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Cooperatives in Bolivia: Customer ownership of the local loop

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Abstract

Cooperatives have been used by the inhabitants in rural areas to gain access to telecommunications. In Bolivia and Finland, for example, consumer cooperatives have been for many years the only mechanism to provide local telecommunication services to the whole country. This paper studies the effects of the Bolivian market's structure on the development of competition as well as on universal access and service policies. It argues that some cooperatives after the liberalisation of the market are not helping to develop competition. Cooperatives may have incentives to increase the interconnection charges that they receive from long distance firms to cross-subsidise the prices of local calls. Moreover, as some cooperatives have entered the long distance market, they may try to restrict competition through collusive agreements. Finally, the paper suggests that the excessive price of the cooperatives' shares may have damaged the possibility of reaching a higher penetration level and greater coverage in rural areas.

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1. Introduction

The telecommunications sector in Bolivia is atypical because local networks are mainly owned by private consumer cooperatives. Fifteen incumbent cooperatives provide fixed local telephony

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in the most densely populated villages. Eight operators provide long distance calls with different levels of coverage, and three mobile operators offer services in the most profitable villages. The objective of this paper is to analyse the effect of this unusual market structure. Cooperatives have been used by the inhabitants of the rural areas of other countries, such as the United States and Argentina, to gain access to telephony. In this paper, however, the authors aim to analyse the effect in Bolivia of using cooperatives as the only mechanism to provide telecommunications services to the whole country.

The creation of several electricity and telecommunications cooperatives in the 1980s in Bolivia is understandable given to the fact that this is one of the poorest countries in Latin America, where more than 40 per cent of the population lives in rural areas, with a Government lacking resources and political strength to invest in the improvement of these services, and where foreign investment has been scarce. But, what is the role of the cooperatives in a liberalised market? What is the impact of this market structure on competition? Could the cooperatives help to expand the service in the rural areas? This paper argues that some cooperatives' regulations established in Bolivia after market liberalisation have not facilitated the development of competition and the expansion of service to the whole population.

The economic literature concerning the telecommunications industry has rarely paid attention to consumer cooperatives. This could be explained by the fact that only in Bolivia and Finland all consumers were the owners of their access telephone lines, and were organised in cooperatives operating the local loops.¹ In other countries, telecommunications liberalisation has generated more familiar types of market structure. One way to organise the sector consists of treating telecommunications services in conventional terms and to completely deregulate them. New Zealand is a paradigmatic example of this strategy, but very few countries have followed its example, perhaps because most Governments consider that the provision of telecommunications services typically exhibits important elements of natural monopoly.² Although telecommunications costs have decreased enormously during recent decades, the cost of installing an access line continues to be very important. Consequently, each consumer is usually connected with only one operator. As the New Zealand experience has finally revealed, this situation requires the regulation of access to incumbents' networks.

A second possibility, better accepted by national authorities, consists of completely liberalising the market, but regulating the interconnection prices to monitor entry into the industry. A low access price encourages entrants to use the incumbent's network. Conversely, a high access price promotes the construction of new infrastructure by new entrants. The promotion of infrastructure competition allows the relaxation of the role of future regulation and promotes the commercialisation of a wide range of services by the entrants. An example of this policy can be found in the United Kingdom and in Spain, or in general, in the European Union.³ However, in practice new operators are not stimulated to deploy their infrastructure in high cost rural areas

¹For an study of the Finish case see Nattermann and Murphy (1998) and Graack (1999).

²Tye and Lapuerta (1996) analyse the experience of New Zealand.

³An analysis on the privatisation process in the United Kingdom can be found in Beesley and Laidlaw (1992), Beesley (1992), Armstrong, Cowan, and Vickers (1994) and Newbery (2000). Costas and Calzada (2003) analyse the liberalisation process in Spain.

which are less profitable. As a result, regulators have been forced to facilitate access to the incumbent infrastructure through access prices and the unbundling of the local loop.

A third market structure consists of licensing different firms for the provision of local telecommunications and for long distance services. The United States and Chile have experimented with this solution.⁴ This organisation is very similar to the one that Bolivia and Finland used before the complete liberalisation of their markets, although in these two countries each cooperative had a local monopoly.

Finally, a more radical option consists of separating the management of telecommunications networks and the commercialisation of services. This strategy implies losing the vertical externalities that exist between these two activities. Despite this inconvenience, during the last few years some countries such as Finland have adopted this model.⁵

The evaluation of these methods of organising the operators in a liberalised market shows that all these alternatives have succeeded in attaining, to a moderate or greater extent, a reduction in prices, an increase in the variety of services and an improvement in the quality of the services offered to consumers. However, it is also important to clarify that in many countries, after more than a decade of liberalisation, it remains essential to regulate the market in order to sustain competition and to protect consumers. This situation occurs because new operators are not interested in providing services to high cost remote rural areas, or low-income consumers.⁶

Could a market based on the presence of cooperatives for the provision of local telecommunications relieve the weight of regulation? At first glance, it seems that the presence of non-profit cooperatives should make less necessary the regulation of the local operators and should make easier the emergence of competition in the long distance market. However, in the case of Bolivia this is not occurring. This paper argues that stakeholders in the cooperatives are putting pressure on managers to reduce the price of local calls. This reduces the capacity of cooperatives to invest. On the other hand, traditionally managers had maintained the price of the shares high enough in order to satisfy cooperatives stakeholders. As a consequence, the penetration and coverage of the service did not increase for many years. By contrast, the expansion of fixed telephony in the rural area in the last few years must be attributed to the Government's universal access and universal services policies.

