.

Following Markus (1990), in this dissertation access is, broadly speaking, the number of people who can be reached through the use of a telephone. The aim is to begin to untangle the effects of telecommunications sector liberalization on access, but since obtaining a true measure of access as defined here is impracticable, the analysis centers on the effects of liberalization on two main determinants of access: *availability* and *affordability*. The first implies the recognition of the existence of supply-side constraints on access, or in other words, an insufficient number of telephone lines relative to existing demand. This has long been a problem in LDCs and is evidenced by the interminable waiting lists for telephone service, which in some countries has resulted in over ten years waiting time for a telephone line (ITU 1998). At first glance, liberalization of local and mobile operators seems to have helped alleviate problems of availability, as has the introduction of mobile phones, which in many developing countries have become an easily available and affordable substitute to mainlines for voice telephony and basic data services. Though the conventional measure of availability is teledensity, evidence increasingly shows it is inappropriate for LDCs. For example, mobile phones have outnumbered fixed lines in Africa this year (Turner 2001) so ignoring them underestimates the number of telephones in the continent. In addition, business studies increasingly show mobile phones are a cheaper and more profitable way of providing telephone service in LDCs (Dhawan *et al.* 2001).<sup>1</sup> Therefore, the measure of availability used throughout is combined teledensity: teledensity plus

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<sup>1</sup> In addition, a study conducted in 1999 by Telefónica, one of two mobile service providers in Rio de Janeiro, found 23 percent of its customers did not have access to a fixed telephone at home or at work. In Côte d'Ivoire, the number of mobile subscribers had surpassed the number of mainline subscribers by the beginning of 2000.

mobidensity (i.e. the number of mainlines plus the number of mobile phones per 100 people).

Affordability, on the other hand, is concerned with the price of telephone service relative to income. Studies suggest that, when the cost of telephone service exceeds three percent of average income, it is no longer affordable for the majority of the population and access grows very slowly if at all (Milne 2000, 9-10). Depending on how it is implemented and which sub-sectors it encompasses, liberalization can theoretically impact affordability positively or negatively through the mechanisms explained below.

Other variables such as country-specific characteristics, which include area, income, income distribution, population density and degree of urbanization; individual-specific characteristics including gender and education; and technological advances, also impact access. Most existing empirical studies have focused on the effects of country-specific characteristics on the availability of telephone service, for which they normally used teledensity as a proxy. In a study of determinants of stocks of infrastructure, Canning (1998) finds the growth rate of mainlines to be negatively associated with area, but positively associated with growth in GDP per capita and increases in the urbanization ratio. Gutierrez and Berg (2000) also find the number of mainlines to be positively related to population density and GDP per capita, while Ros (1999) finds teledensity increases with GDP per capita. Milne (2000) develops a quantitative model to show the effect of income distribution on the affordability of telephone service, which predicts that, holding income constant and at higher levels of GDP per capita, higher income inequality decreases the affordability of telephone service and therefore results in lower take-up levels of telephone service in the absence of supply constraints. She provides

limited empirical support for her model using data from a few Western and Eastern European, Latin American and African countries.

Practically no quantitative studies exist relating gender and education to access, but anecdotal evidence from various countries suggests women and less educated people are less likely to use a telephone (ITU 1998). These variables, however, are unlikely to have a consistent measurable effect, if any, on either availability or affordability. Finally, technological advances tend to decrease the cost of providing telephone service, and, provided these savings are passed on to the consumer, can increase affordability. Alternatively by making it cost-effective or simply possible to provide service in previously unserved remote areas, they can also increase availability. Unfortunately, technological advances and their take-up are hard to measure, and it is almost impossible to separate their effect on access from those of other variables.

Therefore, the analysis presented here only attempts to control for the country-specific characteristics identified above but not for individual characteristics or technological advances. Furthermore, any complete analysis of access must also consider the quality of telephone service because increases in access resulting from improvements in availability and affordability accompanied by decreases in the quality of service (manifested by higher faults per line, a lower call completion rate, interference during the call, etc.), will offset many of the benefits of more telecommunications. Yet, because it is difficult to quantify this offset, issues of quality are only addressed in the case studies when information is available but not in the quantitative analysis.

## THE MECHANISMS

Neoclassical economic theory predicts that, in the absence of economies of scale, competition maximizes the welfare of society because it results in allocative efficiencies (see Hayek 1945). On the other hand Ros notes that, "economic literature suggests that when economies of scale are present such that one firm is able to fulfill total industry demand at a lower cost than if other firms were present, economic welfare is maximized by restricting the number of firms to one" (1999, 71). The high sunk and fixed costs of building a telecommunications infrastructure led most countries to treat the provision of telecommunications services as a natural monopoly until the late 1980s. Technological advances, which have lowered these costs, and the development of value added services have led to a rethinking of the existence of economies of scale in the provision of telecommunications, culminating in the current liberalization trend.

