One goal, different strategies: an analysis of national broadband plans in Latin America

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Abstract

Purpose – *The ambitious government initiatives currently underway to accelerate broadband development indicate a major shift from the consensus that prevailed during the 1990s in the telecommunications sector. To what extent does this change represent a return to the period before market liberalization and the privatization of government-run telecom services? What are the main objectives of national broadband plans and which policy tools are best suited to achieve them? This paper aims to analyze these questions through a comparative analysis of the goals, policy instruments and network-deployment models of the most relevant national broadband plans adopted in Latin America.*

Design/methodology/approach – *The paper takes the form of a comparative analysis of the goals, policy instruments and network-deployment models of the most relevant national broadband plans adopted in Latin America.*

Findings – *Common patterns and key differences between the initiatives adopted in five countries (Argentina, Brazil, Chile, Colombia and Mexico) are identified and compared to those deployed in developed countries. Variations in the strategies adopted are linked to national differences in economic endowments and the broader processes of political change in Latin America.*

Originality/value – *To the best of the authors' knowledge, this is the first paper making this comparative analysis.*

Keywords *Broadband networks, Developing countries, Public policy, Telecommunications industry, South America*

Paper type *Research paper*

1. Introduction

The pendulum has swung once again in regard to the state's role in the development of telecommunications networks and services. Large public investments to deploy new network infrastructure and ambitious government initiatives to accelerate broadband adoption indicate a major shift away from the consensus that prevailed during the 1990s in the telecommunications sector. Governments are no longer content with regulating private operators and correcting market failures with universal service funds (USF). Rather, policymakers are once again favoring public financing of network deployment and equipment adoption, government participation in the operation of these networks, and an active industrial policy in the telecommunications sector. This change can be readily observed in developed and developing countries, and is particularly noticeable in the proliferation of national broadband plans, a term used to encompass the diverse array of initiatives implemented by national governments over the past five years with the principal objective to accelerate the deployment and adoption of broadband services.

The new role assumed by the state in the telecommunications sector since the first decade of the 2000s raises several questions: to what extent does this change represent a return to the period before market reforms and the privatization of state-owned incumbents? Which safeguards must be adopted to avoid market distortions and the crowding out of private

investment? What should the objectives of state intervention in the broadband services market be and which tools are best suited for achieving them? How should the activity of government-subsidized or state-controlled operators be regulated?

This paper tackles these questions through a comparative analysis of the goals, policy instruments and network-deployment models of the national broadband plans adopted in five Latin American countries (Argentina, Brazil, Chile, Colombia and Mexico). A key objective of the analysis herein is to identify common patterns and key differences between these broadband initiatives and compare them to those deployed in developed countries. The paper also seeks to contextualize the analysis of these plans within the framework of broader political changes in the region, particularly the purported ''left turn'' which followed the economic crisis of the late 1990s.

The paper is organized in the following manner: the next section seeks to identify the factors that have motivated governments in the region to undertake ambitious public initiatives to promote broadband; the third section describes the main characteristics of the national broadband plans of five Latin American countries (Argentina, Brazil, Chile, Colombia, and Mexico), which are also summarized in Table I; the fourth section identifies similarities and differences in the objectives and policy tools of these plans, and compares them with the initiatives adopted in several developed countries; and, the final section outlines policy recommendations derived from the analysis.

2. Context matters: explaining goals and motivations in national broadband plans

Changes in the role of the state in telecommunications are not new. Several authors have shown that these variations are the result of changes in macroeconomic conditions and the prevailing consensus about the role of government in the economy (Vietor, 1994; Mariscal, 2002; Cowhey and Aronson, 2009; Bauer, 2010). The policy cycle designed to promote industry deregulation and the privatization of state operators which began in Latin America in the late 1980s was showing clear signs of losing momentum by the mid 2000s. At first glance, this may seem surprising insofar as the liberalization cycle brought about a significant increase in service coverage, an exponential rise in telecom investment, and a virtuous circle of new technology introduction and widespread adoption of new services (Estache *et al.*, 2002; Jordán *et al.*, 2010).[1]

If the evidence generally indicates the success of market reforms in telecommunications, what explains policymakers' motivations for altering this cycle and accentuating government intervention in the industry? This paper identifies five factors, two of which are linked to broader transformations in the political-economic context of the region, and three of which are more closely linked to the telecommunications sector. Not all the factors are equally relevant in the countries analyzed, thus explaining variations in policies adopted. However, taken as a whole, these factors provide the incentives for the return of the state as a central actor in the development of the industry.

