

Competition and Diffusion of Telecommunication Services: The Multimedia Communication Services in Brazil

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Abstract—This paper aims to discuss the recent trends in the regulation of telecom services regarding the diffusion of broadband. To this matter, it compares the recent international competition regulation experiences to the Brazilian scenario. Considering that the telecom sector passed through huge technological and structural transformations in the last decades (from typical voice communications to convergent services based on broadband, and from voice services monopoly to multiple services oligopoly), its regulatory framework has also changed. Lately, several countries – such as the United States, the Netherlands, Korea and Chile – have established inter and intra-platform competition regulations in order to expand the access to the new forms of communications based on broadband. In Brazil, such mechanisms are not fully explored, and the country has lots of areas in which there is no competition in broadband services (known as multimedia communication services). As a result, Brazil has one of the highest prices of broadband services and one of the lowest levels of broadband penetration. In this way and considering international success in expanding services through competition, the paper defends that such mechanisms should be reinforced in the Brazilian broadband market.

Keywords—Brazil, broadband, competition regulation, international experiences.

1. Introduction

The recent changes in telecommunication sector, such as liberalization, privatization and convergence, brought several challenges to policy makers. The recognition that the growing importance and essentiality of broadband has changed the socio-economic dynamics of countries made governments to change their regulatory agendas in order to introduce mechanisms to stimulate broadband diffusion.

Based on this, the competitive regulatory mechanisms have been introduced in the broadband markets in order to reduce the monopoly power of incumbents and to promote the expansion and modernization of broadband infrastructure mainly to unserved areas. Lately, these regulatory mechanisms are applied in order to encourage intra and inter-platform competitions.

This paper aims to discuss these regulatory measures and their effective impacts in the diffusion of broadband in se-

lected international experiences and in Brazil. Section 2 discusses the recent transformations that have happened in the telecom sector, stressing the important role of broadband as a subject of central appeal in the telecom regulatory agendas. Section 3 shows how these transformations mentioned in the first section have affected the pattern of competition in telecom sector, introducing intra and inter-platform competition, and how these kinds of competition affect broadband diffusion. Section 4 presents the experiences of the USA, the Netherlands, Korea and Chile in competition-based regulation and broadband diffusion. Finally, Section 5 presents the Brazilian case, showing the differences in patterns of competition in the broadband markets of its different regions, and how these differences are correlated to the diffusion of broadband. The Conclusion presents the major achievements of the paper and points some possible measures to be applied in the Brazilian scenario.

2. Recent Changes in Telecom Sector

Over the past two decades, the telecom sector has been shaken by huge transformations. One is related to the sector's liberalization and privatization processes that took place around the world. These processes have accelerated the movement of global mergers and acquisitions, especially by developed countries searching for scale gains. The other important change that took place in this sector was the digitalization of telecom networks. This innovation gave rise to Next Generation Networks (NGN) that integrate the existing separate voice and data network into an easier and more flexible network mainly using Internet Protocols (IP). So, these NGN are chiefly based on new platforms such as broadband Internet, 3G mobile networks, wireless LANs and digital televisions [1].

This digitalization of telecom networks provides a convergence of services and technologies – enabling a single network to carry a range of voice, audiovisual and data transmission services – modifying the patterns of competition and innovation among firms and countries, and blurring traditional boundaries in a large range of telecom services. Besides, it is important to stress that this revolution in in-

formation and telecommunication technologies (ICT) has also induced major social changes related to forms of communication and information access¹.

The digitalization of telecommunication networks is increasingly extending the limits of this industry, previously restricted to equipment and services for voice transmission. Beyond the rapid spread of mobile telephone services since the 1990s, the increasing speed of technological convergence tends to incorporate different types of media and data services for communication networks. Furthermore, the disseminated use of uploads and downloads requiring higher bandwidths transforms broadband Internet access into an indispensable resource for accessing information today.

In this context, there is growing public concern related to the generalization of availability and access to these new forms of communication, especially in the remote areas and/or to low income populations, which could not be supplied only by the private sector. The most common networks to provide broadband access to the mentioned forms of communication are traditional telecommunication access networks, through the ADSL technology, and the cable TV networks, using different versions of coaxial cables.