In the simplest possible scenario, the move from monopoly to competition in basic telecommunication services would have a positive effect on affordability by increasing technical efficiency which lowers costs and results in a decrease in the price of the service. Because demand will be higher at the lower price, supply should also grow as firms compete with each other to capture new users, thereby increasing availability. However, under government monopoly provision and particularly in developing countries, local telephone service was often subsidized using the revenues from national and international long distance services in a practice known as cross-subsidization. The introduction of competition, whether in local or long distance services or both, requires the removal of cross-subsidies in order to ensure fair competition in local services and the competitiveness of the incumbent in long distance services. This results in price rebalancing, which increases the price of local telephone service and

decreases the price of long distance services. Yet, Ros (1999) finds that because of the existence of supply side constraints, price rebalancing and specifically, an increase in the price of local service can still be associated with higher teledensity and with higher growth in teledensity. According to his results, a \$1 increase in the monthly subscription charge leads to a 2.2 percent increase in teledensity and a 7.1 percent increase in the growth rate of teledensity (85).

Thus, while the introduction of competition in the respective segment should positively affect availability by resulting in increases in teledensity and mobidensity, in terms of affordability, the effects are harder to assess. On the one hand, because mobile phones have not been subsidized in the past, they are not subject to price rebalancing so competition in the segment should result in lower prices. On the other hand, price rebalancing caused by the introduction of competition could result in an increase in price for local telephone service. Hence, it is difficult to predict the overall impact of competition on the affordability of basic telephone service as it depends on specific country characteristics such as the ratio of mobiles to mainlines and the difference in price between them. Furthermore, in theory, it is not necessary for competition to be introduced across the board to maximize increases in availability and affordability. If mobile phones are viewed as substitutes for fixed lines, strong competition in the mobile sector which stimulates sector growth, could be seen as a threat by the monopoly fixed line operator, causing it to improve its performance and become more competitive (Wellenius and Stern 1994).

Empirical evidence of this relationship is scarce because most studies have focused on privatization rather than competition (see for example Ramamurti 1996), although this is partly due to the difficulty of finding reliable data on competition. Ros

(1999) uses the relatively new ITU database of regulatory statistics to determine the effects of privatization and competition on teledensity, teledensity growth and efficiency. He finds that privatization is significantly and positively associated with all three, while competition is only significantly and positively associated with efficiency. He concludes that "competition in basic services is not significantly associated, either positively or negatively, with main lines per 100 inhabitants or growth in main lines per 100 inhabitants" (84). However, his definition of competition is rather loose, as he assigns the competition dummy variable a value of one if a country permits competition in local or national long distance or international long distance service and zero if otherwise. Competition in national and international long distance services is unlikely to have significant effects on network expansion as it seldom requires new entrants to install a fixed line network and does not pose a threat to the incumbent in the local services market. Thus, his variable cannot be expected to capture the effects of competition on availability. His results on efficiency hint at a possible positive impact of competition on affordability, but because the magnitude of cost savings for firms and the extent to which they are passed on to consumers in the form of lower prices remain unknown, it is impossible to draw any conclusions. Wallesten (1999) uses a fixed-effects model to analyze the effects of telecommunications reform for a sample of Latin American and African countries, using the number of mobile operators in a country to measure competition. He finds a positive impact of competition on teledensity, but like Ros, his measure of competition is problematic because he may be overestimating the degree and intensity of competition in Latin American countries like Brazil which are divided into several zones, where one or two operators are given the right to operate but are forbidden from providing service outside their zone.

Neoclassical economic theory says little about how to prevent the occurrence of market failure which plagues telecommunications sectors in LDCs, but scholars of telecommunications emphasize the importance of establishing a regulatory body separate from all operators and independent from political power in order for the benefits of competition to accrue (for example Petrazzini (1997) and Melody (1997) and (2000)). Such a regulatory body should generally be responsible for ensuring fair competition, preventing operators from colluding and establishing and enforcing universal service obligations (USOs) which are likely to have a very big impact on availability and affordability.<sup>2</sup> Since competition generally cannot be introduced without modifying the existing regulatory framework, the benefits of competition may actually come from improvements in regulation rather than simply from the existence of more operators in the market. For example, Wallesten (1999) finds a significant positive impact of regulation and of the interaction of competition and regulation on network expansion.

However, it is difficult to determine what makes regulation effective when it is taken out of the broader political and economic context. NIE, with its emphasis on the interactions between institutions and organizations in the process of institutional change, is a useful framework in which to evaluate the effectiveness of regulatory frameworks.<sup>3</sup> Levy and Spiller (1996) use NIE to show in five case studies how the effectiveness of a country's telecommunications regulatory institutions depends on its institutional endowment, while Singh (2000) concludes that "network expansion and efficiency are most noticeable where adequate property rights and enforcement are in place." On the

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<sup>2</sup> USOs are designed to ensure the provision of service in geographically or economically marginalized areas and can require an operator to build and operate a certain proportion of lines in remote areas and/or to contribute to a universal service fund (USF) which is used to finance telecommunications investments in these areas (see also ITU 1998).

<sup>3</sup> For the definition of institutions and organizations in the NIE context see North (1990).



quantitative front, Gutierrez and Berg (2000) assemble measures of different aspects of a country's institutional environment (regulatory governance, political stability and economic freedom) and use these measures in a panel regression. They find all measures have a positive and significant impact on teledensity.

