

Institutions, Telecommunications Reform, and Universal Service Policy in Mexico (1990–2014)

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The article analyzes difficulties in the design and implementation of pro-competition and universal services policies in Mexico, from the privatization of the public telephone company in 1990 to the recently approved Telecommunications and Broadcasting Reform of 2013–2014. It reviews recent literature on the expansion of Mexico's telecommunications infrastructure, formulates its conceptual framework based on institutional theory, and proposes possible explanations for Mexico's underperformance. Finally, it addresses the reforms of 2014, concluding that the new institutional embodiment of these reforms has begun to bear fruit: Telecommunication markets have seen a rise in their contestability, attributable to the institutional strength of the new regulatory framework. On digital inclusion, the deployment of two wholesale networks is on schedule. The Mexico Connected program has led to a 500% increase in Internet access points in public places. But there little information on whether these access points are equipped with the necessary infrastructure and personnel for developing digital skills to foster the adoption of such technologies

Keywords: antitrust, digital inclusion, institutions, telecommunications policy, regulation

Introduction

This article examines the major difficulties that have been faced by regulation and public policy designed to promote universal telecommunication services in Mexico (1991–2012) and to what extent the Telecommunications and Broadcasting Reform of 2013–2014 may be contributing to the access and adoption of these services: by fostering competition and thus bridging the market *efficiency gap*, and by promoting infrastructure development to reach high-cost areas, and thereby bridging the *access gap*.

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The article presents an analysis of connectivity in Mexico and its annual average growth over the period 2000–2014, with special emphasis on the poorest regions. It then presents international comparisons to put Mexico's performance over these years in context, comparing it to continents with large proportions of developing countries: Latin America, Asia, and Africa. This analysis focuses on mobile service teledensity across these countries. The emphasis on this service here is explained by the advances in mobile communication density in developing countries, where network costs are estimated to be only half of those of fixed networks and where the rollout of mobile is more flexible and faster and enables these networks to reach rural populations with low levels of income and literacy (Vogelsang, 2010). The introduction of mobile services in the developed world offered a convenient complement to a fixed network, but their impact has been more significant in emerging economies, where most of the population has limited access to traditional telephone services. According to Khalil et al (2009), the next billion mobile subscribers will consist mainly of the rural poor.

In addition, mobile smart phones and tablets increasingly have been used to access broadband Internet services and have found applications in the delivery of education, health, and financial services in less developed countries (Deb, 2012; Esteve & Machin, 2007; Kumar, Reddy, Tewari, Agrawal, & Kam, 2012; Marshall, 2007).

In the light of available evidence both in Mexico and internationally, this article proposes possible explanations for Mexico's relative underperformance by analyzing the implementation of telecommunications regulations and policies. Specifically, the article analyses the difficulties that have been faced by the regulatory bodies behind the design and implementation of pro-competition and universal services policies over the 23 years from 1991–2013, from the privatization of the public telephone company Telmex in 1990 to the recent Telecommunications and Broadcasting Reform of 2013–2014. Finally, the study explores the effects on the potential adoption of telecommunication services that are likely to ensue from the recent reform, which represents the most significant shake-up of the telecommunications industry in the last two decades.

Connectivity in Mexico

In 1990, the license agreement of the privatized telecommunications company Telmex stated:

As holder of the license for the network with nationwide coverage, our objective is to ensure that every person has access to basic telephone service within as short possible time span, either via a public booth or in their home. (Secretariat of Communications and Transport, 1990, p. 27)

In Mexico, more than two decades have elapsed since the privatization of the state telecommunications company, and universal service coverage is still an unfulfilled promise: In 2014, on average, half of all homes (54%) lacked a landline service (Instituto Federal de Telecomunicaciones [IFT], 2014). Although this sparse coverage may be mitigated in part by the 88.3% penetration of mobile lines (International Telecommunication Union, 2014), the distribution of mobile services is biased toward the more prosperous states and larger cities. In Mexico, only a third of homes (35.0%) have a computer and

pay TV (36.7%), and less than a third (30.7%) have Internet (Instituto Nacional de Estadística, Geografía e Informática [INEGI], 2013).

In the poorer states of Chiapas, Guerrero, Oaxaca, Tlaxcala, Zacatecas, and Hidalgo, home to 15% of the country's population and with almost 62% of their population living in poverty, the availability of residential landlines is more limited (25.5%), and such regions also have low mobile density (71.1%) (IFT, 2014; INEGI, 2013).

In 2013, in rural areas, representing 6.9 million households (21.9% of the total population), only 1.5 homes in 10 had fixed-line services, only half of the people used a cellular phone (51.4%), 8.3% households had a computer, and just 3.6% had Internet (INEGI, 2013). These data suggest that it is among rural populations, in the poorest states of the country, where the greatest challenge lies in providing telecommunications services.

Before examining universal service policies in Mexico and policies related to competition of the telecommunication services markets, it is helpful to look at the achievements of other developing countries to put Mexico's performance into perspective.

International Comparisons

International comparisons for 2013 highlight that teledensity in mobile services in Mexico was 88.3%, below the average for the Latin American region (113.0%) and lower than that observed among countries in the region with a similar level of income per capita (142.0%).² Despite the growth in mobile lines in Mexico (14.9% annually between 2000 and 2013), this fell behind the average growth in Latin America (25.4%) (ITU, 2014).

When we compare Mexico with emerging Asian countries, which have a mean per capita income that is less than half of Mexico's (US\$6,888 vs. US\$15,600, respectively), we see that teledensity in mobile services in Asia is greater than that in Mexico (88.3% in Mexico vs. 94.4% in Asia; ITU, 2014). Growth in these services is more than double (37.5% vs. 14.9% in Asia), suggesting that the service soon will be universal in these countries.