On the other hand, this paper explains that the managers of some cooperatives may have incentives to use their market power in local telephony to control the long distance market. First, by fixing high interconnection charges for the long distance operators they can cross-subsidise local calls. Secondly, as the regulation allows the cooperatives to enter the long distance market these may look for alliances to compete against long distance operators.

The paper is organised as follows. The second section briefly reviews the utilisation of the cooperatives in the telecommunications sector in selected countries. The third section considers in more detail the liberalisation process in Bolivia. The fourth section evaluates the introduction of

⁴For a complete study of the telecommunications industry in the United States see Temin (1987), Brock (2002), Brock and Katz (1997), Woroch (2002) and Noam (2002). An analysis of the liberalisation in Chile could be found in Moguillansky (1998), Melo and Serra (1998) and Guasch and Spiller (1999).

⁵This kind of vertical separation has also occurred in railroad industries of some countries such as Sweden and the United Kingdom. See Estache, Goldstein, and Pittman (2001) and Hausman and Myers (2002).

⁶Torero, Chowdhury, and Galdo (2003) show that in Peru the rural telecommunications projects are welfare enhancing, since households' willingness to pay are higher than the prevailing tariff rates.

competition in the local, long distance and mobile markets. The fifth section studies the effect of the cooperatives on interconnection agreements and in the expansion of the rural telecommunications. Finally, the sixth section explains the main conclusions.

2. Cooperatives in the telecommunications sector

Consumer ownership of telephone lines is a market structure that has been scarcely studied in the economic literature and that has only been experimented in a few selected situations. [Schechter \(1996\)](#) studies the theoretical advantages that would imply customer ownership of the local loop. He emphasises that “customers will determine whose traffic their loops carry, and incumbents will not have to supply competitors with the means of competing with them”. However, this theoretical work avoids some important practical problems. For example, it does not consider the transaction costs that consumers will incur when they negotiate supply contracts with each operator. In practice, this problem has been solved in some countries through the creation of consumers’ cooperatives. In terms of the existing experiences, telecommunications cooperatives are associations of customers that provide local telecommunications and that negotiate with other firms for the provision of long distance services. Following recent liberalisation of the telecommunications market, however, the cooperatives are now also entering in the long distance market.

The control of the local loops by cooperatives may simplify the regulation of the industry in several ways. First of all, the presence of cooperatives eliminates the abuse of the dominant position that local operators can exercise. Secondly, the vertical separation between local and long distance activities facilitates competition in the long distance market, because all the firms are playing on the same level field. Thirdly, the presence of cooperatives and vertical separation allows regulation of interconnection prices more easily than other market structures. Since the cooperatives are local monopolies, they are not interested in raising interconnection prices charged to other cooperatives. Because members of the cooperatives are interested in having low prices, they ought not to have incentives to charge high interconnection prices to the long distance operators.

In spite of that, governance problems of the cooperatives may invalidate some of these predictions. The theoretical literature on the governance of cooperatives is relatively undeveloped in comparison to that on corporate governance. A recent study by [Cornforth \(2004\)](#) applies agency theory to the study of cooperatives.⁷ He shows that in cooperatives the relationship between the shareholders (the principal) and the managers (the agent) is different than in conventional firms. “First, cooperatives are established to serve their members’ interests and hence profitability is a means to an end rather than an end in itself. Secondly, the shares of cooperatives and mutuals are not traded in a market and hence there are not the same external pressures from major shareholders or the threat of takeover. Hence the boards of cooperatives

⁷[Cornforth \(2004\)](#) identifies some problems that affect the cooperatives: democratic legitimacy of boards, low levels of member participation. In particular, he emphasises the difficulties of effectively supervising senior managers and of protecting the interests of members and other relevant stakeholders. He reviews the agency, stewardship, stakeholder, and managerial hegemony theory and discusses how they can be applied to understand the cooperatives.

may have a diversity of goals, which do not readily translate into traditional measures of business performance, and managerial actions will be less constrained by market forces". Other theories, such as the stakeholder theory, consider that the boards negotiate and resolve the potentially conflicting interests of different stakeholder groups in order to determine the objectives of the organisation.

In practice, the relationship between shareholders and managers depends on regulation and the features of the cooperative. In some countries, the cooperatives emerged because of the efforts of certain groups to bring telephony to unprofitable rural areas not hitherto served by the incumbent operators. This is the case in the United States and Argentina, where the cooperatives are extensions of the incumbent's network, although with an independent commercial and managerial policy.

In the United States, the telephone industry began to develop throughout rural America early in the 1890s. After the publication of a manual that explained to farmers how they could develop their own telephone systems on a mutual basis, many farmers' mutual systems emerged. By 1912 there were 320 cooperatives. In 2000, there were more than 1100 local telecommunications firms. These companies' customer bases ranged from less than 100 to more than 50,000.⁸

Rural telephone companies serve a variety of community needs, including education and economic development. For this reason, they receive support under universal service mechanisms established before the 1996 Telecommunications Act. In particular, they obtain support for servicing low-income customers and high cost areas. Moreover, rural companies receive important financial support from access charges.

In Argentina, the first cooperatives appeared in 1958 to bring telecommunications to rural areas not served by the National Telecommunications Company (ENTEL). In a few decades the number of cooperatives grew considerably, and at the beginning of the nineties there were approximately 1300 cooperatives that provided electricity, telephony, gas and/or water. More than 300 of these cooperatives offered telecommunications.⁹

The situation of the cooperatives did not change in 1990, when ENTEL was privatised and replaced by two private companies with Spanish and French capital. After the liberalisation of the Argentinean market in November 2000, the cooperatives were given the monopoly in their areas, but they were obliged to satisfy certain objectives of expansion. Interestingly, moreover, in 1999 FECOTEL, an association of 250 cooperatives, was given a license to operate public telecommunications.