Thus, disentangling the effects of the various mechanisms set in motion by liberalization is anything but straightforward, with some scholars attempting to do so in quantitative studies and others using qualitative case studies. Quantitative (econometric) studies are useful for identifying the general trends and they help get around the problem of comparability and generalizability of case studies. One of the major difficulties in carrying them out is the availability and reliability of the data. Case studies not only serve to illustrate the findings of statistical analysis but also help get around some of the shortcomings of the data and can illustrate the idiosyncrasies of liberalization which are lost in a regression (Warwick 1993). This dissertation combines both methods in an effort to provide the most complete account possible of the impact of liberalization on access. While purists would argue that combining methods could have negative effects on methodological rigor, because of the complexity of the subject in this particular case, combining them should result in gains in explanatory power. The following section uses descriptive statistics and simple cross-country regressions to provide a broad picture of the impact of liberalization on access, while Section 4 presents three case studies examining it in more detail.

### 3. QUANTITATIVE ANALYSIS

This section uses cross-country data from the ITU database of regulatory statistics to examine the general trends of the impact of liberalization on access. The data include measures of the level of competition in the various telecommunications sub-sectors for close to 150 countries as well as information about the regulatory framework, including the number of years an independent sector regulator has been in existence and whether it is independent from political power, for over 80 countries. The number of years a regulator has been in existence can serve as a rough proxy for the legitimacy of the regulator since the establishment of legitimacy for regulatory entities “requires resources and sustained commitment” (Samarajiva 2000, 186). Independence from political power helps gauge how much the regulatory framework has changed with liberalization by showing whether the regulator has been given real power and authority or whether it is subject to the interference of the government and policy makers, who often have an interest in one or more telecom operators. This information allows for an assessment of the impact of competition and of an improved regulatory framework on availability and affordability, but, due to the difficulty of collecting measures for competition and regulatory environment, the data have some limitations:

- A country is classified as permitting competition in a sub-sector according to the number of operators permitted by law and not according to the actual number of operators in each sub-sector. Since in some countries additional operators have not yet been licensed, the data overestimate the number of countries with true competition. However, the imminent threat of new entrants may be enough for

the incumbent to restructure its operations and become more efficient in preparation for competition in the near future. Thus, the threat of competition could still have positive effects on access.

- Competition is likely to have a greater effect on access as it intensifies, but the ITU only classifies countries by the level of competition—that is, whether they are monopolies or competitive markets— but not by its intensity.<sup>4</sup>
- The database contains data for 1997-1999, but it includes 'duopoly' as an extra category of competition in 1998 making it difficult to compare it with the other two years. The number of observations is also limited in the earlier years, making it difficult to assemble panel data or construct a fixed-effects model.

Keeping these limitations in mind, an analysis of the effects of liberalization on availability, measured here by combined teledensity, is presented first, followed by an analysis of the effects of liberalization on affordability, measured by the ratio of residential and mobile telephone service costs to GDP per capita (see Table 1).

## AVAILABILITY

To analyze the effects of liberalization on availability, combined teledensity is regressed on dummies for competition in local and mobile services, controlling for teledensity prior to reform, GDP per capita lagged one year and population density in an equation as follows:

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<sup>4</sup> They also classify some sectors in some countries as 'partial competition' which they ambiguously define as having "non-technical barriers to entry."

**Table 1**  
**Description of Variables**

Variable	Description
COMBTELED	Combined teledensity: mainlines per 100 people plus mobile phones per 100 people
RESRATIO	Ratio of residential connection fee plus residential monthly subscription fee to monthly GDP/capita
MOBRATIO	Ratio of mobile connection fee plus mobile monthly subscription fee to monthly GDP/capita
TELED85	Teledensity in 1985
GDPLAG	GDP per capita (PPP) lagged one year
POPDEN	People/square kilometer
COMPLOC	1 if competition is allowed in local services, 0 otherwise
COMPMOB	1 if competition is allowed in mobile services, 0 otherwise
YEARS	Number of years since an independent regulator was first established
POLIND	1 if regulator is independent from political power, 0 otherwise

$$\text{COMBTELED} = \alpha + \beta_1 \text{COMPLOC} + \beta_2 \text{COMPMOB} + \beta_3 \text{TELED85} + \beta_4 \text{GDPLAG} + \beta_5 \text{POPDEN} + \varepsilon$$

The measures of competition include only competition in local telephone service and mobile service because these are the only two sectors whose expansion necessarily involves the installation of more telephone lines. Controlling for teledensity prior to reform accounts for the S-shape of the teledensity growth curve which means it is easier to increase the number of telephone lines from a higher starting point (ITU 1998).<sup>5 6</sup> Since the number of telephone lines in a country impacts future and possibly present economic growth, GDP per capita is lagged one year to avoid any possible endogeneity with the dependent variable. Finally, population density is included in the regression because previous studies indicate that as it rises, suppliers should find it more cost-effective to install more telephones.

Table 2 columns 1-3 show the results of the regressions when all countries are included while columns 4-6 include only countries with GDP per capita less than \$10,000. F-statistics are not reported because they are significant at the one percent level in all cases. As expected, initial teledensity and GDP per capita are the strongest predictors of combined teledensity across the board, and the high R-squared is consistent with ITU estimates that differences in income account for 85 percent of cross-country variations in teledensity. In regressions 1 and 4, which do not include the regulatory variables, competition in mobile services has a positive and significant impact on the availability of telephones. However contrary to the predictions of economic

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<sup>5</sup> In 1985 teledensity equals combined teledensity because mobile phones were not available commercially.