Similarly, when we compare Mexico with emerging African countries, with a mean income that is half the per capita income of Mexico (US\$7,070 vs. US\$15,600, respectively), we see that teledensity in mobile services in Africa is greater than that in Mexico (88.3% in Mexico vs. 104.6% in Africa). The rapid growth in mobile services observed in these countries in Africa (40.5% vs. 14.9%, respectively) also suggests that service soon will be universal.

² International comparisons used the latest available information (ITU, 2014). We adopted the World Bank's (World Bank, 2013) country classification methodology based on gross national product (GNP) per capita based on purchasing power parity (PPP).

In short, Mexico lags behind other countries with similar or lower levels of development in the adoption of mobile services. These results raise a number of questions regarding the reasons for the lower relative density of telecommunications services and lower growth in adoption of these services (Casanueva, 2013; Khalil et al., 2009). The reasons relate not only to countries' per capita income; a helpful approach to exploring the reasons is the distinction made in the literature between a *market efficiency gap* and an *access gap*.

Literature Review

The literature on the adoption of telecommunication services makes a distinction between a *market efficiency gap* and an *access gap*. The first of these terms refers to the extent to which well-functioning competitive markets complement universal service policies to maximize social well-being. Countries with a competitive structure have higher penetration levels than those with monopolies or markets that are partially competitive by closing the market efficiency gap (Munte-Kunigami & Navas-Sabater, 2009). *Access gap* refers to cases where private operators cannot provide service on a commercially sustainable basis without some form of government universal service subsidy (Stern, Townsend, & Stephens, 2006).

Competition, Bridging Market Efficiency Gap and Universal Service Policy, Bridging Access Gap

Much has been published on the market structure of telecommunications services. The consensus is that competition is an essential factor for the development of a modern telecommunications infrastructure (Del Villar, 2009; Lee & Marcu, 2007; Waverman, Meschi, & Fuss, 2005). It has also been suggested that protecting incumbents from competition has resulted in decreased investment in telecommunications networks, fewer pay phones, lower mobile telephone penetration, and less international calling (Wallsten, 2001).

In Latin America, more competition and the free entry of private investors in telecommunications services has propelled network expansion and efficiency across the sector (Gutiérrez, 2003). A recent study found that insufficient competition in Mexico has resulted in poor market penetration and infrastructure development, imposing significant costs on the economy and burdening the welfare of the country's population (Organisation for Economic Co-operation and Development [OECD], 2012).

These studies strongly suggest that competition is an essential factor for the development of a modern telecommunications infrastructure and that market competition in telecommunication services should complement universal service policies to improve social welfare.

An additional finding in the literature on universal service policies is that, in the case of Mexico, resources allocated by the government for connecting the poorest communities have not been sufficient to meet potential demand for these services (Casanueva-Reguart, 2013). According to Estache and Wren-Lewis (2009), there is clear concern over the inability of public institutions to allocate sufficient funding for direct subsidies when consumers' ability to pay for services is limited. This limitation is reflected in the

slow progress seen in providing universal service subsidies. Clarke and Wallsten (2002) present evidence of the limited success of state-subsidized network expansion and suggest that targeting is a major problem.

The literature on the adoption of telecommunication services points to an analytical framework that emphasizes the role played by *institutions*: regulations and policies, their design, and their implementation within a specific institutional environment.

Institutional Analysis: Conceptual Framework

This article examines factors that have contributed to the difficulties in bridging both the *market efficiency gap* and the *access gap* in Mexico. I argue that these factors are related to the institutional set-up that has typified Mexico for the last few decades, as failures in regulation occur as a result of a weak institutional framework.

An institutional analysis emphasizes the importance of the environment in which policies and regulations are drawn up, ratified, and implemented, because such policies and regulations are the result of a process of reconciling the interests of the groups involved. The various interests adjust as a whole to the institutional environment and to a given political context, where economic interests emerge as both political interests and policies (Levy & Spiller, 1994).

Analyzing the experiences in some developing countries over the past two decades, Estache and Wren-Lewis (2009) suggest that the effects of institutional limitations on regulatory outcomes can be large when institutions are weak. They argue that four key institutional weaknesses need to be taken into account: limited regulatory capacity, limited accountability, limited commitment, and limited fiscal efficiency.

Limited regulatory capacity refers to the notion that regulators are often short of resources, usually because of a shortage of government funding, which prevents regulators from employing suitably skilled staff. *Limited accountability* refers to the fact that institutions, including regulatory agencies, that are designed to serve citizens on behalf of the government may not be answerable to their principals and, hence, may be free to fulfill their own objectives: "Where accountability is lax, collusion between the government and various interest groups, including regulated firms, is more likely to occur" (Estache & Wren-Lewis, 2009, p. 733). With regard to *limited commitment*, North (1990) has emphasized the existence of an effective legal system as a precondition for investment and growth.

This article attempts to clarify the major difficulties that have been faced by regulation and public policy designed to promote universal telecommunication services in Mexico. Another goal of this article is to determine the extent to which the recently approved Telecommunications and Broadcasting Reform contributes to the access to and adoption of these services: by fostering competition and thus bridging the *market efficiency gap*, and by promoting infrastructure development to reach high-cost areas, thereby bridging the *access gap*.

The article begins by presenting an analysis of connectivity and its annual average growth over the period 2000 to 2013, with special emphasis on the poorest regions in Mexico.

The article then presents international comparisons to put Mexico's performance over these years in context, comparing it to continents with large proportions of developing "the inability of societies to develop effective, low-cost enforcement of contracts is the most important source of both historical stagnation and contemporary underdevelopment of the third world" (North 1990, p. 54). Estache and Wren-Lewis (2009) found that, between 1985 and 2000, in Latin America, more than 40% of licenses were renegotiated, most at the request of governments. The results indicate that property rights and the quality of bureaucracy play a significant role in promoting investment in private infrastructure.