In the United States and in Argentina, small cooperatives and commercial local exchange companies have played a major role in connecting rural areas, while more densely populated areas are served by traditional private operators. Finland and Bolivia represent a different case. One of the distinguishing features of these countries is that the majority of consumers are grouped into cooperatives providing local calls. For many years, this organisation has influenced telecommunications policy, and nowadays similarly influences the development of competition.

⁸More than half of these cooperatives are integrated in the National Telecommunications Cooperatives Association (NTCA), which was created in 1954. These cooperatives have approximately 2.600,000 subscribers. See www.ntca.org.

⁹De Barberis, Cinqugrama, Varela, and González (1989) explain that Argentinian cooperatives have been traditionally located in the region of Buenos Aires, Santa Fe and Cordoba.

Nattermann and Murphy (1998) show that before market liberalisation in 1994, Finland had 46 local non-profit cooperatives. Telecom Finland, a public firm, had the monopoly of the long distance calls and provided local services in the rural areas not covered by the cooperatives. After liberalisation all the cooperatives came together to form the Finnet Group, which successfully entered the long distance business.

In the Finnish cooperatives, one telephone line represents one share, and each shareholder has a vote. The shareholders only pay a monthly flat rate for local calls. Moreover, they receive an annual return for their investment that varies from 10 to 15 per cent.

Bolivian local telecommunications cooperatives were created very recently, in 1985.¹⁰ Before then, the local operators were independent firms, with private and state participation, located in the most important municipalities. At the beginning of the eighties, the country suffered hyperinflation, approximately 25,000 per cent annually, that severely undercapitalised these firms. Moreover, many of them were accused of corruption and political manipulation. In order to solve these problems, the Government decided to transform the municipal firms into non-profit private cooperatives. This implied that the cooperatives' stakeholders were the owners of one telephone line, and that for each line they had a vote.

During the first years of existence of the cooperatives, it was assumed that the stakeholders were going to directly control the managers of the firms. Moreover, the Government began to supervise the cooperatives through the National Institute of Cooperatives overseen by the Labour Ministry. In spite of this, some public institutions and large firms that controlled important number of shares, tried to control the managers of the cooperatives. This forced the Government to modify the regulation of the cooperatives and to restrict to one the number of votes of each stakeholder.

Nowadays, not all telecommunications consumers are stakeholders of cooperatives. The advantage of being a stakeholder is that they do not have to pay a monthly rental for a telephone line. In spite of that, the tariffs are the same for everybody. On the other hand, in the last year as the difference between the price that the stakeholders and the non-stakeholders pay has been reduced, the number of users that are not stakeholders has increased. This trend could be exacerbated by the fact that the Bolivian cooperatives do not allocate dividends. In fact, some large cooperatives even have negative returns.¹¹

3. Liberalisation of the Bolivian market

In the last decade, the Bolivian telecommunications industry has followed a rapid process of liberalisation. In 1994, the Government decided to liberalise the sector in order to eliminate the inefficiencies of the incumbent firms. The reform of the sector was undertaken in two phases. The first one began in 1996, when the Government privatised the National Telecommunications Firm (ENTEL) and extended its monopoly of the long distance market until 2001. As compensation, ENTEL was compelled to extend his network to more than 1000 small villages. Besides the 15 incumbent local operators, the cooperatives, could maintain their monopoly in the local services

¹⁰Velázquez (2002) analyses in detail the history of the telecommunications sector in Bolivia.

¹¹In 2002, the three largest cooperatives had an insignificant or even a negative return: COTEL (-1,81), COMTECO (-0,88) and COTAS (0,07).

under the condition that they would digitalise their networks and increase the coverage in their Area of Local Service (ASL). As a result of these measures, in 5 years the level of penetration of fixed telephony almost doubled.

The second phase of the reform process began at the end of 2001, when the Government completely liberalised local and long distance markets. In spite of this, the Government maintained the incumbents' obligation to expand their coverage.

3.1. *Telecommunications before 1995*

Bolivia did not have a telecommunications policy until the mid-1990s. For many years the market adopted an unusual structure. The State provided long distance communications through ENTEL and the Rural Direction of Telecommunications (DITER): ENTEL only operated in the nine regional capitals of the country and in some other less important villages. DITER provided telecommunications services in the rural areas, mainly through telegraph and radio technology.

Local telephony was provided by 15 cooperatives, which operated as monopolies in the most populated villages. The rest of the country lacked service. The Government did not exert any intervention or control on the activity of the cooperatives. For many years, the General Director of Telecommunications (GDT) was responsible only for issuing licences to operate in the sector. However, it was the cooperatives that established the tariffs and decided the technical specifications for services. The Government justified this abdication of the industry by showing that the cooperatives were non-profitable organisations regulated by the National Director of Cooperatives. As a consequence, it was considered that the interests of the consumers were reasonably protected. However, lack of planning had a direct effect on the market, and in 1995 the penetration level of the fixed telephony was only 3.3 per cent.

The situation in the mobile sector was no better. In 1991, TELECEL, a private firm, began to exploit mobile telephony in the three most important cities of the country (La Paz, Cochabamba and Santa Cruz). However, its "elitist" prices did not promote an expansion of mobile services and 5 years later the penetration level of the service was still lower than 1 per cent (Table 1).