Based on this most common market structure, regulatory measures focused on stimulate competition between operators have been explored by regulators all around the world in order to expand broadband infrastructure and services. These competitive regulatory measures are analyzed in the next section.

3. Competition in the Broadband Market

Technological and structural changes that took place in telecom sector in the latest decades have changed the kind of regulatory interventions in the market. Previously, competitive stimulus between telecom operators was conceived as inefficient, facing the duplication of networks, and as an obstacle to the expansion of infrastructure investments [5]. But, since the market liberalization and the technological and services convergence processes, competition has been seen as an important mechanism for the diffusion of telecom services, especially of broadband, once it allows costs reduction and increase of penetration rates.

There are two major forms of competition between telecom operators: service-based competition (or intra-platform competition) that is known as the competition between entrants and the incumbent in a single network with regulated access, and platform-based competition (or inter-platform competition) known as the competition between different kinds of infrastructure for the provision of services [6], [7]).

¹Indeed, there is vast economic literature addressing the interpretation and consequences of the ICT Revolution in socio-economic development. An interesting discussion on this issue from an evolutionary perspective is presented by [2]–[4].

The classical example of a platform-based competition is the competition between cable TV operators, providing content, broadband and telephony services, and telecom operators, providing the same kind of services. In this way, the promotion of platform-based competition depends on the level of encouragement supported by the regulator in order to attract investments in alternative networks than the already established in a telecom market.

According to Katz [8], the advantages of platform-based competition are that, because it occurs between companies with their own different infrastructures, it promotes a multidimensional form of competition (in price, service and quality), and it stimulates each operator to invest and to innovate in their own networks. In the same way, Prado [9] affirms that the advantages of platform-based competition are the promotion of the expansion and of the modernization of the operator's networks, leading to the cheapening of the technological solutions.

The classical example of the service-based competition is the competition between entrants (telecom operators that do not have their own networks, and that, because of this, rent a portion of the incumbent's network) and incumbents through the same platform but providing different services. This kind of competition has emerged after the convergence advent. The major regulatory mechanisms applied to guarantee service-based competition are: network interconnection, unbundling, wholesale and structural/functional separation.

The network interconnection is the connection of compatible telecom networks in order to provide communication or service access between users of different networks. The unbundling is the mechanism by which telecom operators are able to buy or rent portions of incumbent's networks to provide services to their own subscribers. The wholesale is the mechanism by which telecom operators are able to acquire network services, by wholesale prices, to resale in retail. Through the structural separation between services and platforms (also known as functional separation), the company that owns the infrastructure is prevented from offering services, in order to avoid vertical integration. Finally, through the structural separation between services, the regulator determines the establishment of different business units to a unique telecom operator. In such a way, incumbents that own fixed telephony networks should only offer telephony services, and not internet access services, for example². All of these regulatory mechanisms aim at avoiding anticompetitive behaviors based on the historical market power of the incumbents. The major advantage of the promotion of service-based competition is the diminishing of the incumbents' market power through the provision of the access for the entrants to the already established networks (especially through the unbundling mechanism). But, according to Bourreau and Dogan [10], although it stimulates competition within existing networks,

²This kind of mechanism is rarely used because, by essence, it goes against the convergence trend of telecom sector.

service-based competition could discourage investments in the expansion of alternative networks.

In this way, contrary to the situation of a platform-based competition – that satisfies the objective of the dynamic efficiencies (such as the stimulus in investments in infrastructure and in innovation) [8] – in a service-based competition situation, this stimulus is much lower since competitors (entrants) benefit from investments made by networks owners (incumbents).

As one can imagine, competition between telecom operators has an important role on broadband diffusion. International experiences show that platform-based competition has been responsible for the expansion of broadband access to Internet, especially between cable and ADSL platforms. The next section shows some international experiences of how the regulatory competitive mechanisms are increasing broadband penetration rates.