With regard to *fiscal efficiency*, public institutions are unable to allocate sufficient funds to allow direct subsidies when consumers' ability to pay for services is limited. Infrastructure limitations are apparent in the slow progress observed in the provision of universal service subsidies. Clarke and Wallsten (2002) provide evidence for the limited success of state-subsidized network expansion, reflecting the low priority assigned to serving the needs of the country's poorest. In Mexico, social programs do not benefit those with the most pressing needs and represent an unsustainable proposition in the long term. The current model in Mexico represents a serious problem in terms of sustainability for public spending and in view of low tax revenue, particularly given the dependency on government spending from oil revenue, for which earnings are not guaranteed (Chávez-Presa, Trillo, López-Calva, & Centro de Estudios Espinosa Yglesias, 2013).

In short, policies and regulations aimed at improving the performance of infrastructure industries in developing countries, including telecommunications, have had limited success, and in many instances this has been due to key institutional limitations in these countries. Public regulatory policy may have been different within a robust institutional environment. This institutional analysis conceptual framework defines this article's main arguments and central questions.

Main Arguments

In relation to the *market efficiency gap*, it is argued that failures in regulation occur as a result of a weak institutional framework and an imbalance of power between the regulatory authorities and operators from the market-dominant conglomerate comprising Telmex, with 67% of landlines (IFT, 2014), and Telcel, with 69% of mobile lines (IFT, 2014).

With regard to the *access gap*, it is argued that Telmex's dominance has led to the various difficulties faced by government authorities in enforcing the social coverage commitments set out in the company's operating license signed in 1990, and subsequently as the only winning bidder of the government-funded Social Coverage Fund (FONCOS [Fondo de Cobertura Social], 2002–2006).

This study examines the government policies implemented with the aim of guaranteeing both availability of telecommunications services in rural communities of fewer than 500 inhabitants and access to Internet services via Digital Community Centers. I suggest that these schemes have lacked the

resources necessary to provide connectivity among the country's poorest, and for that reason the policies have not provided an effective response to the access gap. As argued in the presentation of the conceptual framework, the access gap is ultimately of an institutional nature, reflecting the low priority assigned by the government to serving the needs of Mexico's poorest citizens.

Finally, Mexico's recent Telecommunications and Broadcasting Reform proposes a more robust *institutional design*, aiming to make good the regulatory failures of the previous two decades by reinforcing regulation, intensifying competition, and proposing an important shift in digital inclusion in the form of direct government involvement in the construction and operation of infrastructure.

Research Questions

The arguments described above lead us to consider the following research questions:

RQ1: Regarding the market efficiency gap, is it likely that the difficulties in regulating the incumbent operator have meant a limited ability to counter the anticompetitive practices?

RQ2: Regarding the access gap, is it possible that the incumbent's dominance has led to difficulties faced by government authorities in enforcing the social coverage commitments set out in Telmex's operating license, and the government's Social Coverage Fund program (FONCOS, 2002–2006) as the only winning bidder?

RQ3: Regarding the access gap, have public resources been sufficient to facilitate universal service coverage?

RQ4: To what extent will the policy and regulatory measures embodied in the Telecommunications and Broadcasting Reform contribute to solving the difficulties previously faced by regulators wishing to boost competition? To what extent does digital inclusion policy actually reach areas lacking service?

Methodology

To answer the first question about the *market efficiency gap*, I document the attempts by regulators to prevent anticompetitive practices by declaring Telmex-Telnor and Telcel as operators with *substantial market power* in the different telecommunication services markets, including access to infrastructure and interconnection services (1997–2014).³ The sources on the implementation of pro-competition policies consist of official secondary sources: annual reports and press releases from the Comisión Federal de Competencia (the Federal Competition Commission, or CFC) and the Comisión

³ This is the definition of market power adopted by the extinct Comisión Federal de Competencia, or Federal Competition Commission.

Federal de Telecomunicaciones (the Federal Telecommunications Commission, or COFETEL from December 1997 to February 2013 and information from industry analysts and newspapers.

On the question the *access gap*, the study examines the scope of policies on universal service provision by the Mexican authorities and presents the main outcomes of these policies. The sources for this analysis are the *Household Survey on the Access and Use of Information Technologies* (INEGI, 2013) and statistics published by the Secretariat of Communications and Transport (SCT) (2000–2010, 2012) and the IFT (2010 and 2013). Also used were documents prepared by government agencies charged with defining and monitoring telecommunications policies on universal service, mainly by the SCT. Finally, in-depth interviews were conducted with former representatives of the Office of Rural Telephony, which previously monitored the implementation of universal telecommunications policies.

On the third question, continuing with the issue of the *access gap*, I examine the policies implemented by the government that were designed to guarantee both the availability of telecommunications services in rural communities of fewer than 500 inhabitants and public access to Internet services via Digital Community Centers. The sources for this analysis are SCT annual reports (2003–2011, 2013).

With regard to the fourth question on the recent Telecommunications and Broadcasting Reform and *market competition*, I examine the criteria used to identify the dominant operators in the telecommunication markets. The IFT has the power to act upon these operators by imposing asymmetric regulation to remove barriers to competition and potentially call for the divestment of assets to prevent anticompetitive behavior. The analysis is based on official information published, including press releases by both the IFT and telecom companies.

On the subject of *digital inclusion*, I assess the progress of processes under way for the deployment of a government-operated infrastructure. I also examine the progress made in fitting out public places with network access points linked to the fiber-optic network, thus promoting universal access to broadband in schools, universities, hospitals, government buildings, and public open spaces.

The Market Efficiency Gap and Mexico's Pro-Competition Policies (December 1997 to February 2013)

Article 63 of the Telecommunications Act of 1995 stipulated that when an operator is declared as being dominant by the CFC in any particular telecommunications services market, asymmetric regulation is put in place around tariffs, quality of service, and disclosure of information—all measures designed to prevent anticompetitive practices or, where appropriate, aid in the identification of such practices and in sanctions being imposed.