<sup>6</sup> Initially, the analysis was conducted using teledensity in 1990 to control for availability prior to reforms, but a low tolerance suggested a possible problem of multicollinearity with GDP. This was corrected by using 1985 teledensity, which raised tolerance to acceptable levels.

Table 2  
Regression results for availability (dependent variable: combined teledensity)

	All Countries			GDP<\$10,000		
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
Constant	-2.719* (-1.668)	-2.589 (-1.035)	-4.215 (-1.313)	-5.542*** (-4.750)	-4.535*** (-2.888)	-4.414** (-2.084)
TELED85	0.963*** (6.040)	0.993*** (5.327)	0.947*** (4.785)	1.541*** (9.855)	1.744*** (8.615)	1.724*** (7.935)
GDPLAG	0.003*** (10.172)	0.003*** (7.922)	0.003*** (7.511)	0.003*** (10.509)	0.003*** (7.573)	0.003*** (6.978)
POPDEN	-0.002 (-1.132)	-0.004* (-1.672)	-0.004* (-1.700)	0.007** (2.059)	0.012* (1.708)	0.012 (1.574)
COMPLOC	-3.775* (-1.724)	-2.424 (-0.933)	-2.771 (-0.948)	-3.232** (-2.319)	-2.690* (-1.692)	-2.985 (-1.636)
COMPMOB	4.368** (2.428)	4.262* (1.868)	4.122* (1.693)	3.200*** (2.756)	3.959*** (2.724)	4.102** (2.550)
YEARS		-0.010 (-0.037)	0.080 (0.269)		-0.158 (-0.805)	-0.190 (-0.793)
POLIND			3.203 (1.153)			-0.172 (-0.103)
N	138	82	76	103	58	52
Adj. R-sq	0.926	0.942	0.938	0.858	0.888	0.877

Note: t-statistic in parentheses

\* Significant at 10% level

\*\* Significant at 5% level

\*\*\* Significant at 1% level

theory, competition in local services has a negative impact on combined teledensity, though the magnitude of the impact is lower than that of competition in mobile services. One possible explanation is that the introduction of competition in local services is coupled with less strictly enforced, if any, universal service obligations and the removal of subsidies results in fewer incentives to expand capacity. Another explanation is that, because the time required by a new entrant in local services to physically build a base network is relatively long and local services have begun to be liberalized only recently, new entrants have not yet begun to operate new telephone lines and the benefits of competition on availability will only be realized once they do. This also suggests that the threat of competition alone is not always sufficient to stimulate expansion and efficiency by the incumbent.

Columns 2 and 5 add the number of years an independent regulator has been in existence to the base model. Although the variable does not have the expected sign, its coefficients are very small and are not statistically significant in either case. Competition in mobile services continues to have a statistically significant positive effect on combined teledensity, particularly in countries with GDP less than \$10,000. However, competition in local services is no longer significant in the regression including all countries and is only significant at the 10 percent level in countries with GDP less than \$10,000. Finally, columns 3 and 6 show the results when the other regulatory variable is included. The political independence of the regulator has a positive effect for all countries but a negative effect for lower income countries, possibly reflecting the variations in the quality of the institutional environments between different levels of development, but it is not significant in either case. Again competition in mobile services has a positive and

significant effect, while this time, competition in local services is not significant in either case.

The results for population density are somewhat contradictory. On the one hand, the coefficients of population density are negative in columns 1-3 and significant in 2 and 3, but on the other hand they exhibit a weak positive relationship with combined teledensity in columns 4-6. Running a bivariate correlation between combined teledensity and population density including all countries and not controlling for other variables, two outliers, Singapore and Hong Kong, drive the positive relationship, but because of missing observations these countries are excluded from the regressions. Thus, holding all other factors constant, population density exhibits a weak negative relationship with combined teledensity.

It is possible that endogeneity exists between competition and/or the regulatory variables and combined teledensity, so that higher availability leads to more competition and a better regulatory environment. It is also impossible to find suitable instruments for competition and the regulatory variables. However as the list of adherents to the ABT shows, a large sample of countries of widely varying income levels and teledensities are liberalizing or have liberalized their telecommunications sector. In fact, low levels of access are one of the reasons for liberalizing the sector, so countries with the lowest levels of access often pursue liberalization as assiduously as any other country, suggesting endogeneity is unlikely to be a systematic problem.

Overall, these results suggest competition has a greater impact on availability than the regulatory variables. However, because competition in local and mobile sectors seem to have contradictory effects, it is difficult to determine the net effect of competition in both sub-sectors on access, though in countries with GDP less than



\$10,000, the results do suggest that competition in mobile services will improve availability, whether local services are competitive or not. This is consistent with the increasing contribution of mobile phones to combined teledensity in LDCs, which is often equal to or greater than that of mainlines. Given that countries have begun to liberalize local services only recently and that the incumbent is usually in a very strong position relative to new entrants as compared to mobile services where competitors often enter the market almost simultaneously, it is premature to arrive at conclusions about the nature of the effect of the liberalization of local services.