4. Experiences of Competition and Broadband Penetration

Policies and regulations concerning the diffusion of broadband vary among the world's leading ICT countries. However, there is now consensus regarding the growing importance of the role of government in the promotion of a competition-based regulation.

With regard to broadband diffusion, empirical research emphasizes that inter-platform competition drives broadband adoption, while intra-platform competition in DSL is estimated to play a less significant role. The benefits of unbundling are emphasized for countries with a lack of alternative infrastructure, like some Member States of European Union, and less broadband penetration.

As it is presented in this section, DSL and cable are the two most common broadband access technologies nowadays. DSL is by far the dominant broadband access technology in the majority of the cases, with exception of the United States of America. Furthermore, cases show that facility-based competition is, lately, considered by regulators the most effective mechanism to promote broadband diffusion, mainly due to the fact that this kind of competition leads to decreases in prices and to stimulus in investments in the infrastructure expansion and modernization.

4.1. The case of the United States of America

According to Denni and Gruber [11], in the case of the USA, in the beginning of United States Market liberalization, regulatory mandates towards interconnection and unbundling were established to reduce incumbent monopoly power and to stimulate competition in order to increase the provision of broadband services. Initially, intra-platform competition seemed to have a positive impact only on the rate of diffusion but then dissipates. So, the outputs obtained in terms of increasing of broadband penetration rates, new investments and innovation were below than expected.

Based on this fact, in 2003, the FCC reoriented its policy priorities towards equal access conditions to networks incumbent wireline firms reducing the regulatory effort and in favour of investment incentives that promote inter-platform competition. Two years later, the FCC decided to deregulate the US broadband market totally, eliminating regulatory tariffs and unbundling obligations, allowing mergers and acquisitions, and reinforcing inter-platform competition.

Nowadays, competition in the US broadband market is happening almost exclusively between telecommunications and cable operators and it is stimulating new investments on the expansion of infrastructure and on innovation. As positive results derived from the stimulus to inter-platform competition in the US, the following are [8] the diminishing of 80% in the broadband services prices between 2001 to 2005 (from USD 80.00 per month to USD 15.00 per month on average) and the increasing of the offered average speed. Moreover, data from ITU show that from 2003 (mark of the beginning of encouragement of inter-platform competition in the US) to 2010, the penetration of broadband services had a significant increasing of 190%, from 9.5% to 27.6% (as shown in Table 1).

So, it is possible to consider that in the US experience the inter-platform competition had a much more important role in driving the rate of diffusion for the longer term, and the US model of inter-platform competition was considered the basis for this kind of competition in the world [8].

However, as considered by Picot and Wernick [7], by relying solely on the benefits of platform competition, the US is pursuing a different path than Korea and Europe. Despite its attempts in spurring the broadband development by public initiatives on the local level, the role of the US government in furthering broadband deployment can be interpreted as rather passive. So, the passive role of the US regulation with regard to supply- and demand-side activities linked with deregulatory efforts in market regulation have furthered massive investments by incumbent operators in NGN, but not yet succeeded in bridging the lack in relation to penetration rates in leading broadband economies.

4.2. The case of the Netherlands

As well as in the case of the USA, the broadband market of the Netherlands has two major operators: telecommunications (KPN representing the major incumbent) and cable. Regulation in the Netherlands is based on the rules related to unbundling and open access, but the major form of competition is inter-platform.

This competitive dynamic has encouraged operators to increase their investments on infrastructure expansion, as well as on the modernization of networks based on NGN services, which allowed the Netherlands to achieve the highest level of broadband penetration in the world (38%, in 2010, as shown in Table 1).

Differently from the US broadband market – in which the cable operator has the largest share (54%) – in the Netherlands, KPN is still dominant in the market (44%). This is

Table 1
USA, Korea, Netherlands and Chile: Competition and impacts on broadband market

Country	Kind of competition encouraged	Market share	Broadband penetration rate (2010)	Monthly minimum broadband price (USD PPP)
United States	From Service-based to Platform-based	Cable: 54% Telecom 1: 20% Telecom 2: 12%	27.6%	USD 15.00
Korea	Platform-based	Telecom 1: 45% Telecom 2: 26% Telecom 3: 10% Cable: 19%	35.7%	USD 31.00
Netherlands	Platform-based	Telecom 1: 44% Cable: 39%	38.1%	USD 8.00
Chile	From Service-based to Platform-based	Telecom 1: 50% Cable: 40%	10.5%	USD 55.00

Source: [8], [13].

due to the fact that the incumbent has always been committed to invest on the modernization and expansion of its networks, although obliged to share access of its infrastructure with entrants [8].