Below I present a summary of 16 years (December 1997 to February 2013) of regulatory action taken by both the CFC and COFETEL in their attempts to regulate Telmex-Telnor and Telcel's market power.

Enforcement of Pro-Competition Policies: An Unfulfilled Promise

At the end of 1997, the CFC declared that Telmex-Telnor⁴ had market power in five relevant markets: local communications, interconnection, national and international long distance, and interurban call transport. In September 2000, COFETEL imposed specific obligations on Telmex and Telnor regarding tariffs and quality of service and disclosure of information under the Federal Telecommunications Act. In December 2000, Telmex-Telnor appealed COFETEL's rulings, obtaining a suspension (OECD, 2012, p. 63).

In May 2001, the CFC issued a new declaration that Telmex and Telnor were operators with substantial market power in the same five markets. The operators in question appealed the ruling. A further ruling in favor of Telmex-Telnor was issued, and the secretariat considered the obligations relating to market dominance to be annulled (OECD, 2012).

In the first quarter of 2004, the CFC issued a further ruling on the substantial market power of Telmex-Telnor. The operators appealed, and the court overrode CFC's earlier ruling (OECD, 2012).

Toward the end of 2007, the CFC initiated investigations to assess the potential market dominance of Telmex-Telnor. Preliminary rulings were issued on the basis of these investigations, in which the CFC determined that these operators had substantial power in the following markets: origination and termination of public traffic, local call transport, and wholesale leasing of dedicated lines. In August 2010, Telmex-Telnor made an appeal, which the CFC denied. Telmex-Telnor then filed for an *amparo* (injunction). As a result of Telmex-Telnor's *amparo* claim, Mexico's Supreme Court of Justice suspended these antitrust rulings (OECD, 2012).

Early in 2011, the head of COFETEL's regulatory unit stated that asymmetric regulation was not a necessary outcome of a declaration of market dominance (Juárez, 2011). This argument is not legally tenable, because the statement contravenes Article 63 of the Federal Telecommunications Act.

In September 2011, the CFC reissued the declaration of market dominance against Telmex-Telnor in the wholesale leased line and in the local and national long-distance markets (Diario Oficial de la Nación [Oficial Gazzete], 2012). Telcel filed an appeal, which was upheld in 2013.

In February 2011, the CFC found that Telcel had engaged in *exclusionary practices* by charging a higher tariff to other competing operators than to Telcel's own subscribers.⁵ Telcel's price-squeezing led to increased costs for competitors, while the company offered a more competitive price to end users within its own network, a clear infringement intended to hinder competition. Telcel appealed, and the CFC agreed to revoke Telcel's fine on condition that the company reduce interconnection tariffs and cease this practice (CNN-Expansión, 2011).

⁴ Telnor is a subsidiary of Telmex that operates in the state of Baja California.

⁵ Article 10, Federal Competition Act (1995).

In taking this approach, the CFC lost credibility in terms of its ability to penalize the anticompetitive practices engaged in by Telmex-Telcel.

In February 2013, the CFC also imposed a US\$50.6 million fine on Telmex for exclusionary practices in the market of wholesale leasing of dedicated lines (Juárez, 2013). Telmex successfully appealed, and in October 2013, the CFC suspended application of the fine (ibid.).

In short, after 16 years of continued attempts to effectively implement regulation following declarations of substantial market power issued by the CFC against Telmex-Telnor and Telcel, the evidence suggests that nothing was achieved in preventing the anticompetitive practices. The OECD (2012) report on Mexico's Telecommunications Regulations states that: "Mexico's weak institutional framework allows telecommunications operators to make constant use of the legal framework to challenge the authority of CFC, COFETEL and the SCT, a process that usually results in the non-application of laws and regulations" (p 55).

COFETEL Reduces Interconnection Charges, a Historic Regulatory Achievement

After more than a decade of continual disputes over interconnection charges between Telmex-Telnor and Telcel and smaller operators, with few results, significant regulatory measures were finally introduced with the aim of fostering competition in the telecommunications sector. COFETEL was to reduce interconnection rates, with the reduction being applicable across local and mobile networks.

But during the first quarter of 2011, a controversy emerged surrounding interconnection charges between Telmex-Telcel and a group of more than 20 providers united under the self-declared title of United Together Against Telmex-Telcel ("Tucotel"). The controversy over interconnection tariffs was referred to Mexico's Supreme Court, which, in May 2011, ruled that COFETEL had the power to set interconnection rates in the case of a dispute between operators, stating that there was no constitutional violation of the terms of the Act.

COFETEL started slashing interconnection charges in May 2011 to 0.39 pesos (around US\$0.034) per minute from the previous price of 0.95 pesos (US\$0.082). The move brought relief to smaller telephone companies, for whom fees to access wireless networks represented approximately 15% of costs (COFETEL, 2012).

This overview of how pro-competition policies have been enforced leads to questions regarding the nature of the regulatory institutions, which, after 16 years, were unable to implement their original mandate, instead preventing market efficiency and causing legal uncertainty in the telecommunications industry. This uncertainty in turn affected investment, service tariffs, and coverage. One further factor highlighted here is that regulatory success was achieved only with the involvement of the Supreme Court of Justice (Suprema Corte de Justicia, 2012, April 18).

Universal Service Provision (1990–2006)

This section discusses the *access gap* and analyzes the scope of public policies on universal service provision designed by the Mexican authorities and presents the results of research into these policies. The first policies involved Telmex as the sole provider, initially governing how it fulfilled its social obligations as a regulated monopoly following the company's privatization in 1990, then as the winning bidder and sole provider under the Social Coverage Fund.

Telmex License: Universal Service Obligations

The following paragraphs give a summary of the main provisions relating to Telmex's universal service. We also include an empirical analysis showing the outcomes of the implementation of these policies, reflecting the achievements of network growth, rural telephony and public telephone services, or telephone booths.