#### AFFORDABILITY

Although data on mainline and mobile telephone service fees and per minute rates are collected by the ITU, the complexity of pricing strategies pursued by many mobile and local telephone service companies means that the ITU data on the cost of telephone service provide a simplified picture of the cost of telephone service within a country. Nevertheless, the data provide an idea of the relative magnitude of the cost of telephone service across countries. To analyze the effects of competition and the regulatory framework on affordability the RESRATIO and MOBRATIO measures described in Table 1 are constructed. The major limitation of these measures is they exclude the cost of telephone calls, and hence underestimate the cost of telephone service.<sup>7</sup> However, since the monthly subscription fee and the connection fee are the unavoidable (fixed) costs of telephone service and are likely to account for the bulk of

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<sup>7</sup> Yet, since the measures are based on averages, if one were to consider the variety of pricing plans in a country, it would generally be possible to find a more affordable option. This is especially true in the case of mobile services, where prepaid (pay-as-you-go) cards have eliminated the payment of monthly subscription fees and allow the user greater control over the amount spent on telephone service.

the expense, the ratios should still provide a general notion of the affordability of telephone service in a country.

Table 3 shows the correlations between the four competition and regulatory variables and the two ratios for all countries and countries with GDP less than \$10,000. Only the regulatory variables have the expected signs across the board (a negative impact on the ratios and therefore a positive impact on affordability), and they are only significant when the complete sample of countries is used. Competition in local service has the expected sign for all countries, but is positive for countries with GDP less than \$10,000, though the coefficients are very small and not statistically significant. Competition in mobile services appears to have no effect on the affordability of telephone service.

These findings must be interpreted with caution given the difficulty of constructing a measure of the affordability of telephone service and of capturing all the factors influencing the pricing decisions of telecom operators. Overall, they suggest the relationship between competition and affordability and between a better regulatory framework and affordability is weak. Yet, a good regulatory framework seems to be relatively more important in increasing affordability. This is probably due partly to the importance of the role of the regulator in establishing pricing guidelines. Yet, it also underlines the importance of the role of the regulator in establishing and enforcing guidelines for interactions among operators. For example, interconnection between operators if left unregulated provides opportunities for the dominant operator to overcharge other operators for interconnection capacity, resulting in higher costs passed on to the customers in higher prices for telephone service.

**Table 3**  
**Correlation between affordability and regulatory and competition variables**

	All Countries		GDP<\$10,000	
	<u>RESRATIO</u>	<u>MOBRATIO</u>	<u>RESRATIO</u>	<u>MOBRATIO</u>
COMPLOCAL	-0.103 (0.255)	-0.144 (0.116)	0.098 (0.345)	0.006 (0.957)
COMPMOB	0.066 (0.463)	0.021 (0.827)	0.074 (0.483)	0.004 (0.968)
YEARS	-0.208* (0.071)	-0.215* (0.071)	-0.162 (0.251)	-0.120 (0.416)
POLIND	-0.267** (0.025)	-0.174 (0.163)	-0.200 (0.178)	-0.075 (0.634)

Note: p-statistic in parentheses

\* Significant at 10% level

\*\* Significant at 5% level

In sum, it is difficult to make generalizations about the impact of liberalization on access, and the above results highlight the complex and sometimes contradictory nature of the forces unleashed by liberalization and the difficulty of capturing their effects by condensing them into simple numerical measures. However, some general trends can be identified. First, competition does have an effect on availability, but its direction depends on the sub-sectors liberalized and on the way the process is carried out. Second, the measure of competition used here does not seem to be related to affordability. Finally, the regulator also appears to have a role in increasing access, but it is difficult to infer its relative importance from the data. The case studies in the next section address some of the limitations of this analysis by closely examining the liberalization process in three LDCs.

## 4. CASE STUDIES

The results presented in Section 3 showed a relationship between different aspects of liberalization and the two determinants of access exists, but the overall impact of liberalization on access could not be determined because of the difficulty of capturing the complexities of the liberalization process with quantitative data. Using Ghana, The Philippines and El Salvador as examples, this section illustrates some of the subtleties arising from the complexity of the liberalization process and highlights the importance of tailoring the design and implementation of liberalization to a country's institutional environment. Specifically, these case studies reveal how a perfectly reasonable liberalization strategy designed to address the shortcomings of the sector's regulatory framework can lead to few or no access benefits because broader institutional constraints obstruct its implementation.

These countries have been chosen because, having liberalized most telecommunications sub-sectors, they appear to be further along the liberalization process than most other developing countries. Furthermore, they are all signatories of the ABT and have adopted the working paper on regulatory principles in its entirety. They differ from each other slightly in their socio-economic characteristics and levels of access, but they are all considered to have passed innovative and thorough telecommunications reforms by regional and world standards. In choosing these case studies, the emphasis is on comparability rather than representativeness. The hope is that in comparing these three countries it will be possible to identify some of the numerous variables affecting the access outcomes of liberalization, which can serve to guide sector policy design and implementation. Using data from regulatory websites,

company reports, newspaper articles and academic papers, the case studies provide a brief description of the liberalization process and its impact on access in each country, identifying shortcomings in its design and implementation in the context of the broader institutional environment.