3.2. *Liberalisation of the market*

In 1994, the Government recognized that the existing regulatory model was unable to solve the decline of the sector. Most of the telecommunications cooperatives had financial problems that prevented them from investing in expansion and modernisation of their networks. Paradoxically, while the cooperatives were over-staffed, they were unable to cope with the increasing number of

Table 1
Evolution of the fixed and mobile telephony (1985–2003)

	1985	1991	1995	1996	1997	1998	1999	2000	2001	2002	2003
Fix telephony	2.86	3.03	3.33	4.86	5.21	5.96	6.43	6.35	6.34	6.64	7.29
Mobile	—	0.00	0.10	0.47	1.60	3.15	5.38	7.25	9.43	10.40	11.85

Source: SITTEL (2004).

applications for new telephone lines. In addition, labour union activism made it very difficult to increase productivity. The need for reform was also supported by the perception that the political parties were “capturing” the managers of the cooperatives in order to get private privileges. Taking this complicated situation into account, the Government decided to initiate a gradual program of reform.

The liberalisation of the sector was part of an ambitious reform that began with the creation of the System of Industrial Regulation (SIRESE), which is in charge of supervising the telecommunications, electricity, transport, fuel and water sewerage regulation. The 1994 SIRESE Act created the Superintendency of Telecommunications (SITTEL), a new regulatory agency that supervises the sector.

Following procedures adopted by Latin American countries lacking financial resources, one of the first measures that the Government embraced for reforming the market was the “capitalisation” of ENTEL. In contrast to a conventional privatisation, in which investors pay a price to the Government for a part or all the assets of the firm, in a capitalisation the State maintains the ownership of its assets, but also creates new ones. The Government enlarges the capital of the firm, ‘privatises’ the new assets and gives the control of the resulting firm to the new investors.¹²

In 1996 Telecom Italia bought 50 per cent of ENTEL in an international bid for the price of US\$610, in excess of the US\$250 offered by Telefónica of Spain. Following this experience, no other operators have been capitalised in the telecommunications sector.¹³

The second measure undertaken by the Government to liberalise the market was to approve the 1995 Telecommunications Act. This established that the reform of the sector had to be carried out in two stages. The first stage was intended to prepare an open market. For this purpose the Act gave to the incumbent operators a temporary monopoly that lasted from 1996 until 2001. The second stage began in 2001, and completely liberalised the sector.

The Government realised that the universalisation of the service was going to be very difficult to attain once the market was fully liberalised. Therefore, the first stage in the liberalisation schedule was designed to increase the penetration of telecommunications in rural areas and to modernise the infrastructure. The Government conceded to ENTEL the monopoly of the long distance services and the Internet. As compensation, ENTEL is obliged to install telephone boxes in all the rural villages with more than 350 inhabitants. On the other hand, the Government gave to the cooperatives the monopoly of the local communications in their own Areas of Local Service (ASL), as well as the local telecommunications monopoly in villages of more than 350 inhabitants that belonged to their Expanded Rural Service Areas (ASRE).

The concession of these exclusive rights was one of the most controversial issues during the liberalisation process. The creation of the temporal monopolies increased the attractiveness of ENTEL before its capitalisation, and strengthened the position of all the incumbent operators before the arrival of competition. The big firms, such as ENTEL and the cooperatives COTEL,

¹²In Bolivia, the utilisation of this mechanism allowed enlargement of the capital of ENTEL, while maintaining the fifty per cent of the assets in the hands of the Bolivian population. See Salinas (2002).

¹³In 1999, COTEL, one of the largest cooperatives of the country revealed plans for a capitalisation and began to search for a strategic partner to take control of the company. However, despite the initial interest of some operators, no offers were received.

Table 2
Nominal and real mean tariffs for residential in the local telephony (in Bolivianos)

Tariffs	1992	1994	1996	1997	2000
Mean nominal tariff	16.83	39.49	74.52	75.04	82.60
RPI (1991 = 100)	1.16	1.38	1.68	1.79	1.99
Mean real tariff	14.48	28.64	44.47	41.95	41.48

Source: SIRESE (2000).

COTAS and COMTECO, digitalised their networks, improved their efficiency and modified their commercial strategy. To sum up, the Government strategy produced beneficial results, and in the period 1996–2001 although the Bolivian population increased 20 per cent, the penetration level had doubled. In spite of this, during this period ENTEL established the highest long-distance prices of the region (Table 2).

The second stage of the reform process began with the liberalisation of all markets on the 28th of November 2001. This policy brought about the entry of several firms in the long distance market. Nevertheless, only ENTEL has begun to commercialise local services.

Some months before liberalisation the Government designed a new regulatory policy. In 2000, it approved the Plan to Open the Telecommunications Market, which outlined important measures such as the regulation of interconnection services and the rules governing infractions. The Plan established that prices have to be regulated through a RPI-X until the services become competitive.¹⁴ The Act classifies services as competitive (which are not regulated) and non-competitive which are regulated by the RPI-X. At the end of 2003 local, rural, long distance national, international, satellite, public phones and carrier services were considered as non-competitive. Mobile telephony prices have recently been deregulated.

4. The development of competition

After the liberalisation of the industry in 2001, Bolivian competition developed with great success for national and international long distance calls and for mobile services. The local market continues to be monopolised by the cooperatives.

4.1. Local telephony

During the monopoly period ENTEL took advantage of its position and provided local telephony in some areas not serviced by the cooperatives. Moreover, as it had the monopoly of long distance services and the Internet, it could install its infrastructure in areas served by the cooperatives. As a result, in some locations ENTEL has cream-skimmed the most profitable users in the local market. As well as other operators in Latin America, ENTEL has opted for wireless

¹⁴The first time the RPI-X was implemented it benchmarked a number of different countries. Subsequently, the mechanism was adjusted every 6 months to reflect national inflation and the productivity's gains.