This situation of inter-platform competition combined to increasing of investments from the both sides (telecom operators and cable operators) has led to decreasing of prices and increasing of broadband penetration rates. In relation to prices, it is shown that the minimum monthly price of broadband subscription in the Netherlands is USD 8.00 (PPP), one of the lowest prices in the world [8].

As one can notice, the Netherlands could be considered as the best succeeded case of outputs of broadband based on inter-platform competition.

4.3. The case of Korea

Based on the fact that in Korea the model of regulation was focused on the encouragement of inter-platform competition, as well as in the government intervention (through the protection of national groups and the election of the "national champions"), it is suggested that it is possible to classify the case of Korea as a hybrid model of competition regulation [8]. This model of "administered competition" is responsible to transform Korea in one of the most important players of telecom sector in the world and, at the same time, it has enabled the country to achieve one of the highest levels of broadband penetration (35.7%, as shown in Table 1).

The leading position of Korea has been furthered by platform competition between DSL and cable modem [7]. While LLU played a negligible role, open access obligations for cable owners were important for new entrants to compete on a playing field level.

In this way, platform competition between the incumbent, KT (45% of market share, as shown in Table 1), offering broadband by DSL, and Thrunet and Hanaro (26% of market share, as shown in Table 1), being dependent on leasing

Cable TV networks, at least in the early phase after market entry, contributed significantly to the launch of broadband markets in Korea [12]. Lately, based on the sanction of regulator for the provision of bundled services (multiple services packages), a price war has been established between Korean major operators [8]. So, it is possible to notice that inter-platform competition in Korea led to rapidly decreasing price levels of broadband, which furthered broadband adoption, as well as to the increasing of infrastructure expansion and modernization investments.

4.4. The case of Chile

As well as in the case of the US, in Chile, the regulator has also reoriented its strategy towards the encouragement of competition. After the liberalization of Chilean telecom market, in 1990's, regulatory measures, such as unbundling and wholesale through the incumbent's infrastructure were used in order to promote intra-platform competition. In 2004, the regulator proposed the adoption of the structural separation between services and platforms, a mechanism that prohibits the operators that offer telecom services to use their own infrastructure to this matter. This mechanism reinforced the option of Chilean regulation towards the encouragement of intra-platform competition.

However, as it is presented in [8], from 2000 to 2005, the level of infrastructure investments on broadband networks dropped significantly. This fact influenced the Chilean regulator to change, in 2006, the regulation strategy towards the encouragement of inter-platform competition. As one can notice, the change of the regulatory orientation that took place in Chile is the same that the one observed in the US – from service-based competition to platform-based competition.

Nowadays, the Chilean broadband market has two major competitors: the incumbent operator, Telefonica, that is responsible for 50% of the broadband market, and the cable operator, VTR, that is responsible for 40% of it (Table 1).

