Mobile Broadband at the Bottom of the Pyramid In Latin America

Telecom Advisory Services, LLC

JUNE 2013

The **GSMA** represents the interests of mobile operators worldwide. Spanning more than 220 countries, the **GSMA** unites nearly 800 of the world's mobile operators with more than 230 companies in the broader mobile ecosystem , including handset makers, software companies, equipment providers and Internet companies, as well as organisations in industry sectors such as financial services, healthcare, media, transport and utilities. The **GSMA** also produces industry-leading events such as the Mobile World Congress and Mobile Asia Expo.

For more information,
please visit the **GSMA** corporate website
at www.gsma.com

or **MOBILE WORLD LIVE,** the online portal for the mobile communications industry,
at www.mobileworldlive.com

For more Latin American resources in spanish, english and portuguese, please check
www.gsmala.com

Telecom Advisory Services, LLC

Telecom Advisory Services is an international consulting firm specialized in providing high level advisory services in business, policy and financial strategies to telecommunications and technology companies, governments, and international organizations.

For more information, please visit the TAS corporate website at www.teleadvs.com

To Download the report please access
gsmalatinamerica.com

AUTHORS

Raúl Katz (Ph.D., Management Science and Political Science, Massachusetts Institute of Technology) is Director of Business Strategy Research at the Columbia Institute for Tele-Information, Adjunct Professor in the Finance and Economics Department at Columbia Business School (New York), and President of Telecom Advisory Services, LLC. Prior to these positions, he worked for 20 years at Booz Allen Hamilton, where he served as Lead Partner of the Telecommunications Practice in North and Latin America and was a member of the firm's Leadership Team.

Lic. Fernando Callorda (BA, Economics, University of San Andrés-Argentina) is an Assistant Professor in the Economics Department at the ESEADE (Argentina), where he teaches Econometrics and Financial Analysis. He is also affiliated with the Centro de Tecnología y Sociedad (Center of Technology and Society) at the University of San Andrés. He currently serves as a consultant at Telecom Advisory Services, LLC. Beforehand, he worked as a consultant in Argentina's National Congress and as an auditor at Deloitte Touche Tohmatsu.

CONTENTS

Executive Summary

The broadband demand gap in Latin America is still fairly large. Forty-three percent of the population residing in areas served by fixed broadband does not acquire the service. A large portion of the demand gap is explained by limited affordability. For example, while 60 % of households at the cusp of the socio-demographic pyramid have already adopted fixed broadband, penetration at the bottom of the pyramid is limited to 8%.

While a number of adopted public policy initiatives focused on tackling the affordability barrier by, for example, launching "social broadband" products at lower price points, have been effective, their contribution has been primarily limited to enhancing adoption of the middle classes. In order to tackle the broadband demand gap at the bottom of the pyramid, it is necessary to deploy new strategies that should complement direct policy intervention in fixed broadband, where most of the policy efforts have been focused so far.

Mobile broadband represents a solution to this acute social problem. Due to the competitive intensity in the mobile broadband sector, service tariffs have dropped between 7.3% for dongles and 52% for smartphones in the last three years, which has increased service affordability. Furthermore, the offering of service limited to number of days per month, download volume, or sites to be accessed allows users that are more economically vulnerable to gain access to the Internet. Finally, Internet access from smartphones can also address indirectly the digital literacy barrier to adoption at the bottom of the pyramid, by offering a simpler way to use the technology compared to standard computer interfaces. As is well known, a large number of individuals can handle a mobile phone but cannot operate a computer. As a result, the growing penetration of smartphones could be a way of including digitally illiterate population in the Information Society, thereby stimulating the development of more comprehensive mobile broadband plans.

The segmentation flexibility and accessibility of mobile broadband plans have the potential to replicate, to some degree, the contribution of pre-paid tariffs to the universalization of voice telephony. This study provides evidence as how the currently available mobile broadband plans have the power to increase the affordability of broadband to up to three income deciles of the Latin American population (see figure A).