Table 3
Number of user by cooperative (1999)

Cooperative	Number of users
COTEL (La Paz)	159.380
COTAS (Santa Cruz)	130.534
COMTECO(Cochabamba)	107.145
COTEOR (Oruro)	22.610
COTES (Sucre)	18.629
COSETT (Tarija)	16.890
COTAP (Potosí)	10785
COTEAUTRI (Trinidad)	6.108
COTABE (Bermejo, Tarija)	2.229
COTERI (Riberalta, Trinidad)	1.667
COTEGUA (Guayamerin, Trinidad)	1.510
COTERO (Roboré, Santa Cruz)	392
COTEVI (Villazón, Potosí)	255

Sources: SITTEL (2002).

technology in the local loop system to boost low penetration rates in some sparsely populated regions.

The cooperatives are aware of their paralysis in the face of ENTEL, and some of them have developed new commercial policies to attract consumers and to diversify their services. However, the cooperatives have difficulty in reducing prices, and therefore they cannot react aggressively when ENTEL enters their market.

No cooperatives have entered each other's areas and, although an alliance of some cooperatives has been created, there have been no mergers among cooperatives. Before liberalisation it was thought that some of the smallest cooperatives, with less than 2000 lines, will not survive or would be absorbed by the others (Tables 3 and 4).¹⁵ But surprisingly, until now this has not occurred, probably due to their financial problems.

What has been the evolution of the local prices? In 1999, a modification of the RPI-X brought about an important reduction in prices. However, since liberalisation in 2001, the mean price of calls has remained unchanged (Table 5). Indeed, competition has not emerged in the local market and the productivity gains of the cooperatives have been small.

Finally, it is important to emphasise that in Bolivia there is no geographic uniform price for the installation of a telephone line and for the provision of local calls. SITTEL proposes the prices of ENTEL and the 15 cooperatives considering the individual costs of each firm and their expansion strategies. As a result, the mean price of the local calls in the rural areas is 45 per cent more expensive than in the urban areas. Moreover, the tariff structure of the firms may differ: while some establish a flat rate (small cooperatives) others impose a linear price (COTEL) or a non-linear price.

¹⁵In 2000, ENTEL planned to purchase COMTEC, but COMTECO joined the group of cooperatives in Boliviatel which provide long distance calls.

Table 4
Penetration level of local telephony (first semester of 2002)

Department	Penetration
La Paz	7.34
Santa Cruz	6.65
Cochabamba	8.95
Chuquisaca	4.93
Oruro	7.43
Tarija	6.68
Potosí	2.84
Beni	4.02
Pando	3.06
Total Bolivia	6.72

Source: SITTEL (2002).

Table 5
Prices of local telephony

	Capped price	Mean price
1996	41.4	29.8
1997	42.5	28.3
1998	45.2	28.0
1999	17.3	16.9
2000	18.1	17.2
2001	17.6	17.5

Source: SITTEL (2002).

4.2. The long distance market

At present, the consumers of some villages can choose among 8 operators. In Bolivia there is no carrier pre-selection. Therefore, consumers have to select their long distance provider on a call-by-call basis. This type of competition has reduced ENTEL's market share to 90 per cent in national long distance calls and to 70 per cent in international long distance calls (Table 6). The reduction is even more important in some villages such as Santa Cruz.

In spite of such entry, only two of the new operators, ENTEL and AES, have constructed their own infrastructure to serve the most important cities: La Paz, Oruro, Cochabamba and Santa Cruz. The rest of the operators use their own local and wireless networks, and rent the backbone network to others. The result of this strategy is that competition has only emerged in the communications amongst regions, but not in rural telephony, where ENTEL is still the sole operator. This situation could have important effects in the future. The Bolivian Law establishes that during the first 2 years of their activities, entrants in the long distance market have an obligation to serve their own local market. However, in the next 2 years they have to extend their network to cover the entire country. At present, there are operators such as AES, COTAS and

Table 6

Market shares of the national and international long distance telephony (first semester of 2002)

	National	International
ENTEL	90.94	73.68
AES	2.71	10.43
TELEDATA	2.21	10.94
TELECEL	1.00	0.94
BOLIVIATEL	3.14	4.01

Source: SITTEL (2002).

Boliviatel, which are already present throughout the country. But for other small operators it will prove a serious problem to satisfy this requirement.

A key group of entrants in the long distance market are the three mobile operators and an alliance of the cooperatives COTAS, COTEL and Boliviatel. Moreover, Boliviatel integrates the cooperatives COMTECO (Cochabamba), COTES (Sucre), COTAP (Potosí) and COTEOR (Oruro). More recently, in May 2004, FECOTEL, an association of all the cooperatives, has been interested in the acquisition of 50 per cent of the capital that Telecom Italia has retained in ENTEL. If this offer succeeds, it will entail the re-nationalisation of the firm, but up to now the acquisition has not been authorised.

The alliances of cooperatives constitute an important problem for the development of competition. The Finish experience illustrates this situation. In 1994, all Finish local cooperatives came together into the Finnet Group to enter the long distance market. Amazingly, during the first week after liberalisation the Finnet Group attracted 50 per cent of the market.¹⁶ Therefore, the fact that consumers are tied to the cooperatives not only affects competition in the local market, but may also affect the growth of competition in the long-distance market.