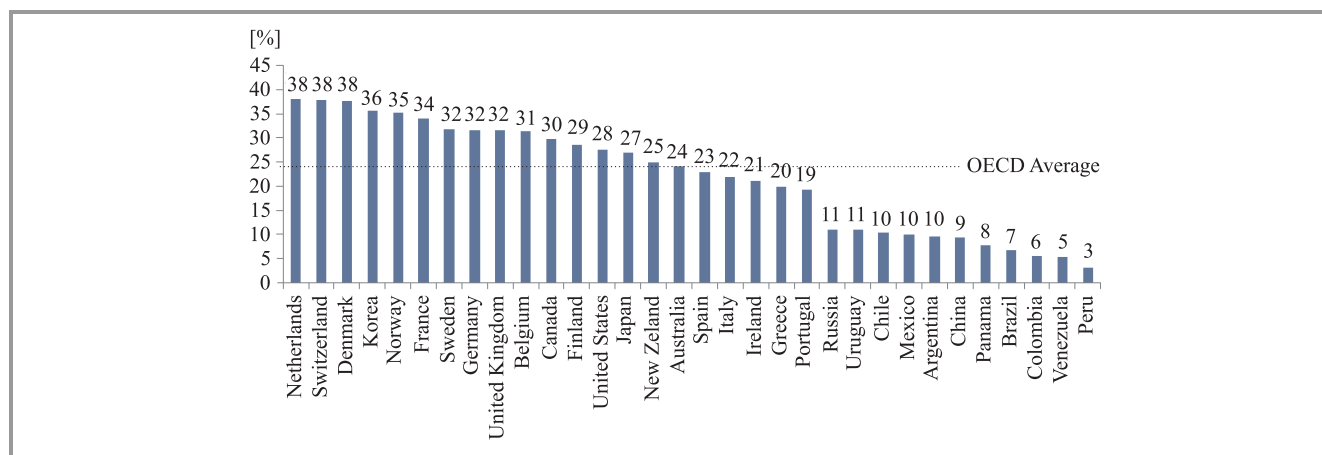


Fig. 1. Selected countries: Broadband penetration rates (2010) [13].

Although close to a duopoly, the structure of Chilean broadband market has intense competition, what is confirmed by important indicators, such as, penetration level of broadband (10.5%, as shown in Table 1 – the highest in Latin America) and the drop of broadband prices (50%, from 2002 to 2008) [8].

5. The Brazilian Broadband Market

After the process of market liberalization that occurred at the end of 1990's, the General Telecommunications Law [14] established some regulatory mechanisms in order to stimulate competition between operators (such as unbundling and interconnection obligations). After several processes of mergers and acquisitions, today, three major competitors are responsible for 80% of the provision of multimedia communication services, i.e., broadband services³. Oi, the major telecom incumbent, is responsible for 34.4% of the market; NET, the major cable operator, for 22.65%; and Telefonica, the telecom incumbent authorized to explore the richest region of the country – the São Paulo state – is responsible for 21.77% of the market (see Table 2).

Table 2

Market Shares of the majors multimedia communication services providers in Brazil

Operator	Market Share
Oi	34.4%
NET	22.65%
Telefonica	21.77%

Source: [15].

The Brazilian market structure is quite similar to those of the cases mentioned above (the USA, the Netherlands,

³ANATEL, the Brazilian telecom sector regulator, determines that companies interested in providing broadband services can only do so with the authorization issued by ANATEL to explore the multimedia communication services.

Korea and Chile), and the kind of competition achieved, inter-platform competition – between DSL and cable, is the same as the successful cases indicate as the most effective in broadband diffusion. So, why the Brazilian broadband penetration level, prices and infrastructure investments are one of the worst in the world?

Brazil has one of the smallest rates of broadband penetration in the world (6.81%, in 2010, according ITU database). It represents the 15th place in penetration rates of Latin America (behind countries like Uruguay – 10.91%, Chile – 10.45%, Mexico – 9.98%, Argentina – 9.56%, and Panama – 7.84%), and it is far beyond the average of 24% of broadband penetration in OECD countries (as shown in Fig. 1).

Moreover, the Brazilian monthly prices of broadband subscription are also one of the highest in the world. As shown in Fig. 2, the relative price of broadband connection in Brazil (the minimum basket of the service divided by GDP per capita) is nine times higher than in the United States, eight times higher than in Denmark and Switzerland, six times higher than in Canada, five times higher than in Sweden, the Netherlands and Finland, four times higher than in Japan and Germany, and three times higher than in Korea. The broadband connection index in Brazil is even higher than in some developing countries, such as Mexico and Venezuela, but lower than in other developing countries like India, Chile and Colombia.

However, as a country of continental size, with a huge range of dispersion of income and population, it is important to analyze the Brazilian case through the differences between its regions. As shown in Table 3, the concentration ratio (CR1) of the largest telecom company in each Brazilian region is high, especially in North, Northeast and Center-West regions. This means that the market power of a single company is significantly high, which threatens competition and, as a consequence, the diffusion of broadband.