Beginning with the contextual factors, the first is the purported ''left turn'' in the political orientation of Latin American governments in the early part of the 2000s (Castañeda, 2006; Levitsky and Roberts, 2011). This change is relevant insofar as it entails an economic agenda of increased state intervention in the economy and a return to the developmental and industrial policy tradition that characterized Latin America during much of the twentieth century (Corrales, 2008). As a result of the economic crisis of 1998-2002, which led to a drop in per capita GDP and an increase in poverty and inequality levels in the region, public opinion shifted in support of candidates with an agenda of redistribution and greater state intervention in the economy.

This shift in public opinion is particularly noticeable in levels of support for the privatization of public utilities. Polls show that the level of support for privatization fell from 46 percent in 1998 to 19 percent in 2004, rising only slightly since then (Latinbarómetro, 2011). Several studies identify the reasons for the limited support for the private management of public utilities in Latin America, among them: the mistrust in governments' ability to adequately regulate private operators (Panizza and Yañez, 2006); the persistence of private monopolies in several sectors;

Table I Main characteristics of broadband plans in Latin America

	Argentina	*Brazil*	*Chile*	*Colombia*	*Mexico*
Population	40.738.000	195.498.000	17.133.000	46.299.000	110.675.000
Size in sq. km	2.780.400	8.514.877	756.102	2.070.408	1.972.550
Name of Initiative	*Argentina Conectada*	*Plano Nacional de Banda Larga (PNBL)*	*Todo Chile Conectado*	*Vive Digital*	*Agenda Digital.mx*
Population target	97 percent	89 percent	90 percent of rural population (3 million)	90 percent	N/A
Geographical target	100 percent	76 percent of municipalities	1,474 rural localities	62 percent of municipalities	N/A
Price/quality target	10Mbps	1Mbps at US$ 20 per month	1Mbps at US$ 30 per month	1Mbps	N/A
Tax incentives	Unspecified incentives for local ISPs	Local ISPs exempted from contributions to USF	N/A	Lower import duties for broadband equipment and terminals. VAT exemption for broadband services to poor households	N/A
Total public investment in broadband plan	$1.8 billion USD	$3.25 billion USD	$45 million USD	$2.25 billion USD	N/A
Total per capita	$44.2 USD	$16.6 USD	$2.6 USD	$48.6 USD	N/A
Total as percent GDP	0.4 percent	0.13 percent	0.02 percent	0.78 percent	N/A
Source of funding	General government funds.	General government funds	50 percent regional governments, 50 percent USF	General government funds.	General government funds
Public investment in network infrastructure	$840 million USD	$1.8 billion USD	$45 million USD (45 percent of total).	$230 million USD (38 percent of total)	N/A
Total per capita	$21 USD	$9.2 USD	$2.6 USD	$5 USD	N/A
Network characteristics	58,000km national/regional fiber backbone.	35,000km national/regional fiber backbone	12 optical nodes and 3G mobile broadband for last-mile	17,000km national/regional fiber backbone	22,000km national/regional fiber backbone
Network ownership and management	AR-SAT (government-owned operator.	Telebras (government-owned operator)	Entel (private operator)	Unión Temporal Fibra Óptica Colombia (prívate operator)	Telefonica/Televisa consortium (private operator)
Duration	2011-2015	2010-2014	2010-2012	2010-2014	2012-2015

Sources: Plan Argentina Conectada (2011), Vive Digital (2011), PNBL (2010), Proyecto Todo Chile Conectado (2010), SCT (2012)

and the unequal distribution of the benefits associated with the privatization process (Shirley, 2004). The renationalization of operators in Venezuela (2007) and Bolivia (2008) provides clear-cut evidence about the effect of these political changes in the telecommunications sector. However, the reduction in the jurisdiction of regulatory agencies in several countries (in certain cases, *de jure* and in others, *de facto*), and the widening of powers by executive bodies linked to the telecom sector suggest a wider process of institutional realignment with respect to the regulatory framework adopted in the 1990s.