Did the consumers benefit from an increase in competition? Long distance calls are the services that have most benefited through liberalisation, and these prices have fallen considerably since 1999 (Table 7). In 2001, the first year after liberalisation, the mean price was fixed significantly below the cap defined by the RPI-X.

4.3. Competition in the mobile sector

Since the introduction of a second operator, ENTEL-Mobile, in 1996 and of a third operator, Nuevatel, in 2000 the mobile service has expanded. The number of lines increased considerably from 1996, mainly in the centre of the country. In 2001, the penetration level was still below 10 per cent, but the number of mobile handsets was already greater than the number of fixed lines. This situation also occurs in other developing countries of Latin America. One explanation for this could be the high price of fixed telephony and the reduction of prices in mobile telephony due to the introduction of the “caller pays principle” and pre-paid cards.

¹⁶See Nattermann and Murphy (1998).

Table 7
Prices of the long distance telephony

	Capped price	Mean price
1996	2.35	2.26
1997	2.41	2.39
1998	2.57	2.57
1999	2.55	2.36
2000	2.27	2.25
2001	2.16	1.74

Sources: SITTEL (2002).

Table 8
Market shares in the mobile market

Operator	1996	1997	1998	1999	2000	2001	2002
Telecel	56	36	53	57	52	45	45
ENTEL	44	64	47	43	47	44	44
Nuevatel	0	0	0	0	1	11	12

Source: SITTEL (2002).

Three firms compete in the mobile sector. Telecel and ENTEL share 88 per cent of the market and Nuevatel has the rest (Table 8). Moreover, the cooperative COTAS is the first virtual mobile operator and resells the services of Nuevatel. The license of virtual mobile operator is very important because it allows the fixed telephony operators to compete in all the segments of the market and to offer a complete range of services to their consumers.

In 2001, aggressive competition among the mobile operators brought about price deregulation. It will be interesting to analyse how the operators react to this new situation. The experience of other countries has shown that when the number of subscribers is growing the operators do not compete on price but differentiate their services, offering discount plans and using advertising campaigns. When the market is saturated the operators start competing in prices. In the Bolivia, however, the question is what is the threshold for the mobile penetration at which price competition will start.

5. Effects of cooperatives in the Bolivian market

The lack of adequate regulation of the cooperatives may be responsible for important distortions in the Bolivian market. Conflict has partially come from agency problems between stakeholders and managers. Managers require the support of the stakeholders, but they are not necessary sensitised to the claims of potential new users. On the other hand, as the Government has allowed the entry of a group of cooperatives into the long distance market, the operators may have incentives to harm the other long distance firms.

Another important lesson from the Bolivian experience is that, in contrast to the case of the United States or Argentina, the lack of an effective control of the cooperatives may have prevented a greater expansion of the service to the rural areas. First, the cooperatives stakeholders have forced the maintenance of a high value for their shares, because for many of them this is an important saving instrument. The problem is that this policy reduces the affordability of shares for low-income consumers. Second, the cooperatives are forced to use all their productivity gains to reduce the price of calls. This policy benefits consumption, but it makes any strategy of expansion to the unserved areas difficult.

5.1. The regulation of interconnection prices

One of the most controversial topics in telecommunications policy is the regulation of interconnection prices. In fixed telephony the “one-way interconnection” appears when one operator uses the local loop of another firm to originate and terminate its long distance calls. By contrast, “two-way interconnection” occurs when different operators require to interconnect among them to access all consumers. In the two cases, the problem for the regulators is to determine what the appropriate interconnection price is. In the last decade many theoretical papers have analysed when it is necessary to regulate interconnection prices and what is the optimal price under different assumptions.¹⁷ However, for the regulatory agencies it is not easy to apply these theoretical recommendations. As a consequence, in practice the debate has moved on to evaluate the merits of different ways to compute cost-oriented interconnection prices, which may not have an economic justification but are easier to determine.

How do the presence of cooperatives affect the establishment of the interconnection price? Do the cooperatives require any different regulation from a conventional firm? The regulation of interconnection prices in Bolivia is not different from other countries, although the cooperatives are non-profit operators. Interconnection was first regulated by the 1995 Telecommunications Act, which stipulates that public networks have the obligation to be interconnected. Subsequently, on 1 December 2000, before the complete liberalisation of the market, the Government approved a new regulation establishing that interconnection could be based on one of the following three mechanisms. First, operators can accept the interconnection offer of the firms with which they wish to interconnect. This offer is publicly known, because all the public network operators must publish a Basic Interconnection Offer (OBI) each year in which they expose the economic, administrative and legal conditions for the interconnection. Moreover, the interconnection prices of the OBI must be cost oriented. Secondly, the operators may sign an Interconnection Agreement (AI) with the operator with whom they wish to interconnect. That is, the interconnection regime allows operators mutually to agree to modify the conditions contained in the OBI. Finally, the operator can adhere to the OBI of a third operator connected to the interconnection firm.

This interconnection regime allows the coexistence of the obligation of interconnection with the possibility that the firms freely reach an agreement. In addition, in April 2002 the Government

¹⁷For a complete analysis of the regulation of the interconnection prices in the telecommunications see, for example, Laffont and Tirole (2000), Armstrong (2002) and Valletti (2003).

approved the utilisation of a price cap to regulate the variable costs of the interconnection services. However, this mechanism has not yet been applied. The utilisation of a price cap to regulate interconnection prices is an innovative mechanism that has only been trialled in the United Kingdom since 1997.¹⁸ In other countries, regulators normally use a price cap to regulate retail tariffs but prefer to establish cost oriented interconnection prices.