## GHANA

Of the three case studies presented here, Ghana has the lowest GDP per capita and the lowest telephone penetration, but since passing telecommunications reform legislation in 1996 as part of a broad national policy to become the gateway to West Africa, it now boasts one of Sub-Saharan Africa's most liberalized telecommunications regimes. This legislation includes the National Communications Authority (NCA) Act which created an independent regulator for the communications sector whose objectives are to promote fair competition and protect operators and consumers from unfair conduct by other operators. Like most independent regulators, its functions include granting licenses, assigning and regulating the use of frequencies, providing guidelines on tariffs and advising on policy formulation. In addition, the government sold a 30 percent stake in Ghana Telecom (GT) to Telekom Malaysia and, in an unprecedented move, licensed a second provider of basic services, Westel (a consortium led by Western Wireless), at the same time.

One of the main reasons leading to these reforms was the low availability of telephones within the country which had remained static at a teledensity of 0.3 between 1985 and 1995 despite an average annual economic growth of 4.7 percent throughout the same period.<sup>8</sup> Therefore the licenses required both companies to achieve mandatory

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<sup>8</sup> See [www.newafrica.com/telecommunication/output.asp](http://www.newafrica.com/telecommunication/output.asp).

penetration targets within a specific period: 25,000 lines for GT in the first year and for Westel after three years of operation. GT not only complied with the targets, but exceeded them slightly, doubling installed capacity between 1997 and 1999. Westel, on the other hand, only began operating in 1999 and by the end of 2000 had an installed capacity of 3,000 lines. This disappointing result can be attributed to interconnection disputes with GT which, according to Westel, is violating the terms of the licenses which require every operator to provide reasonable interconnection capacity to all other operators.<sup>9</sup> The NCA Act has a specific clause about regulating interconnection, so in theory it is responsible for mediating interconnection disputes. However, by the end of 2000, the NCA board had not been appointed nor had it been fully staffed. Consequently, it had not yet established comprehensive regulations for the sector. Furthermore, as Freepong and Atubra note, "it is apparent that all the operators have strong bases in the political system of the country and therefore cannot easily be lent upon by the regulatory authority [which] effectively undermines the independence and authority of the NCA in resolving conflicts" (2001, 208). Thus the NCA Act, though innovative on paper, has effectively not been implemented, meaning operators have had to rely on the not-so-transparent and lengthy judicial process to settle their disputes. Because GT has managed to impair Westel's operating ability, the lack of a competitive threat has also offset any potential improvements on affordability that could result from Westel's strategy of using prepaid vouchers and eliminating distance-specific charges for local service.

Mobile phones have also played a significant role in providing access to telecommunications in Ghana since Mobitel began operating the first analogue cellular

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<sup>9</sup> The lack of interconnection capacity with the dominant operator renders Westel's lines worthless because it limits the number of users who can be contacted through its telephone lines, violating the main principle of access to interactive communications technologies (see Section 2).

network in Sub-Saharan Africa in 1992, but they became particularly important when Spacefon began operating a GSM (digital) network in 1996. Thus, mobile phones were provided on a competitive basis even before the decision to liberalize local services and averaged 102 percent annual growth between 1993 and 1997 (Freepong and Aturba 2001, 201). At present there are four cellular operators in the market, though one of them, Celltel, has negligible market share. The launch of GT's GSM network in September 2000 significantly extended the area of the country covered by mobile phones and has given many Accra professionals the opportunity to take their mobile phones back to their rural homes and make the village's first telephone call (Turner 2000). However, mobile phone operators are also involved in interconnection disputes with other operators and particularly with GT. In fact, by the end of 2000, GT had not reached any interconnection agreements with the other major operators for its GSM service and all the other operators had limited, if any, interconnection capacity with GT's mainline network (Turner 2000). Competition in mobile services has also not resulted in vigorous price competition, and call charges have fallen only slightly over the past four years. Falling handset prices have increased the affordability of mobile phones, but a shortage of handsets coupled with a lack of regulation has led dealers to sell prepaid mobile phones for between US\$71 and \$140 instead of the regular price of \$50.<sup>10</sup>

By the end of 2000, Ghana had 300,000 fixed lines and 200,000 mobile phones for a teledensity of 1.5 and a combined teledensity of 2.5, representing a significant improvement in the availability of telecommunications compared to the pre-liberalization period. However, the failure to implement the NCA Act and the weakness of the broader institutional environment—with special interests dominating the judicial and legislative

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<sup>10</sup> See [www.joy997fm.com.gh](http://www.joy997fm.com.gh).



branches—has meant many of the potential benefits of liberalization for access have not materialized. This is further evidenced by the fact that increases in availability both in fixed and mobile service have often come at the expense of quality, resulting in lower call completion rates (Turner 2000). Recently, the Minister of Trade and Industry declared the inefficiencies in service delivery and the high cost of tariff charges in the sector to be unacceptable and announced plans to “make room” for more operators to provide fixed line service.<sup>11</sup> Interestingly, he does not mention the need to strengthen the NCA by staffing it with competent experts and giving it real powers, suggesting that any new operators are likely to find themselves constrained by GT’s anticompetitive behavior with no effective regulatory or judicial recourse. John Mahama, the Minister of Communications who implemented liberalization, best sums up the lesson, “If I had to do it all again, I would have set up and strengthened the regulatory agency before I liberalized” (quoted in Turner 1999).