The second contextual factor is the economic prosperity brought about by noticeably improved terms of trade for the region. As pointed out by several authors, the combination of fiscal and external surplus resulting from the rise in commodity prices has not only provided governments with the funds to carry out large infrastructure investments, but also reduced the macroeconomic risk of the state's operation of public utilities (Weyland, 2009; Murillo *et al.*, 2011). By allowing a rapid accumulation of international reserves and reducing the burden of external debt, the cycle of macroeconomic prosperity that began in the early 2000s increased Latin American governments' ability to carry out an agenda of redistribution and state intervention in industries regarded as strategic. In contrast, the international crisis that began in 2008 slowed private investment in some of these industries. In the telecommunications sector, investment in mobile telephony (the sector's most dynamic market) fell between 2008 and 2009 in most of the countries analyzed in this paper, with the drop reaching levels as high as 40 percent in Brazil and Colombia.[2]

The new context represented a curious reversal of the situation observed in the late 1980s, when governments were unable to meet the investment needs required to modernize their incumbent telecom operators, while the private sector had both the resources and the know-how to undertake the task. Two decades later, in a context of global economic uncertainty, private operators were reluctant to make large investments in new network infrastructure (in particular, investments with high risk and low expected returns, such as laying fiber backbone outside large urban centers). This encouraged Latin American governments, flush with cash from favorable terms of trade, to fill the gap left by the deceleration of private investment in the sector.

The third explanatory factor is more directly linked to the telecom sector, and refers to the mounting evidence about the contribution of telecommunications, in particular broadband, to economic growth and job creation (Qiang and Rossotto, 2009; Koutrompis, 2009; Czernich *et al.*, 2011). Telecommunications infrastructure has long been linked to economic growth (Hardy, 1980; Leff, 1984). However, this fresh new evidence demonstrated the positive effect of broadband adoption on competitiveness and employment (two key policy concerns towards the end of the 2000s), thus creating a sense of urgency about speeding up broadband development through government initiatives.[3] Just as the state played a key role in the development of the electrical, transportation and telecommunications networks in the past, a new consensus called for governments to assume a similar role in the modernization of the telecommunications infrastructure in the twenty-first century.[4]

On which basis is the state being called to lead this effort? Studies in developed countries emphasize two factors. The first one is the reduction in incentives for private investment as a result of the 2008 crisis, a product of the combined effect of a deceleration in demand for telecom services and a contraction in available credit (Katz, 2009). Second, several studies indicate that fiber networks need to be brought closer to the end user in order to produce a significant increase in the quality of broadband services, an undertaking that would require large investments which private operators do not appear to be prepared to assume in the short term due to uncertainty in returns on such investments. Additionally, as shown by Ganuza and Viecens (2012), investments in next-generation networks (NGN) represent many risks for traditional operators, as market power and the distribution of benefits tend to shift from network operators to content providers. Overall, these factors suggest the need for increased public-sector involvement in the modernization of existing telecom networks.

The fourth explanatory factor is the persistence of regional imbalances in the deployment of infrastructure and access to telecommunications services in Latin America. Several studies

show that the investments made by the private sector during the last two decades have, as expected, favored urban areas with the highest per capita income, thus aggravating existing disparities in access to services (Grazzi and Vergara, 2011). The real problem, however, is rooted in the flaws in the design and implementation of the policy mechanisms incorporated to mitigate these disparities, mainly coverage obligations imposed on private operators and USFs (Regulatel, 2006).

The limited impact of USFs in Latin America has been widely documented (Stern, 2009; Barrantes, 2011). In the case of Brazil, the fund (FUST for its Portuguese acronym) was created in 2000 and currently raises approximately $800 million USD per year but has never been executed due to legal obstacles. In the case of Argentina, the USF created in 2000 has been inactive since 2001 due to contractual litigations between the government and telecom incumbents following the 2001 economic crisis.[5] Mexico does not have a USF in the strict sense of the term, but rather a temporary fund (the Telecommunications Social Coverage Fund created in 2002 to provide fixed telephony services to isolated villages). This mechanism has very limited funds (approximately $75 million USD to date), and there have been several flaws both in the design of initiatives and the associated contracts.[6] Other countries such as Colombia and Chile have achieved better results implementing a USF mechanism.[7] However, as indicated by Barrantes (2011), impact has been limited even in the relatively successful cases due to funding restrictions and the programs' focus on subsidizing shared access to landlines.