What has been the effect of market liberalisation on the interconnection agreements? What strategy have the operators adopted to establish the prices? The cooperatives have not perceived the liberalisation as negative and, in contrast to other national experiences, all the new operators obtained an interconnection agreement the first week after the liberalisation. Interconnection traffic among the cooperatives, two-way interconnection, has always been very small because cooperatives have a local monopoly. Before liberalisation, the cooperatives did not charge interconnection prices among them. Nowadays, they charge an interconnection fee for differences in traffic volume. However, they still have an incentive to agree on a low termination interconnection charge to moderate the price of local calls.

In the long distance market consumers can choose their provider. Long distance operators pay a one-way interconnection price to the local operators to originate and terminate calls. Before 1996, each cooperative negotiated with ENTEL interconnection prices. There were some differences in the prices, and normally the large cooperatives obtained better conditions. The interconnection agreements established that the cooperatives should receive between 20 and 30 per cent of the price of long distance calls and between 5 and 10 per cent of the price of international calls. After the privatisation of ENTEL and the liberalisation of the industry, interconnection prices were essentially maintained.

Examination of the strategy of the cooperatives' managers reveals that traditionally they have negotiated high interconnection prices to cross-subsidise the price of local calls. Nowadays, between 40 and 60 per cent of the cooperatives revenues come from interconnection. In contrast to expectations, after liberalisation this policy has not been modified in order to rebalance the prices of calls. In addition, the cooperatives that have entered the long distance market are now even more interested in increasing interconnection prices to raise their rivals' costs. To avoid this problem, in April 2002 the Government decided that local operators must directly bill a price to their consumers and not to the long distance operator, as compensation for the use of its network. Notice that with this measure, if consumers consider that the price for originating and terminating a call is too high they would require a reduction of price to their own operator. In spite of the attractiveness of this mechanism, it has not yet been put in use by any operator. It is interesting to mention that Finland applies a similar instrument that allows the cooperatives to bill their consumers for the interconnection fees generated by long distance calls.

5.2. Universal access and universal service policies

The greatest part of the Bolivian population lives in rural areas and in the village's outer suburbs. Many of the rural regions are not covered by telecommunications cooperatives and they have always had a low exposure to other services such as water and electricity. Since the reform of

¹⁸See OFTEL (2002).

the market in 1996, the coverage of the rural zones has slightly increased. In spite of this, Bolivia is still one of the South American countries with a lower penetration level for fixed and mobile telephony.

In a liberalised market, the two principal public policies for improving accessibility to the telecommunications services are universal access and universal service policies. The universal access policy consists of offering the rural population a public telephone at a reasonable distance from their home. Frequently, it is extremely costly to bring a telephone line near to each home. However, it may be reasonable to install telephone boxes that cover the basic needs of the community. On the other hand, the universal service policy consists of promoting that each home has a telephone available at affordable prices.¹⁹

Traditionally, Governments have attempted to increase the use of the telephone in rural areas establishing geographical uniform prices and cross-subsidising from low cost urban areas to high cost rural areas, and from long distance calls to local calls.²⁰ However, the liberalisation of the market makes this manipulation untenable. New operators are only interested in providing the most profitable services, such as long distance call. This reduces the incumbent ability to subsidise the prices of local calls and the price of rural telephony. In this situation, the objective of the Government in a liberalised market must be to force operators to serve the rural zones.

In Bolivia, the Government has created different institutions and policies in order to promote access to telecommunications services. In contrast to other experiences such as the Finnish, the Government does not subsidise the installation of telephone lines in rural areas.²¹ The 1995 Telecommunications Act defines the extent of universal policy, but it is the firms who look after the development and financing of these policies following the obligations defined in their licences.²² In the contract signed by the Government and ENTEL in 1995, the firm accepted the obligation to install a telephone line and a public telephone box in 1099 rural villages with more than 350 inhabitants before 2001. On the other hand, in order to preserve their exclusivity until 2001 the cooperatives COMTECO, COTAS and COTEL agreed to install a public box in a group of villages between 350 and 10,000 inhabitants that belong to their Expanded Rural Service Area (ASRE).

In 2000, the Program of National Development of Rural Telecommunications (PRONTER) established that ENTEL and the cooperatives COMTECO, COTAS and COTEL have to continue serving the villages with between 350 and 10,000 inhabitants after liberalisation of 2001. On the other hand, from the fourth year of their activity the new long

¹⁹For a complete analyses of the universal service policies see Alleman, Rappoport, and Weller (2000), Cremer, Gasmi, Grimaud, and Laffont (2001) and Gasmi, Laffont, and Sharkey (2000).

²⁰Gasmi et al. (2000) suggest that cross-subsidies may be a valuable means to guarantee the universal service for developing countries.

²¹The regulation considers the possibility of increasing the interconnection prices to finance the development of the poorest zones. But this policy has not been used. Armstrong analyses the distortions generated by financing universal service with interconnection prices (Armstrong, 2001).

²²In Bolivia, as in other Andean countries, with the exception of Colombia, universal access and universal services policies are not defined in any specific Universal Service Act. Normally, the Telecommunications Act of each country establishes these policies. See CITEL (2000).

Table 9
Fixed telephony penetration level in the rural areas (lines per 1000 inhabitants)

Department	1997	1998	1999	2000	2001	2002(1)
Pando	0.17	0.21	0.24	0.40	0.48	0.50
Beni	0.32	0.37	0.41	0.65	0.73	0.77
Potosí	0.24	0.43	0.62	0.86	1.16	1.21
Chuquisaca	0.37	0.50	0.78	0.97	1.23	1.30
La Paz	0.50	0.75	0.98	1.23	1.55	1.70
Santa Cruz	0.76	1.16	1.59	1.84	2.01	2.10
Oruro	0.72	0.93	1.15	1.54	2.01	2.21
Tarija	1.57	2.03	2.42	3.05	3.59	3.92
Cochabamba	4.00	6.44	8.35	9.46	10.54	11.07
Total Bolivia	1.24	1.93	2.53	2.98	3.44	3.65

First semester of 2002.