In the North region, it is possible to observe the worst situation in terms of competition. The level of CR1 is higher than 80%, which means that a single company, the telecom incumbent Oi, is responsible for almost the totality

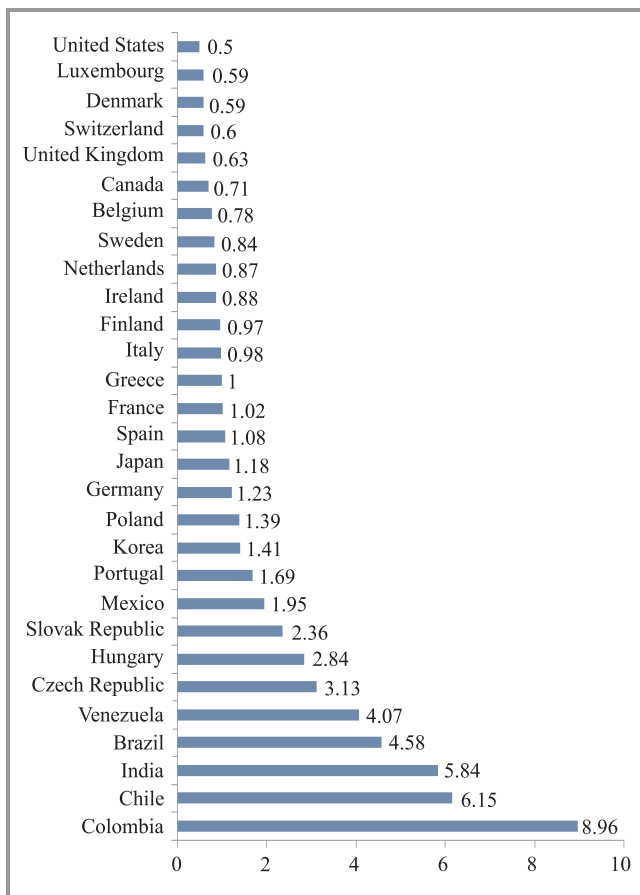


Fig. 2. Selected countries: Relation between broadband monthly subscription cost and GDP per capita (2009) [16].

of the market. Besides the fact the Northern region is the most concentrated broadband market of the country, the predominant kind of competition is the intra-platform, or service-based, competition (see Annex I). The exception is the Amazonas state, in which it is possible to observe inter-platform competition between the cable company NET (52.52% of market share) and the telecom company Oi (36.32% of market share). In this way, the North region presents the lowest percentage of cities with broadband access in the country (62%), and a level of penetration of broadband services that is far below the Brazilian average (3.75%) – comparable to the penetration levels of countries like Peru (3.14%) and Suriname (2.99%) [13].

Table 3
Brazil: Broadband market by region

Region	CR1 [%]	Broadband penetration [%]	Cities with broadband access [%]
North	83.2	3.75	61.7
Northeast	65.1	1.46	66.4
Center-West	63.9	6.97	96.6
South	47.8	8.27	90.5
Southeast	56.8	11.24	91.2

Source: [15], [17].

The situation of the Northeast region in terms of competition is similar to the one observed in the North region and is highly concentrated. Oi, the largest company, has 65% of the Northeast market share; in almost half of the Northeast states the largest company has more than 70% of market share, and in one third of the Northeast states the major kind of competition between telecom operators is intra-platform (see Annex I). Because of this, the Northeast region presents the worst level of broadband penetration in the country (1.46%) – one of the lowest in the world – and only 66.4% of the cities of this region have access to broadband networks.

Although the Center-West region also presents a highly concentrated market structure (the largest company, Oi, has 64% of market share), the major form of competition between broadband companies is inter-platform, especially between the telecom company – Oi and the cable companies, GVT and NET. This situation has led to levels of broadband infrastructure access and penetration in the Center-West region that are above the Brazilian average (96.6% and 6.97%, respectively).