By the end of the 2000s it was clear that limited private investments in core networks and insufficient competition in access networks outside large urban centers had a negative impact on the coverage, quality and price of broadband services in the region. Residential broadband services in Latin America cost, on average, 25 times more than in OECD countries (on the basis of cost per Mbps of advertised download speed), while the average plan in the region offered only a quarter of the advertised download speed in OECD markets (Galperin, 2011). On the other hand, existing policy instruments had proved inadequate to mitigate regional imbalances in access to services by households, businesses and public institutions. In this context, greater public intervention in telecom markets was considered necessary not only as a matter of social equity, but also to fulfill the promised benefits of broadband in terms of social development and economic growth.

The last explanatory factor is the imitation effect related to broadband policies adopted by the more developed countries, which helped legitimize similar initiatives in Latin America. The leadership in broadband development attained by countries in Southeast Asia is particularly relevant for the region, with their success tied to proactive public policies in infrastructure, training and R&D (Kim *et al.*, 2010). The main lesson drawn by policymakers in Latin America was that private-sector activity needed to be complemented by greater state intervention to orient investments and stimulate demand for broadband services.

The factors discussed above explain both the motivation and the ability of governments in Latin America to design and implement large public initiatives to stimulate broadband development. The next section outlines the key characteristics of the national broadband plans adopted in Argentina, Brazil, Chile, Colombia and Mexico.

3. Broadband plans in Latin America: key facts

3.1 Argentina: ''Argentina Conectada''

Argentina Conectada, a program introduced in October 2010 by Presidential Decree 1552/10, sought to integrate several information technology initiatives already underway (such as the implementation of digital terrestrial TV and the introduction of notebooks in schools) with an ambitious plan to build a national fiber backbone. According to the government, the main goal of the plan was to improve the quality and extend the coverage of broadband services across the country, in particular in areas of little interest to private operators (Plan Argentina Conectada, 2010).

The 58,000km national fiber backbone will combine about 22,000km of newly laid fiber in partnership with provincial governments; about 18,000km of new fiber connecting these provincial networks; idle fiber owned by electric utility Transener (in which the state is a major shareholder); and fiber exchange agreements with private operators. It is estimated that the backbone will reach 97 percent of the population by 2015.

The building and operation of the national fiber backbone was delegated to AR-SAT, a state-owned telecommunications operator created in 2006 to take over the assets of Nahuel Sat, a struggling private satellite operator. The plan calls for AR-SAT to operate exclusively in the wholesale access market, selling upstream connectivity to local ISPs (the program includes soft credit and technical assistance to local ISPs). However, structural separation rules have not been formally adopted, leaving the door open for AR-SAT to provide retail services in the future. Total investment in the program is estimated at AR$ 8 billion (approximately $1.8 billion USD) over five years (2011-2015), of which AR$ 3.7 billion (approximately $840 million USD) will be invested in the new fiber backbone.[8]

3.2 Brazil: ''Plano Nacional de Banda Larga''

Established by Lula's government in 2010 through Presidential Decree 7.175/10 and validated by President Rouseff shortly after her inauguration in 2011, Brazil's National Broadband Plan (PNBL for its Portuguese acronym) has five main objectives: increase broadband access throughout the country; accelerate economic and social development; promote digital inclusion; reduce social and regional inequalities; and promote employment creation. Specifically, the plan seeks to reduce access prices, increase broadband coverage and improve service quality. The plan is organized into four lines of action: regulatory reforms, tax incentives, R&D incentives and the deployment of a national fiber network.

According to the plan the national fiber network will link the 27 state capitals, offering connectivity to public institutions (hospitals, schools, and government offices) and selling capacity to local ISPs. The plan seeks to service 4,278 of the country's 5,564 municipalities (76 percent) by 2014, covering 89 percent of the population, with total investments calculated at about R$ 5.7 billion (approximately $3.25 billion USD). The network will extend for about 30,000km, combining new fiber segments with idle fiber capacity from state-controlled utilities such as Petrobras and Eletrobras.