Telmex's Social Obligations to Communities With More Than 500 Inhabitants

As a result of the negotiations between government telecommunications policy makers and the main investor, Telmex's license freed the company from its obligation to serve communities with fewer than 500 inhabitants. According to the 1990 census, such communities represented 21.2 million people, or 47.2% of inhabitants in rural areas in Mexico (INEGI, 1990).

An analysis of the impact of Telmex's rural operations indicates limited results. An estimate shows that the country's average was 1.3 lines per community. Although Telmex thereby complied with the condition stipulating that basic services must be provided to every rural community, the goal for provision is itself very low when potential demand for this service is taken into account. Potential demand is estimated using the population over age 15 in rural communities of 500 to 4,999 inhabitants. This estimate reveals that towns have an average of 600 inhabitants per telephone booth or basic voice service facility. In rural communities in the rest of the country, the number of citizens per telephone line varies from 232 people in Aguascalientes to 5,210 inhabitants per telephone line in Baja California Sur (see Table 1). Given the extremely low density of lines per inhabitant, it is very likely that many of these communities currently rely on mobile services, where such a service is available.

Table 1. Telephone Lines Installed by Telmex in Rural Localities of 500 to 2,499 Inhabitants and Line Density 1990–1994 (Selected States).

State	Number of rural communities (500–2,499 inhabitants)	Number of lines per community	Ratio of population age 15 and older to number of lines
National average	540	1.3	600
Aguascalientes	1816	0.1	232
Baja California Sur	24	0.2	5,210.2
Chiapas	950	0.8	684.4
Puebla	1,040	1.0	548.5
Sonora	230	1.3	489.8
Oaxaca	1,362	1.3	461.4
Hidalgo	735	1.1	419.0
Veracruz	1,779	1.2	384.1
Guerrero	932	1.1	379.5
Tabasco	678	1.1	376.9
Jalisco	584	1.3	358.5
Campeche	135	1.2	338.9
Quintana Roo	122	1.1	337.4
Colima	56	1.4	332.1
Michoacán	1,036	1.5	296.4
Yucatán	322	1.7	265.7
Aguascalientes	181	1.4	232.5
Coahuila	238	1.8	227.0
Chihuahua	372	2.4	151.4
Tamaulipas	373	2.5	113.6
Nuevo León	232	3.1	70.3

Note. Sources are SCT (2010) and INEGI (1990).

Unfortunately, according to the definition of universal service set out in Telmex's license, the universal service obligation ceased, and areas that were served with at least one public booth increased slightly in 1995, then ceased to grow from 1996 (see Figure 1).

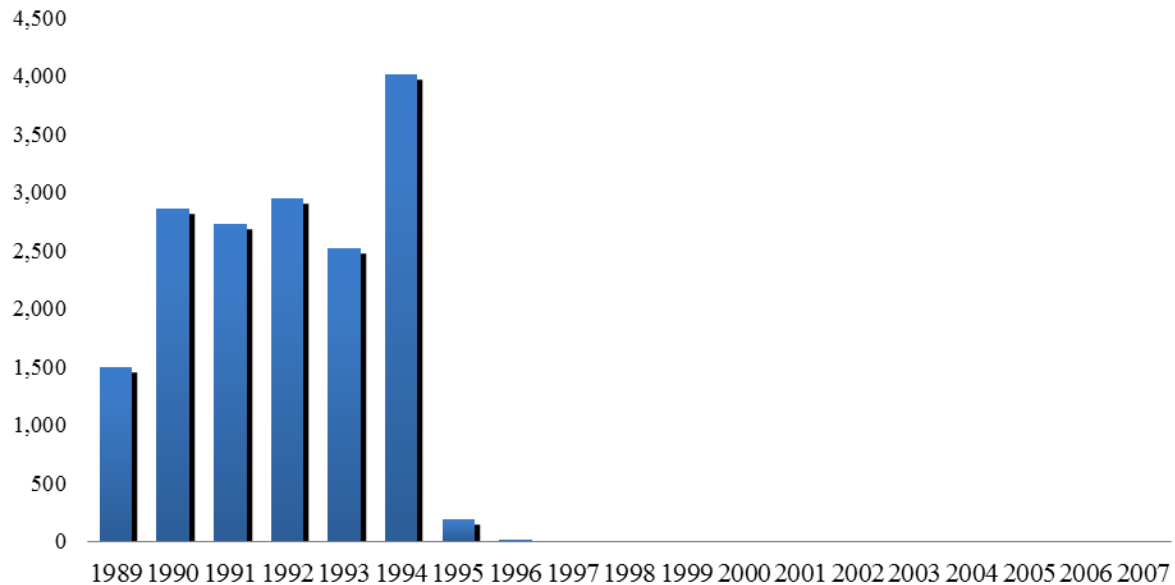


Figure 1. Number of rural communities of more than 500 inhabitants connected by Telmex. Source is SCT (2010).

According to Telmex's license, the commitment to provide basic service under the aim of universal access through public booths in Mexico is severely burdened by the challenge of providing services to the poorest communities of Mexico.

Social Coverage Fund

In 2002, the program *Social Coverage Fund* FONCOS [Fondo de Cobertura Social] was established as a trust fund with an allocation of US\$75 million provided by the Secretariat of Finance. Its main purpose was funding social telecommunications services serving communities of between 400 and 2,500 inhabitants.⁶ The secretariat designed two public tender processes: For STB-1 (Basic Telephony Service-1 [Servicio de Telefonía Básico-1]), the subsidy for the chosen operator consisted of both financial and bandwidth resources for 10 years (renewable), which were reserved by the government for social coverage purposes. The subsidy to the end user included all expenses relating to the installation and rental of the equipment, so that the end user had to pay only for call traffic.

For STB-2 (Basic Telephony Service-2 [Servicio de Telefonía Básico-2]), the ***subsidy to the successful bidder consisted of bandwidth resources only***. The end users were charged for installation costs and call traffic, exonerating them from payment for the rented equipment. The subsidy for the chosen company consisted only of the license to operate bandwidth resources for 10 years (also renewable). In both public tenders Telmex was chosen.