Nevertheless, the best situations in the Brazilian broadband market are presented in the South and Southeast regions. In the South region, the level of broadband penetration is about two percentage points higher than the average of the country; the level of CR1 is below 50% (which represents the best competitive situation of inter-platform competition in the Brazilian broadband market – especially between the telecom operator Oi, and the two cable companies, NET and GVT), and the percentage of cities with access to broadband infrastructure is higher than 90%.

Finally, it is possible to observe that, in terms of market concentration, the Southeast has two major telecom companies that dominate the market⁴: Telefonica, in São Paulo state, and Oi, in Rio de Janeiro state, Minas Gerais and Espírito Santo that together have 56.8% of market share. But, as well as observed in the South region, in the Southeast region there is also a strong inter-platform competition between these two telecom companies and the cable companies NET and GVT (see Annex I). This strong presence of inter-platform competition has led the Southeast region to achieve the highest level of broadband penetration in Brazil (11.24 %, comparable, for instance, to some Latin American countries like Chile, 10.45%, and Uruguay, 10.91%, and to Russia, 10.98%) and the highest percentage of cities with broadband infrastructure access in the country (91.2%).

As noticed in this section, although in the aggregate level Brazil presents a situation of low level of concentration in the structure of broadband market and inter-platform competition (especially between telecom and cable companies),

⁴Based on the General Concession Plan [18], the country was divided in regions to be explored by the private company utilities. Due to the fact that São Paulo state is the richest and most populated region of the country, it was considered an isolated concession region, and Telefonica won the concession to explore it. The concession to explore the other states that compound the Southeast region (Rio de Janeiro state, Minas Gerais and Espírito Santo) was won by Oi.

the penetration rate of broadband is still low, even in comparison to other Latin American countries, and the prices of broadband monthly subscription are one of the highest in the world. The low level of penetration and high prices of broadband are the symptoms of a fragile competitive structure. So, facing the fact that Brazil is a huge country, with regions of different levels of density, income and competition, this paper analyzed the different patterns of competition between regions of the North, Northeast, Center-West, South and Southeast, in order to explain the country's lag in a broadband diffusion.

As observed, in the North and Northeast regions – that present high levels of CR1 and cases of intra-platform competition – one can find the lowest levels of broadband penetration and the lowest percentage of cities with access to broadband infrastructure. On the other hand, in the Center-West, South and Southeast regions, where inter-platform competition and lower levels of CR1 are presented, one can find the highest percentages of cities with access to broadband infrastructure and levels of broadband penetration above the average of the country.

6. Conclusion

It is often claimed among practitioners and policy makers that broadband adoption can be stimulated more effectively by promoting competition between different platforms (inter-platform competition), rather than focusing on the market for DSL services (intra-platform competition). The international cases and the analysis of Center-West, South and Southeast Brazilian regions presented in this paper can confirm such a claim.

The international experiences show that, although elected in the early stages of telecom markets liberalization, the regulatory mechanisms directed towards reducing incumbent's market power (such as unbundling, interconnection, wholesale and structural/functional separation) turned out to be insufficient in promoting broadband diffusion, drop in prices and infrastructure expansion and modernization. Nevertheless, while platform competition seems to have much impact on a high deployment rate, especially in metropolitan areas, LLU can contribute to broadband diffusion in regions and countries lacking of alternative infrastructure.

In the Brazilian case, in which broadband penetration diffusion is far behind in comparison to several countries – including countries in Latin America – the regional analysis confirmed that, in the regions where there is inter-platform competition, higher levels of broadband diffusion were achieved.

In this way, this paper states that the strengthening of regulatory and political measures towards the increasing of inter-platform competition is mandatory in order to eliminate the digital divide between regions, as well as to increase the level of broadband penetration of the country as a whole.

Finally, it is important to stress that Brazilian hindrances to the expansion of broadband penetration are much bigger

and more striking than those faced by developed countries, such as: huge income concentration, educational and instruction shortcomings and unavailability of some essential services in remote areas of the country.