The responsibility for building and operating the network was delegated to Telebras, the state-run incumbent until its privatization in 1998, which was reactivated by the government and recapitalized for about R$ 3.2 billion (approximately $1.8 billion USD). Telebras will operate in the wholesale access market, establishing agreements with local ISPs. Under such agreements, local ISPs must offer customers a basic 1 Mbps plan for R$35 a month (about $20 USD). As in the case of Argentina, structural separation rules have not been adopted, and the PNBL contemplates the possibility of Telebras offering retail services under conditions set by the regulator (ANATEL).The entry of a state operator was strongly resisted by the main private operators, which control about 90 percent of the retail broadband market (Jensen, 2011). Nonetheless, some of them have already signed agreements with Telebras, and by September 2012 the plan was available in 1,842 municipalities.

3.3 Chile: ''Todo Chile Conectado''

Todo Chile Conectado was designed to deliver broadband in the country's many isolated and rural communities, which for the most part represent small communities (fewer than 1,000 inhabitants) with limited market potential and a high cost to service. The initiative was implemented through the Fondo de Desarrollo de las Telecomunicaciones (Telecommunications Development Fund or FDT), a public fund created to extend telecommunications services to low-income or isolated communities and capitalized through the general government budget.

The program was designed as a public-private partnership in which the government subsidizes operators that provide services in pre-determined areas and under conditions

established in public tenders. The initiative, which was launched in 2010, seeks to offer mobile broadband services to over 3 million inhabitants in 1,474 isolated communities by the end of 2012 at an estimated cost of $110 million USD. The main contract was awarded to private operator Entel, which committed to invest $65 million USD to build the new network; FDT and regional governments were responsible for the remaining investments. The program is already providing services in over 1,000 communities, where Entel offers a 1Mbps mobile broadband Internet service for $14,220 Chilean pesos (approximately $30 USD) a month.

3.4 Colombia: ''Vive Digital''

Vive Digital is an ambitious program launched by the government in 2010 to promote broadband development throughout Colombia. The program established three main objectives to be achieved within five years: triple the number of municipalities connected to the national fiber network; reach 50 percent broadband connectivity among households and SMEs; and quadruple the number of broadband subscriptions (from 2.2 million to 8.8 million) by 2014. In terms of coverage, the program seeks to service 62 percent of Colombia's 1,120 municipalities (or 90 percent of the population), and provide shared access points in all communities with over 1,000 inhabitants (Vive Digital, 2010).

A key initiative of the plan is the building of a new, 15,000km fiber backbone connecting municipalities currently not serviced by high-capacity data networks. As in the case of Chile, the initiative was designed as a public-private partnership, and in late 2011 the contract was awarded to a joint venture controlled by Mexico's Salinas Group. Under the agreement, the government pledged to provide $415,000 million Colombian pesos (approximately $237 million USD), which represents a third of the total investment estimated for the deployment of the network. According to the government, the winning consortium was selected on the basis of the largest geographical coverage proposed (1,078 municipalities in total).

The tender stipulates that the operator must deploy the fiber network and operate it for 15 years. After this period, the operator will have full ownership of the network and operate under the conventional regime established by the regulator. The operator must also provide free broadband access to 2,000 public institutions located in the municipalities covered by the network during the first five years of operation. Unlike in Argentina and Brazil, the backbone operator is also expected to provide retail services, although the tender stipulates that access must be granted to other competitors on non-discriminatory terms.

The program includes many other complementary initiatives, including tax incentives for the software and digital content industries, a reduction in import duties for broadband equipment and terminals, regulatory reforms promoting service convergence and infrastructure sharing, and ICT training programs. In addition, $300,000 million Colombian pesos (approximately $170 million USD) were allocated to subsidize Internet access and equipment by low-income households.

3.5 Mexico: agenda Digital.mx

During President Calderón's tenure (2006-2012), several initiatives were undertaken to promote broadband deployment and use. However, this period was also characterized by significant instability within the Secretariat of Communications and Transport (SCT), which stymied the development of a full-fledged national broadband plan. It was only in early 2012 that the government pulled together the many existing initiatives under the umbrellas of two large programs: Actions to Reinforce Broadband and Information and Communication Technology focuses on promoting telecommunications services, by encouraging both public and private investment in infrastructure; and, Digital Agenda.mx centers on developing demand for services by encouraging ICT adoption and use, in addition to developing the market for telecommunications-based content and applications. The overall vision has four main objectives: promote infrastructure investment in broadband services throughout Mexico; reduce the cost of broadband; increase digital literacy; and promote service demand.