There was an important change to the terms of the original contract signed between Telmex and the SCT, which consisted of exchanging bandwidth resources reserved by the government for social coverage purposes for bandwidth with high commercial value. A few weeks before the end of the presidential and ministerial administration of 2000–2006, this exchange of frequency bands took place: Telmex's 21 MHz allocation in the 1.5 GHz band, originally allocated by the SCT as part of the Social Coverage Fund, was exchanged for 10 MHz in the 450 MHz band (Comisión Federal de Telecomunicaciones [COFETEL], 2006).

The exchange of frequency bands had the effect of reducing the cost of deploying the FONCOS network and proved commercially advantageous for Telmex, since the 450 MHz band was the most appropriate for the provision of wireless services with technology known as CDMA450 (Peralta, 2007). The exchange of bandwidth resources allowed Telmex to use these resources without going through an open public tender. Former representatives of the Office of Rural Telephony argued that Telmex's true interest was to acquire the use of those frequency bandwidth resources with a potentially high financial return (personal communication, November 12, 2010).

This analysis leads us to consider the role of the government authorities in allocating public finance and bandwidth resources for social coverage. In this case, the Secretariat of Communications and Transport granted valuable infrastructure resources to be used commercially at a very low cost for the incumbent operator (Casanueva-Reguart & Pita, 2010).

Additionally, based on fieldwork and remote monitoring performed by the Office of Rural Telephony, an audit of the services offered by Telmex under FONCOS showed that, out of the program

⁶ The total sum is derived from 750 million pesos, the exchange rate between Mexican pesos and U.S. dollars at the time being around 10 Mexican pesos to 1 U.S. dollar.

objective of 109,016 telephone lines, only 88,791 were actually installed, implying that 20,225 lines were never installed. In 2006 the Office of Rural Telephony identified numerous irregularities, for example, involving the installation of two landline connections in the same household, which proved less costly for Telmex (19,397 lines). A similar discovery was made of lines that were not connected to any specific household, which prevented verification that they were operational (6,983 lines).

So far, the limited success of the different public policies aimed at providing universal service has been presented as being due firstly to the limited extent to which clauses set out in Telmex's license were invoked, and secondly to the irregularities observed when it came to compliance with various agreements, including the FONCOS contract with Telmex.

Rural Telecommunications Services and e-Mexico (2002–2012)

This section examines the policies implemented by the government with the aim of guaranteeing both the availability of telecommunications services in rural communities of fewer than 500 inhabitants and access to Internet services via Digital Community Centers.

Rural Telecommunications Services

In 1995 the Secretariat of Communications and Transport designed a policy aimed at providing telecommunications services to rural communities with fewer than 500 inhabitants. As shown in Table 2, telephone density in these small towns remained extremely low, with the estimated average for telephone booth density being just 0.2 lines per town. It seems clear that most towns did not benefit from this program.

Table 2. Rural Telephony: Lines Installed by the Ministry of Communications in Towns With Fewer Than 500 Inhabitants, 1995–2002.

	Towns with fewer than 500 inhabitants	Estimated number of lines installed per town
Total	173,409	0.2
Chiapas	18,514	0.1
Puebla	5,060	0.3
Oaxaca	9,191	0.1
Tlaxcala	1,029	0.1
Hidalgo	3,788	0.4
Michoacán	8,434	0.2
Tabasco	1,693	0.5
Zacatecas	4,259	0.2
San Luis Potosí	6,253	0.2
Veracruz	18,818	0.2
Durango	5,498	0.1
Morelos	1,243	0.2
Yucatán	2,209	0.1
Campeche	2,627	0.1
Guanajuato	7,827	0.3
Guerrero	6,282	0.2
México	2,935	0.8
Nayarit	2,433	0.1
Aguascalientes	1,816	0.1
Jalisco	10,252	0.2
Quintana Roo	1,858	0.1
Querétaro	2,330	0.2
Tamaulipas	7,136	0.1
Coahuila	3,635	0.1
Sinaloa	5,316	0.2
Chihuahua	12,033	0.1
Colima	1,175	0.1
Distrito Federal	506	0.0
Sonora	7,005	0.1
Baja California	4,345	0.1
Nuevo León	5,119	0.1
Baja California Sur	2,790	0.1

Note. Sources are INEGI (2005) and SCT (2010).

Information provided by the Office of Rural Telephony showed that 173,409 lines were installed between 1995 and 2010. An analysis of this information reveals very rapid growth in the number of installed lines between 1995 and 2000 (50.7% yearly average growth) and that the pace of growth declined considerably over the following years, when the yearly average growth observed between 2001 and 2010 was only 1.2%. There was no evidence of growth after 2010 (see Table 3).

Table 3. Growth of Telephones Booths Installed in Communities With Fewer Than 500 Inhabitants, 1995–2010.

Average annual growth 1995–2000	50.7%
Average annual growth 2001–2010	1.2%

Note. Source is SCT (2010).

These observations raise doubts about the government's commitment to bridging the *access gap* in the smallest and poorest communities of Mexico. They also raise questions about the nature of the agreements signed by the SCT and operators undertaking the installation of the telephone lines—specifically, operation and maintenance in accordance with acceptable quality standards. Those interviewed agreed that the contracts included maintenance and quality clauses, which poses additional questions regarding the strength of the secretariat as a regulator able to enforce these clauses.

Information and Knowledge Society Coordination Program

The e-Mexico policy was initiated in 2002 with the aim of providing public access to the Internet and information technology by setting up Digital Community Centers (CCDs). CCDs were the result of collaboration agreements between the SCT and various government offices tasked with developing content in the areas of education and training, health, and social development (see Table 4).

Table 4. Digital Community Centers' Areas of Joint Responsibility, 2013.