Source: SITTEL (2002).

distance operators have to provide basic telephony to non-serviced villages of less than 350 inhabitants.²³

The sum of all these expansion requirements has considerably increased coverage in the rural zones, although the penetration level is still very low (Table 9). On the other hand, during the period 1996–01 the number of public boxes has almost tripled.

Why have the cooperatives traditionally not expanded into the rural areas? There are some aspects that may help to explain this situation. First of all, the local monopoly of the cooperatives avoids the duplication of costs inherent in model of infrastructure competition and increases profitability. This reduces the installation cost of a telephone line. However, in Bolivia the cost of a telephone line has not been sufficiently low to bring about the creation of cooperatives in the rural districts. On the other hand, the per capita income of the rural population is extremely low, and in some municipalities the priority is to have access on a regular basis to water and electricity. Secondly, the Bolivian cooperatives do not have resources to invest in network expansion. Stakeholders usually compare their prices with those of other cooperatives and vote to get additional reduction of prices. This situation could be modified by changing the regulation of the cooperatives. In Finland, for example, to avoid a price war the cooperatives pay out dividends to the stakeholders.

Finally, for the Bolivians it is very difficult to become a member of a cooperative because the prices of the shares are very high. Nowadays, the price of the shares of many cooperatives still reflects the price of the original capital investment, which was undertaken in the seventies, and was very high due to an excess of demand. In the last decade the cost of installing a telephone line has fallen, but this has not been reflected in the prices of the shares. Indeed, for the managers of the

²³SITTEL establishes the list of villages that have to be covered. The number of villages to be served by each operator depends on their benefits.

cooperatives it is very difficult to reduce the share value. For the Bolivian population the shares in the cooperatives are an important savings instrument, and the stakeholders force the managers to maintain the price of the share. Obviously, this affects the decisions to buy a fixed telephone line. Note, for example, that the mean value of a share is US\$ 1400, but the Bolivian per capita GDP in 2002 was lower than US\$ 1000.

In recent years, the managers of one of the biggest cooperatives, COTEL, have decided to give a free second telephone line, and therefore a second share, to all its shareholders. The reason for this measure is that the cooperative has more than 80,000 spare lines that constitute an important cost. With this initiative the managers want to stimulate the sale of telephone lines at affordable prices and to increase consumption. If this solution is imitated by other cooperatives it may help to increase participation in the market significantly.

Can mobile telephony provide a solution for low penetration? Amazingly, although the prices of mobile telephony are higher than those of its fixed counterpart, the rate of growth of mobile is higher, and at present there are more mobile phones than fixed lines. However, this does not necessarily imply that the number of families with a mobile hand-set is higher than the number of families with a fixed telephone. Many families have a mobile and a fixed telephone, and generally several members of the same family have a mobile phone.

Until now, the greatest number of mobiles were concentrated in urban districts. But in the future mobile technology could be a solution to solve the coverage problem in the rural areas. Recently, the Government has launched different projects to cover the non-served rural areas through the extension of cellular networks. However, these proposals still need to be approved.

6. Conclusions and policy implications

This paper shows that the liberalisation of the Bolivian telecommunications market in 2001 has generated a substantial competitive environment in long distance and mobile markets. Competition has reduced prices and, most likely, has contributed to increase the penetration level of the fixed and mobile telephony.

One of the more relevant features of the Bolivian market is that before the complete liberalisation of the industry all the telephone access lines were owned by 15 consumer cooperatives. Other countries such as the United States and Argentina have cooperatives that provide electricity or telecommunications in small villages or inaccessible locations. But only in Bolivia and Finland the cooperatives provided all the telephone access lines. In these two cases, after liberalisation, the cooperatives still dominate local telecommunications.

The presence of non-profit private cooperatives should make the control of the sector easier, and particularly should simplify the regulation of interconnection prices. The cooperatives should be interested in stimulating competition amongst the long distance operators in order to obtain lower prices. However, the present analysis reveals that the present regulation of the Bolivian cooperatives may harm the development of competition. On the one hand, the managers of the cooperatives may want to increase interconnection prices of originating and terminating long distance calls. This allows them to raise funds to subsidise local calls, which in turn confers on them the support of the stakeholders. On the other hand, the Government has allowed the cooperatives to enter the long distance market and the cable television industry. As a result, now

the cooperatives compete as vertically integrated firms in these markets and have an incentive to increase the interconnection price to raise their rivals' costs. A solution to this problem would be to force the cooperatives to bill the interconnection fees directly to their consumers. This measure is partly applied for mobile calls.

Finally, another important lesson from the Bolivian experience is that the cooperatives have not stimulated the expansion of fixed telephony during the monopoly period. The high price of the shares, the lack of incentives to invest and administration problems have not encouraged the growth of cooperatives and their extension to high cost areas. The cooperatives protect their members, but their vocation is not to supplant the social policies of the State.

This study of the Bolivian experience shows that the cooperatives could be an effective instrument to bring telecommunications to the rural communities. However, the success of this type of market structure on a large scale depends on how the relationship between the managers and the stakeholders is organised, and on the regulation of the relationship between the cooperatives and other operators. The design of the regulation is crucial.

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