Among the most relevant initiatives adopted by the government of President Calderón was a tender for the operation of the unused capacity of the fiber-optic backbone owned by the Federal Electricity Commission (CFE), a state-owned electric utility. CFE's fiber network stretches over 34,000km with 36 fiber strands, of which only six were utilized (Mariscal and Flores-Roux, 2009). In 2010 the SCT invited proposals for the use of a pair of dark fiber strands from the CFE's network in three routes amounting to about 20,000km. The call established a 20-year period during which the selected operator would undertake complementary investments to increase the network's coverage and capacity. A consortium led by Telefónica (Spain) and Televisa (Mexico) was awarded the contract, offering approximately $70 million USD and an investment commitment of an additional $103 million USD to expand the network by 1,735km. The new operator will only be active in the wholesale and under strict non-discriminatory terms. Additional strands of fiber from CFE's network are set to be auctioned in late 2012. In addition, the government has launched complementary initiatives such as a large digital literacy program for adults, a program to facilitate the use of passive infrastructure controlled by the government (such as public buildings and ducts), and the establishments of about 18,000 community access centers.

4. Discussion: two models for broadband initiatives

The national broadband plans adopted in Latin America follow a broader pattern of government initiatives to promote investment and adoption of broadband technologies in many countries. Nonetheless evidence suggests that the plans adopted in this region can be distinguished from those in more developed nations along several dimensions. First, whereas in OECD countries the key problem to be addressed is the scarcity of investments in next-generation access networks (and thus in household adoption of very-high speed access services), broadband initiatives in Latin America seek to redress regional imbalances in the availability of high-capacity backbone lines. Thus, while the plans in developed nations have ambitious service quality targets (typically above 30Mbps), the initiatives analyzed in this paper have far more modest quality goals (rarely more than 2Mbps). Rather, the emphasis is on expanding the geographical coverage of backbone networks and promoting the take-up of basic access plans.

Second, unlike plans in OECD countries, broadband initiatives in Latin America focus almost entirely on increasing coverage and encouraging competition in the wholesale segment of the network. This reduces the problem of market distortions and the crowding out of private investment since resources are directed to areas not covered by fiber networks (as in the case of Colombia) or areas where legacy incumbents have few incentives to update copper networks (as in many areas in Argentina, Brazil and Mexico). This contrasts with initiatives in some developed countries such as Australia, New Zealand and Singapore, where broadband plans lack a geographical focus and include both wholesale and retail segments.

Third, broadband plans in Latin America limit the scope of government intervention in the broadband market by delegating retail operations to private firms. In the cases of Argentina and Brazil, incentives such as soft credits, training and the establishments of regional traffic exchange points are targeted to small or medium-size local operators. Both governments consider entry by the public network operator in retail services as a strategy of last-resort, though the lack of clear guidelines for such entry to date (as well as the lack of structural or functional separation) is likely to hinder private investments. In the cases of Colombia and Mexico, however, broadband initiatives include safeguards for private operators such as non-discriminatory access to the new backbone networks.

In the cases of Argentina and Brazil, the regulatory mechanism for overseeing the behavior of new public operators is still under discussion. In this respect, both the theoretical foundations and international experience suggest that there is a need to put into place safeguards that ensure non-discrimination in access to network segments controlled by the public operator and a level regulatory field if retail services are provided. Moreover, insofar as public operators offering services and developing infrastructure in unprofitable areas, subsidies must be granted transparently and through mechanisms that optimize the

allocation of public resources. These safeguards are particularly important since the plans do not establish long-term financing mechanisms for the public operator, thus creating incentives for the operator to enter more profitable areas in the future.

Table I provides a comparative perspective on the magnitude of the broadband initiatives undertaken in Latin America. Colombia's *Vive Digital* is the most ambitious of the plans in the region, with total projected public investments of $2.25 billion USD (0.78 percent of 2011 GDP). Interestingly, a relatively small portion of such resources ($230 million USD) is being invested in network infrastructure. Broadband initiatives in Argentina and Brazil are less ambitious relative to GDP (0.4 and 0.13 percent respectively), though in both cases the portion allocated to network infrastructure is much larger, and amounts to about half of total public investments in the broadband plan.