Area of joint responsibility	%
Education and training	61.7
Health	27.1
Social development	10.9
Other	0.3

Note. Source is SCT (2010).

Over the first decade of the e-Mexico scheme (2002–2009), the number of CCDs increased annually at an average rate of 19.3%, going from 1,838 CCDs in 2002 to 8,971 in 2009. Information for 2010 was unavailable, but published information for 2011 (SCT, 2012) reports that only 6,788 CCDs were operational, revealing an average annual drop of 13.0% between 2009 and 2011.

The analysis revealed that most municipalities in each state had at least one CCD (between 0.7 and 1.0 CCDs per municipality). However, this metric does not consider fulfillment of the potential *demand* for access to IT services—in particular, the Internet. To determine how well CCD coverage meets potential demand, I estimated the ratio of CCDs to population size. Population was calculated as the reported number of inhabitants of between 12 and 54 years of age in Mexico's poorest states. The result is an extremely high potential demand compared to available CCD provision (see Table 5). For example, in Michoacán there are 6,710 inhabitants per CCD; in Tlaxcala, 4,474 inhabitants per CCD; in Chiapas, 2,780 inhabitants per CCD; and in Guerrero, 3,228 inhabitants for each CCD. It should be pointed out that, in most cases, the community in question is likely to have other means of commercial Internet access at its disposal. Although the estimate presented here is rough, it suggests that Internet access and other IT services offered by CCDs during 2002–2013 was extremely limited compared to the potential demand.

Table 5. Potential Demand for Digital Community Centers in Mexico's Six Poorest States), 2013.

State	Population	Number of CCDs	Number of CCDs per municipality	Population per CCD ²
Chiapas	2,941,511	1,058	9.0	2,780
Guerrero	2,046,847	634	7.8	3,228
Oaxaca	2,302,561	1,590	2.8	1,448
Tlaxcala	742,652	166	2.8	4,474
Zacatecas	912,053	258	4.4	3,535
Michoacán	2,677,181	399	3.5	6,710

Note. Source for population data is INEGI (2010), and source for number of CCDs I SCT (2014).

In 2014, the person in charge of coordination offered hope of continuity for the CCD program. A directory of the CCDs in operation published by an official source in October 2013 listed 11,589 CCDs, which represents an annual growth of 70.7% between 2012 and 2013 (Telecomm-SCT, 2013). The installation of CCDs began to recover its pace in 2009, reaching the growth seen in 2013 (see Figure 2).

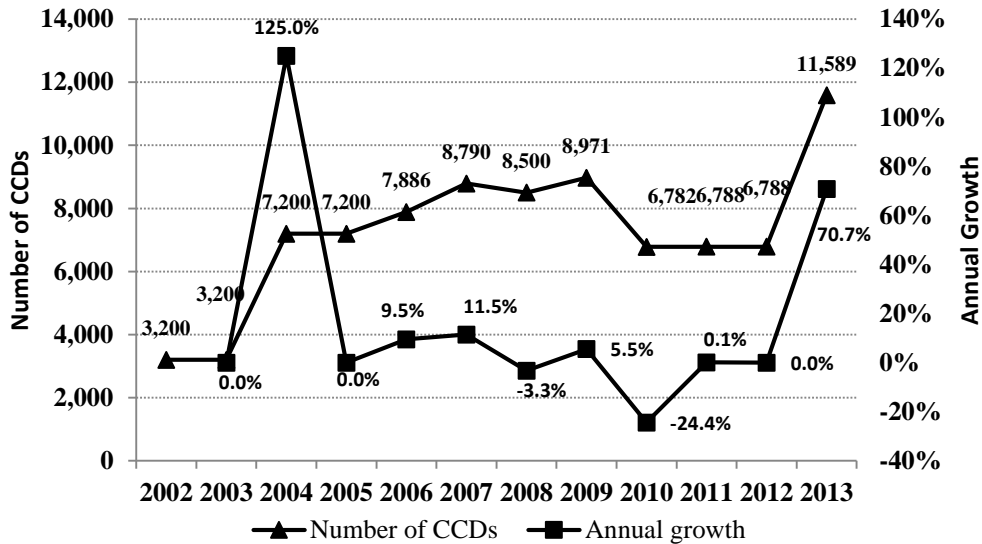


Figure 2. Number of Digital Community Centers in Mexico and average annual growth, 2002–2013. Source is SCT (2013).

Telecommunications Reform as a New Institutional Design: Competition and Digital Inclusion Policy

The Reform of 2013 and the Telecommunications and Broadcasting Act of 2014 include measures to encourage competition in the telecommunications sector by way of a new institutional framework in which regulatory institutions are strengthened, a new Federal Telecommunications Institute is established (with the power and autonomy to regulate competition in these marketplaces), specialist tribunals are created, and an amendment is adopted to the *amparo* law to prevent any immediate injunction over the regulator’s rulings. These measures are in addition to allowing 100% investment in the telecoms sector and opening up the broadcasting sector to allow for up to 49% foreign capital, subject to a reciprocal investment deal in the corresponding country of origin. The law includes additional measures such as elimination of long-distance charges.

To foster *digital inclusion*, the reform includes provision for the deployment of two new state-administered wholesale networks, with the aim of boosting competition in the interconnection service marketplace and making it easier for relatively small local operators to access enhanced 700 MHz-band wireless networks and a government-operated fiber-optic backbone.

A proposal has been put forth to turn public places into network access points with links to the fiber-optic network, thus promoting universal access to broadband in schools, universities, clinics, hospitals, government buildings, public open spaces, and any place providing public services. There are about 250,000 such public places in the country, with 44.6% located in rural localities of fewer than 500 inhabitants, home to just 9% of the population. The public access points, in addition to offering broadband connectivity, will aid the provision of government (e-government), education, health, and other services (Esteve & Machin, 2007).