Thus although public and regulatory initiatives appear to be in line with those taken by some OECD countries, it is necessary to consider that in the context of developing countries like Brazil the government involvement in directing the private sector and in planning and implementing wise public policies is of paramount importance to successfully mitigating the digital divide, and to achieve real conditions for broadband diffusion.

Appendix

Brazil: Broadband market structure by region and state

NORTH REGION		
States		
<i>Acre</i>		
Company	Network	Market share [%]
Oi	DSL	93.28
Embratel	DSL	2.93
<i>Amazonas</i>		
Company	Network	Market share [%]
Oi	DSL	52.52
Embratel	DSL	36.32
<i>Ampá</i>		
Company	Network	Market share [%]
Oi	DSL	67.95
Embratel	DSL	24.15
<i>Pará</i>		
Company	Network	Market share [%]
Oi	DSL	87.59
Embratel	DSL	6.93
<i>Rondônia</i>		
Company	Network	Market share [%]
Oi	DSL	95.15
Embratel	DSL	2.15
<i>Roraima</i>		
Company	Network	Market share [%]
Oi	DSL	92.54
Embratel	DSL	6.74
<i>Tocantins</i>		
Company	Network	Market share [%]
Oi	DSL	93.02
Embratel	DSL	1.97
NORTHEAST REGION		
States		
<i>Maranhão</i>		
Company	Network	Market share [%]
Oi	DSL	76.23
Embratel	DSL	13.85

<i>Piauí</i>		
Company	Network	Market share [%]
Oi	DSL	88.47
Embratel	DSL	5.34
<i>Ceará</i>		
Company	Network	Market share [%]
Oi	DSL	57.63
GVT	Cable	22.16
Videomar	Radio	9.48
<i>Rio Grande do Norte</i>		
Company	Network	Market share [%]
Oi	DSL	87.59
Cabo Serviços de Telecom Ltda.	Cable	6.93
<i>Paraíba</i>		
Company	Network	Market share [%]
Oi	DSL	47.55
NET	Cable	27.96
GVT	Cable	13.47
<i>Sergipe</i>		
Company	Network	Market share [%]
Oi	DSL	84.32
Embratel	DSL	4.34
<i>Pernambuco</i>		
Company	Network	Market share [%]
Oi	DSL	51.94
GVT	Cable	31.12
Embratel	DSL	4.66
<i>Bahia</i>		
Company	Network	Market share [%]
Oi	DSL	56.2
GVT	Cable	16.08
Embratel	DSL	4.17
CENTER-WEST REGION		
States		
<i>Goiás</i>		
Company	Network	Market share [%]
Oi	DSL	55.84
GVT	Cable	19.43
NET	Cable	15.08
<i>Mato Grosso</i>		
Company	Network	Market share [%]
Oi	DSL	76.16
GVT	Cable	14.62
<i>Mato Grosso do Sul</i>		
Company	Network	Market share [%]
Oi	DSL	59.59
NET	Cable	15.30
GVT	Cable	14.02
SOUTHEAST REGION		
States		
<i>Minas Gerais</i>		
Company	Network	Market share [%]
Oi	DSL	51.35

NET	Cable	14.74
CTBC	Optical Fiber	11.75
GVT	Cable	5.82
<i>Espírito Santo</i>		
Company	Network	Market share [%]
Oi	DSL	51.59
GVT	Cable	24.89
NET	Cable	13.44
<i>Rio de Janeiro</i>		
Company	Network	Market share [%]
Oi	DSL	68.30
NET	Cable	21.49
<i>São Paulo</i>		
Company	Network	Market share [%]
Telefonica	DSL	55.87
NET	Cable	33.31
SOUTH REGION		
States		
<i>Paraná</i>		
Company	Network	Market share [%]
Oi	DSL	38.37
GVT	Cable	28.61
NET	Cable	12.75
<i>Santa Catarina</i>		
Company	Network	Market share [%]
Oi	DSL	62.28
NET	Cable	17.34
GVT	Cable	12.24
<i>Rio Grande do Sul</i>		
Company	Network	Market share [%]
Oi	DSL	42.85
NET	Cable	26.44
GVT	Cable	18.03
Source: [18].		

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