In terms of projected public spending on network infrastructure, the plans vary between $2.6 USD per capita in the case of Chile and $21 USD per capita in the case of Argentina. Taking the ambitious broadband plans of Australia and New Zealand as a parameter, in which public investment per capita totals $845 USD and $245 USD respectively (Given, 2010), these levels of investment seem relatively low. However, considering the characteristics of the networks being deployed, the comparison is more appropriate with broadband initiatives in the US and Canada, where public investment in broadband infrastructure amounts to $8 USD per capita and $5 USD per capita, respectively (Qiang, 2010).[9] This provides evidence of the significant commitment of resources involved in broadband plans in the region, particularly in the case of Argentina, which is investing almost three times more than the US (on a per capita basis) in its broadband infrastructure plan.

The analysis of the key policy instruments reveals that broadband plans in Latin America follow two basic models: on the one hand, there is the public-operator model adopted by Argentina and Brazil, in which the deployment and operation of the backbone network is undertaken by a state-controlled operator; on the other, the public-private partnership (PPP) model followed by Colombia, Mexico and Chile. Each model has different implications regarding the role of the state in the telecom sector, as discussed below.

One of the most important factors is the level of public investment associated with each model. Where public operators are established, the government assumes a long-term commitment to fund the operation and continued modernization of the network, even when complementary private investments are expected in the last-mile segment. The key is that such complementarity is not formalized in the plan, thus creating uncertainty for the long-term viability of the initiative, particularly with changes in the macroeconomic conditions for the region. It is also worth noting that in all the broadband plans analyzed in this study there is a striking lack of coordination between these initiatives and the existing mechanisms for financing infrastructure extension and service adoption such as existing USFs. This is particularly problematic for Argentina and Brazil, in which the state is assuming a long-term commitment to operate a large national backbone network.

Conversely, the PPP model makes it possible to formalize coordination between public and private investment *ex ante*, and therefore reduces both the initial investment commitment assumed by the state as well as future commitments to maintain and operate the network. In the cases of Chile and Colombia, public investment represents 45 and 38 percent of total upfront investment respectively. Also, both countries implemented a reverse-subsidy mechanism to select the private operator, thus optimizing the use of public resources and minimizing the displacement of private investment (Wallsten, 2009). In other words, the selection mechanism sought to promote ''competition for the market'' in areas with low potential for private return. Conversely, in the case of Argentina, Brazil and, to a certain extent, Mexico, the strategy emphasized ''competition in the market,'' through the creation of a new backbone operator that would exert competitive pressure on incumbents and thereby reduce access prices.

Can these different routes taken by Latin American countries be associated with national variations in the policy context in which broadband initiatives were designed and implemented? Although an exhaustive answer to this question is beyond the scope of this

paper, a preliminary analysis of the evidence suggests that this is the case. In Argentina and Brazil, the left turn in the political orientation of the government since the early 2000s has had a clear impact on choice of policy tools across economic sectors. Furthermore, the economic crisis that preceded this electoral shift (particularly in the case of Argentina) created political legitimacy for replacing a light regulatory touch with strong state intervention in key industries, including telecommunications. At the same time, the commodities boom that accompanied this left turn has been critical for healing public finances in these resource-rich countries. A ruling coalition with a platform of greater state intervention in the economy thus combined with a significant improvement in fiscal conditions, providing both the political incentives and the resources for ambitious broadband initiatives led by public operators.

Conversely, in Colombia and Mexico, there has been no left turn in the political orientation of the government, while the direct fiscal impact of the raise in commodity prices has been more modest due to a greater exposure to the international financial crisis. Under these conditions, policymakers adopted a PPP model that limits the investment commitment assumed by the state and poses fewer challenges to the existing regulatory scheme. At first glance, the case of Chile is similar to that of Argentina and Brazil (fiscal bonanza due to a commodity boom and a left-leaning government throughout the first decade of the 2000s). However these factors were mitigated by institutional checks and balances that have contributed to the continuity of market-oriented macroeconomic policies in the country for over two decades (Scartascini *et al.*, 2010), and the eventual electoral defeat of the left-leaning coalition in early 2010. The modest connectivity plan adopted by the government under a classic subsidy scheme reflects these important differences with its Southern Cone neighbors.