An assessment of the measures to encourage competition as of 2014 reveals that the reform and its institutional embodiment in the form of a new regulatory body (the IFT) has begun to bear fruit. Declarations of market-dominant economic agents (*preponderancia*) in both the telecommunications and broadcasting sectors have been made, along with a proposal for specific asymmetric regulatory measures to be imposed on these economic agents, including regulation of interconnection charges, sharing of infrastructure, local loop unbundling, leasing of dedicated links, regulation pertaining to roaming services, virtual mobile operators, requirements in relation to marketing of services, audiovisual content, and information and service quality obligations.

On July 8, 2014, the América Móvil Board (AMX the holding company of Telmex-Telnor-Telcel) announced that it would take steps to reduce its market share nationally to below 50% of the telecommunications sector to no longer be deemed a *preponderante* (market dominant) economic agent. AMX announced that it would create a subsidiary company responsible for operating the passive infrastructure to offer services to interested third parties. Thereby, AMX will avoid sharing its infrastructure under asymmetric regulation, and, while the company will lease its infrastructure through the subsidiary, AMX is attempting to ensure that the subsidiary will not have market dominance (AMX, 2014). In addition, investigations are under way into other services market concentrations, such as pay TV, with a view to issuing a declaration of significant market power (regulation by service).

The case of *digital inclusion*, and specifically the two wholesale transport networks, is unlike the previous essentially regulatory case. The strategy for digital inclusion consists of investment in the construction and expansion of infrastructure and in the human capital needed to operate it. Only in December 2014 did the public electricity company transfer its fiber-optic infrastructure to Telecom, the state-owned company that will be in charge of operating the wholesale networks. Although a functional audit of this infrastructure has been performed, the 35,000-kilometer expansion remains on hold. Similarly, deployment of 90 Mhz of the 700 MHz band that will eventually support the wireless wholesale network requires a reallocation of this spectrum resource from private broadcasting operators to the government as part of the transition from analog to digital. This transition program has experienced delays in various locations throughout Mexico, which in turn have probably delayed deployment of the wireless wholesale network for the near future.

The number of Internet access points in the Mexico Connected Program saw a 500% increase in just three years. However, there is little information on the extent to which these access points are equipped with the necessary infrastructure for developing the digital skills that would foster the adoption

of such technologies and trigger a process of economic development. As with the availability of CCDs, the Internet access points appear extremely limited compared to the potential level of demand (see Table 6).

Table 6. Estimated Potential Demand for Broadband Internet Access Points in Mexico's Five Poorest States, 2014.

State	Population	Number of access points	Population per access point
Chiapas	2,941,511	2,664	1,104.2
Guerrero	2,046,847	2,299	890.3
Puebla	3,581,433	1,854	1,931.7
Oaxaca	2,302,561	3,502	657.5
Tlaxcala	742,652	465	1,597.1

Note. Source for population data is INEGI (2010), and source for access points is SCT (2014).

Conclusion

This study addresses a number of questions about the design and implementation of telecommunications policies in Mexico: How have difficulties with regulation of the incumbent telecommunications operator affected the ability to close the market efficiency gap? Has the incumbent operator's dominance hindered the enforcement of social coverage commitments under the FONCOS program, hence failing to bridge the access gap? Have public resources been adequate to spur improvements in universal service coverage? To what extent will the Telecommunications and Broadcasting Reform remedy the deficiencies? And, finally, to what extent does the policy for digital inclusion reach areas in need?

On the first question relating to the *market efficiency gap*, failures in regulation have occurred as a result of a weak institutional framework and an imbalance of power between the regulatory authorities and operators from the market-dominant conglomerate. This examination of regulation aimed at bridging this market efficiency gap confirmed that, after a 16-year history of pro-competition regulatory activity, these measures had limited success in preventing and countering the anticompetitive practices in which the operators engaged, hampering efforts to regulate in favor of greater market competition and efficiency. There is little doubt that the most notable case of regulatory success was in the reduction of interconnection tariffs based on a cost model set out by COFETEL. This one success was achieved when Mexico's Supreme Court of Justice stepped in to defend COFETEL's rulings and quash the various litigation processes that were blocking implementation of the regulations.

With regard to the second question, relating to the *access gap*—and specifically about government enforcement of the contracts between Telmex and the Secretariat of Communications and

Transport—Telmex's dominance made it difficult for government authorities to enforce the universal service commitments set out in the company's operating license and subsequently in the company's contract under the government's Social Coverage Fund program. This study has pointed out the difficulties faced by the government authorities in enforcing the incumbent operator's social coverage commitments. This failure of enforcement has resulted in a lack of process transparency in the allocation of resources and little improvement to access to services. These findings point to an infringement of contracts, as discussed in the article's conceptual framework.

The third question also concerned the *access gap*. When it came to universal service programs, both in the case of providing telephone lines for communities with fewer than 500 inhabitants and in the establishment of Digital Community Centers, the analysis confirmed the lack of necessary resources for providing connectivity among Mexico's poorest citizens. The universal service programs had not provided an effective response to the access gap. The provision of these services through different policy approaches has lagged far behind the potential demand for them.

With regard to the fourth research question, the new institutional structure brought about by the Telecommunications and Broadcasting Reform to boost competition in the given markets will take some time to mature. But the telecommunications markets in Mexico have seen a rise in their *contestability* (Baumol, Panzar, & Willing, 1983), attributable to the institutional strength of the regulatory framework. Any agent remains competitive as long as it stays contestable: "Any individual firm has to act 'efficiently' and competitively, if the threat of entry can function as an economic watchdog" (Machaj, 2013, p. 480). The chances of greater competition in the telecommunications markets as a result of this new regulatory framework have never been better in the last 23 years.

On the deployment of the two wholesale transport networks, although slow, the process seems to be on schedule. With the Mexico Connected program, an increase of about 500% is reported in the number of Internet access points in public places. However, little information exists on the extent to which these access points are equipped with the necessary infrastructure for developing digital skills that would foster the adoption of such technologies and contribute to a process of economic development.

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