## THE PHILIPPINES

The Philippines is unique among LDCs because its experience as a colony of the US led it to copy the US model of private provision of telephone service and regulation when it achieved independence in the early 1900s. Thus initially, a number of small privately owned companies provided local telephone service in different areas, though the Philippines Long Distance Telephone Company (PLDT) became the dominant operator early on by taking over many of the smaller firms. In fact, up until the early 1990s, it owned about 90 percent of the country’s telephone lines and had a virtual monopoly over domestic and international long distance services (Esfahani 1996, 146).

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<sup>11</sup> See [www.joyfm.com.gh/article.asp?p=3&a=738](http://www.joyfm.com.gh/article.asp?p=3&a=738).

Not surprisingly, teledensity was 1.1 in 1992 and had not grown substantially over the previous decade.<sup>12</sup>

The National Telecommunications Commission (NTC) was created in 1979, five years before Britain created an equivalent body, and was granted political independence such that its decisions are only appealable to the Supreme Court. In practice, the NTC remained dormant throughout the first half of the 1980s and from the 1990s was either weak and unable to enforce its decisions or subject to capture by the party in power, which generally has had close ties to the families controlling the country's telecommunications operators (Esfahani 1996). Yet, while efforts to promote efficient competition in the sector through regulatory reform failed, significant change did come slowly from the office of the president beginning in 1986.

The first main change of policy was to promote entry into the sector. This effectively began in 1989 when the government licensed several smaller operators to provide cellular services in competition with PLDT. This policy gained momentum when Ramos, who wanted to dismantle PLDT's monopoly, took office in 1992. He issued Executive Order 159 which made it compulsory for operators to provide interconnection capacity to competitors. The second main change of policy came when Ramos issued Executive Order 152, establishing an innovative and unprecedented system of USOs for all telecommunications operators, such that in addition to requiring local service operators to install a minimum number of lines within a certain period of time, mobile phone operators and international gateway operators are also required to install a minimum of 400,000 and 300,000 *fixed lines* each in unserved areas.

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<sup>12</sup> Teledensity and mobidensity data are from the NTC's website, [www.ntc.gov.ph](http://www.ntc.gov.ph).

Despite the NTC's incomplete enforcement of interconnection terms and some shortcomings in the installation of lines, these policies have made the sector somewhat more competitive and have produced substantial access gains. Teledensity increased to 9.3 in 1998 and mobidity went from less than one to 8.5 mobile subscribers per 100 people, greatly exceeding private and public sector expectations. In particular, the number of mobile subscribers increased by 10 percent in 1999, but increased by over 200 percent in 2000. In the process, PLDT's overall market share decreased to just over 50 percent as the market became more competitive and other operators strengthened their position. The effects on affordability are harder to document because of the change in pricing strategies over time. Yet, two main trends suggest telecommunications are becoming more affordable. First, the successful launch of several prepaid mobile services and one prepaid landline service suggests operators are attempting to deepen their penetration by going after lower income customers. Second, firms increasingly run promotions with discounts of up to 50 percent on connection fees and extended payment periods (see for example PLDT 2000), providing the opportunity for lower-income consumers to sign up for service.

The Philippines has managed to achieve important improvements in access despite having a very weak regulatory body, which has failed to gain legitimacy and enforcement powers even though it was created over two decades ago. These successes can be attributed partly to innovative policy design as in the case of USOs, but mostly to a strong figure in the executive committed to lowering barriers to entry for the sector. However, the changing political environment and the failure to strengthen the NTC have resulted in a lack of commitment to provide continuity in telecommunications policy. Currently, a trend toward consolidation dominates the sector as the four main mobile

operators have merged into two, leaving the sector with an effective duopoly since the third operator has yet to become a competitive threat. Furthermore, though at least one other operator has applied for a cellular license more than three years ago, the NTC has so far refused to grant any other licenses despite the high growth potential of the sector (Ali 1999). The NTC is effectively protecting existing operators from competition and increasing the probability of collusion. At the same time, teledensity has not increased since 1998, partly due to the inability of the NTC to enforce USO targets. Increased liberalization has had a positive impact on access in the Philippines, but the regulatory framework needs to be strengthened to cope with the weaknesses of the country's institutional environment and the NTC given real enforcement powers if liberalization is to continue to bring access benefits in the medium term.

#### EL SALVADOR

The telecommunications infrastructure in El Salvador suffered greatly during the country's long civil war and has subsequently been affected by several natural disasters, including an earthquake in January 2001. The devastation and increase in poverty which followed, would seem to suggest that telecommunications would not be a priority for the government. Yet, telecommunications can play a particularly important role in relief efforts and in long-term development strategies and the comprehensive sector reform law passed in 1996 suggests some recognition of this fact. Prior to reform, the availability and affordability of telephone lines in the country was extremely poor, with waiting lists of 500,000, which amounted to almost double the number of installed lines, and with lines selling for as much as US\$1,000 in the black market (US Department of Commerce 1998). The teledensity in 1997 was less than six and was heavily skewed

towards urban areas with 70 percent of lines in San Salvador. ANTEL, the monopoly state-owned operator provided local services while Telemóvil obtained a license to provide mobile services in 1991.