5. Conclusion

Since the start of the twenty-first century, Latin American countries have undergone significant political and economic changes that have profoundly affected the state's role in the telecommunications industry. At first sight, these changes seem inconsistent with the cycle of investments and industry growth enabled by market reforms in the previous decade. In this paper we demonstrate that a closer examination reveals a combination of contextual and industry-specific factors that motivated governments to deviate from the existing regulatory paradigm and embrace policy tools that seemed long abandoned. We also suggest that the return of the state as a central actor in the industry assumes different models, which reflect variations in the intensity and relevance of the factors identified above.

To what extent do these changes represent a return to the pre-liberalization era? While it is early to assess the results of national broadband plans adopted in recent years, our analysis suggests that these initiatives do not challenge the foundations of the existing regulatory regime, even when in some cases it does require significant adjustments to accommodate a more proactive government role. The new public operators differ significantly from its predecessors, both in terms of its organizational foundations and its political mandate. Moreover, regulatory safeguards are being put into place to minimize market distortions, though our analysis suggests that these need to be strengthened overall.

The new wave of broadband initiatives proposes no rigid dichotomies between public and private operators but rather different complementarities to promote the development of a technology platform with high economic and social externalities. This is supported by a growing body of evidence about the benefits of collaborative arrangements between public and private operators in the development of telecommunications networks, such as PPPs and municipal-fiber projects (Hauge *et al.*, 2008; Falch and Henten, 2010; Ganuza and Viecens, 2011). Still, where public operators are charged with leading broadband initiatives, they will need to address the old challenges faced by public incumbents, among them efficiency in operations and independence from political cycles.

In this respect, the emulation of successful broadband initiatives in other countries must be considered within the institutional context of Latin America. Governments must carefully evaluate the ability of a public operator to manage a complex infrastructure network within a

context of rapid changes in technology and demand patterns. It is critical to acknowledge the cyclical nature of the international economic context, which at present clearly favors commodity exporters. Thus, today governments in Latin America can afford large investments in network infrastructure with relative ease, but in the medium term a more sustainable financing model will be required.

Lastly, the use of public resources to develop telecommunications infrastructure in areas not served by private operators is part of the standard regulatory toolkit. This is less obvious when it involves areas served by a single private operator (typically the former incumbent), which is the case in several regions where publicly-funded network infrastructure will be deployed. In other words, is the duplication of network segments with public financing the most efficient tool for ensuring competitive access prices? It is well known that other tools exist – such as access price regulation and the mandatory unbundling of non-replicable network elements – which policymakers in the region have generally been unwilling (or in some cases unable) to implement. The mixed industry model that is emerging from the current wave of broadband initiatives must not weaken the ability of regulatory agencies to create healthy competition among telecom operators, be they public or private.

Notes

1. Moreover, in terms of the effect of market reforms in the telecom sector on aggregate welfare, several studies have shown a positive indirect effect on employment, while the direct effect of layoffs in privatized operators was largely offset by the growth of total employment in the sector (McKenzie and Mookherjee, 2003). In addition, despite significant tariff rebalancing resulting from reforms (particularly affecting local fixed services), a number of studies have shown that reforms in the telecommunications market have had a positive or null distributive effect (Navajas, 1999).
2. Source: Merrill Lynch Wireless Matrix 1Q2011.
3. See also, among others, OECD (2009), ECLAC (2010) and ITU Broadband Commission (2011).
4. Of course, the consensus is not generalized. See Kenny (2011) for a critical review of the evidence.
5. The USF was partly reactivated in 2011.
6. For a discussion of the Mexican case, see Mariscal and Ramirez Hernandez (2011).
7. For example in the case of Colombia between 1998 and 2007 the Compartel initiative managed to implement rural telephone programs, telecenters and connectivity to public institutions at a cost of approximately $400 million USD (ITU, 2008).
8. To date, tenders have been issued for the building of ten segments of the national fiber backbone (approximately 18,700km), in addition to the construction of the national data center through which AR-SAT will manage the new network.
9. In the case of the US, only the projected expenditure of $2.5 billion USD in the Broadband Initiatives Program (BIP), which corresponds to the deployment of network infrastructure, is considered.

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