The first step in reforming the sector was taken in 1997 with the breakup of ANTEL into a fixed service provider, Compañía de Telecomunicaciones de El Salvador (CTE), and a mobile services provider, Compañía Internacional de Telecomunicaciones (INTEL) holding a license but not yet operating a network. The same year, EMETEL became the first competitor to the CTE when it secured a license to provide local service in the three northwestern provinces. Then in July 1998, CTE was sold to Estel, a consortium led by a subsidiary of France Telecom, in a deal which included a license to provide mobile services in addition to the right to operate the fixed line infrastructure, and INTEL was sold to Telefónica Internacional. At the same time, Grupo Centro Americano de Telecomunicaciones (GCA) began providing local service in five cities. El Salvador presently has three local and three mobile service providers.

The reform also redefined the role of the Superintendencia General de Electricidad y Telecomunicaciones (SIGET) as the regulator of the sector, including among its functions the setting of maximum telephone service charges to be charged by the operators (El Salvador, 1996). So far, SIGET seems to have been fairly effective relative to its counterparts in Ghana and the Philippines at preventing anticompetitive practices by operators and protecting users from abuses from the operators. For example, it is conducting an enquiry into the charging practices of mobile operators, because it appeared some of them were charging customers for uncompleted calls (i.e. calls to a cell phone that is turned off or out of range), and in 2000 it investigated and fined the CTE for its involvement in a case of telephone espionage (Arguello 2000).

Finally, the reform also set up a universal service fund (FINET), which is to be used to set up telephone service in unserved areas.

The impact of the reforms on access has generally been positive. In terms of availability, the number of fixed lines in the country doubled between 1998 and 2000 bringing teledensity close to 10 by the end of 2000. The number of mobile subscribers has also rapidly increased with Telemóvil alone increasing its subscribers from 30,000 in 1998 to about 160,000 in 2000. Together, the three mobile phone operators have a total of 340,000 subscribers, bringing mobidensity up from 1.8 in 1998 to over 4 in 2000.<sup>13</sup> The data on affordability are harder to obtain, but the tariffs published by SIGET suggest some tariff rebalancing in local services, with slight increases in the cost of connection and the monthly subscription fees. However, the price of mobile services began decreasing in 1998 when the threat of competition made Telemóvil offer steep discounts. The introduction of prepaid mobile service by all of the operators has greatly decreased the cost of owning a telephone, but it is still out of reach for the three million Salvadorans living below the poverty line.

Overall, El Salvador's liberalization of telecommunications is a success—at least so far. The establishment of SIGET as a strong and independent regulatory body setting well-defined rules for the sector has led to the curtailment of anticompetitive practices by the operators, so the interconnection problems which have plagued Ghana and the Philippines have been avoided. From this information, it is difficult to make judgments about El Salvador's broader institutional environment, making it impossible to determine whether SIGET is more effective than the regulatory bodies in the other two countries because it is better designed to deal with broader institutional shortcomings or because

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<sup>13</sup> Recent numbers of cellular subscribers are from [www.siget.gob.sv](http://www.siget.gob.sv) while the older numbers were reported by Rock and Valdez 2001.

the country's institutional environment is better than those of Ghana and the Philippines. At the same time, the reform is still in its early stages, and the question is whether it will continue to bring benefits in the future as technological and economic conditions change. Making telephone service affordable for the poorest Salvadorans remains the biggest challenge.

## 5. POLICY RECOMMENDATIONS AND CONCLUSION

The evidence presented in Sections 3 and 4 illustrates the difficulty and danger of making generalizations about liberalization across countries, by taking liberalization out of context and reducing it to a single dimension (i.e. the introduction of competition). Specifically, Section 3 showed the limitations of cross-country data in capturing the subtleties which determine the access outcomes of liberalization. Perhaps the most important lesson is that the liberalization process cannot be designed or evaluated independently of a country's broader institutional environment, since it intricately affects the implementation of liberalization strategies. Thus, the first step to determining the impact of liberalization on access is to gain a deep understanding of the institutional context in which the reform takes place.

The case studies and the cross-country regression analysis do suggest liberalization is unlikely to bring significant and sustained improvements in access unless access is one of its explicit goals. Furthermore, as the Philippines' case study suggests, the definition of access as a goal must be understood and shared by all of the participants in the process and progress toward this goal must be continuously evaluated to maximize the access benefits of liberalization.

Finally, the importance of regulation is paramount, particularly in a weak institutional environment. A strong well-staffed well-financed independent regulator is the most effective way to prevent operators from taking advantage of each other and their users. Furthermore, incorporating appropriately designed universal service obligations into a country's liberalization strategy has a strong positive impact on access when the regulatory body adequately enforces them. However, the difficulty of



measuring and comparing the quality of countries' broader institutional environments, means the evidence presented above is not sufficient to determine with certainty whether it is possible to have a robust telecommunications regulatory framework in a weak institutional environment. In the long run, the solution to this problem is to strengthen the institutional environment, but in the long run, the telecommunications (and therefore the information) access gap will continue to grow if no immediate action is taken. The challenge is whether policy makers will be committed enough to design and implement regulatory frameworks which address the institutional weaknesses impeding the realization of the access benefits of liberalization.

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