LATIN AMERICA: COMPARATIVE AFFORDABILITY BY INCOME DECILE

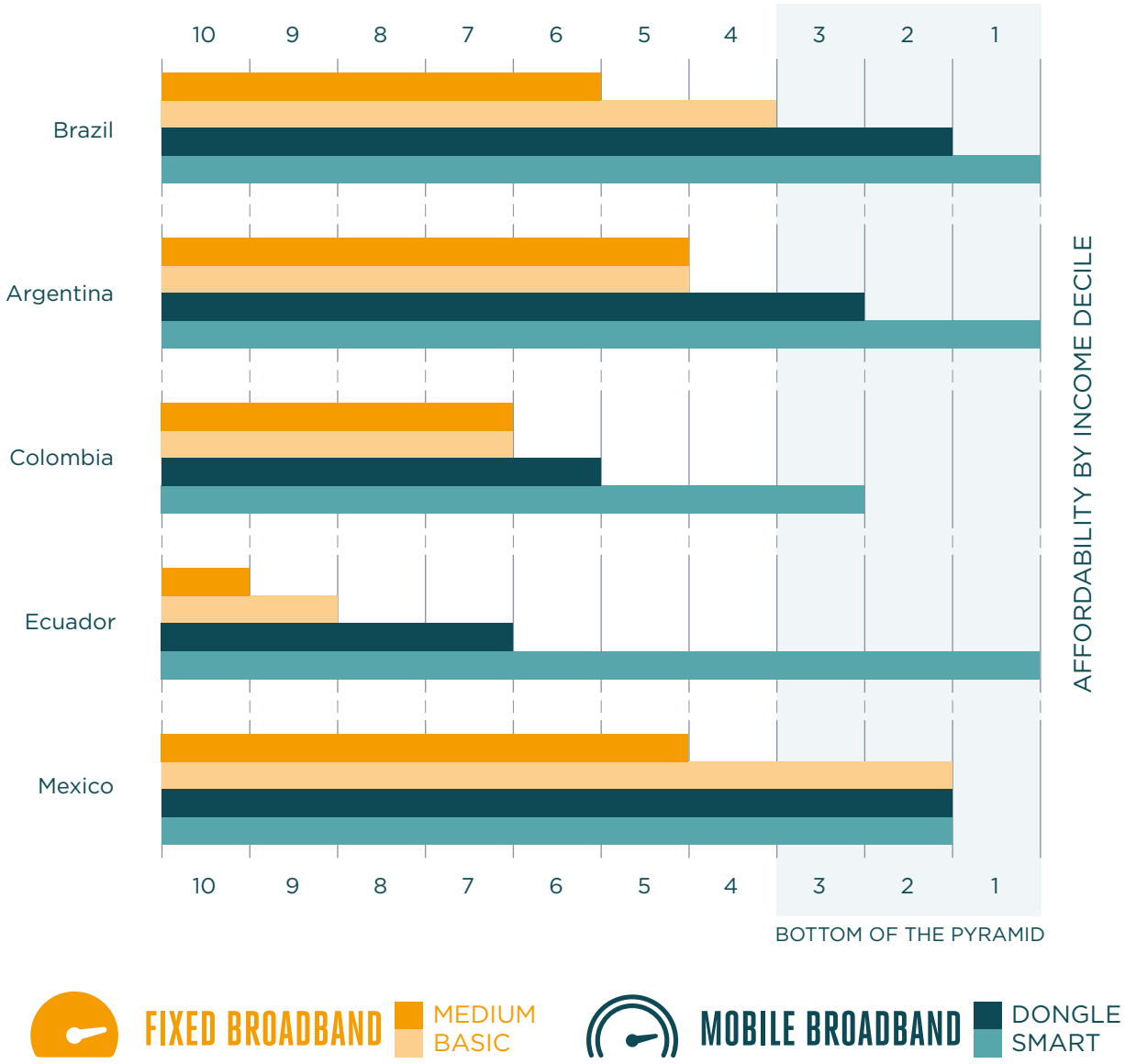


Figure A

As a result, mobile broadband provides an affordable alternative to 54 % of the 37 million households that cannot afford fixed broadband in Argentina, Brazil, Colombia, Ecuador, and Mexico. The importance of this contribution emphasizes the need to provide the industry with the inputs necessary to maximize the offer of mobile broadband service. In particular, higher availability of spectrum would allow the industry to increase the availability of computer connectivity services, which would lead to further price reductions. At the same time, a reduction of service taxes paid by the user would have a positive impact on service adoption.

01.

Introduction

The purpose of this study is to assess the role the mobile sector plays in reducing the broadband demand gap in Latin America.

Mobile networks have already contributed to addressing the demand gap of voice telephony in the region. Replicating that experience, wireless operators will also contribute to the reduction of the broadband gap in the region. Along these lines, this study focuses on the analysis of the recent trend in the launch of services and the decline of prices, which help position mobile broadband as a fundamental contributor to serve the aforementioned purpose.

The study first presents an analysis of the broadband affordability barrier in the region. To do so, it begins by quantifying the demand gap in the region, defined as the population served by broadband networks but that do not acquire Internet access services.

In particular, the analysis concentrates on the portion of the demand gap attributed to economic affordability. On this basis, it argues that mobile broadband will help overcome the economic barrier, demonstrating that adoption of this technology will go beyond the complementarity effect (which establishes that mobile broadband is primarily adopted by fixed broadband users). In this sense, it shows how mobile technology is creating a new generation of Internet users, which are primarily dependent on the mobile platform for access.

In order to provide evidence of the contribution of mobile broadband to the reduction of the affordability gap, this report presents five case studies (Argentina, Brazil, Colombia, Ecuador, and Mexico) where wireless is resolving certain market failures.

In each of these instances, it first presents statistics regarding the structure and size of the bottom of the socio-demographic pyramid, defined as the most economically disenfranchised segments of the population.

These statistics are used to estimate the affordability gap of fixed-line broadband; in other words, it identifies the social segments that, based on their average income, are not able to pay for a subscription to fixed-line broadband service.

The research then studies mobile broadband offers in three categories (USB modem connections for computers, post-paid Internet access plans for smartphones, and plans for either computers or smartphones that are limited by download volume or number of days of use). The pricing analysis of these offers determines the extent to which mobile broadband will overcome the affordability gap for the bottom of the socio-demographic pyramid.

Mobile is seen as the true enabler for nearly

150M

people in Latin America

02.

The bottom of the socio-demographic pyramid in Latin America

The bottom of the socio-demographic pyramid refers to those individuals and households with low incomes. Although not one single definition of this segment exists, this social group has been conceptualized in four ways:

Definition 1

US$2.50

Households with a daily per capita income lower than US$2.50

(Shah, 2013)

Definition 2

Households with an income that places them below the poverty line at the national level

(InfoDev, 2012)

Definition 3

Households located at the bottom three income deciles in a given country

(NsrinJazani, 2011)

Definition 4

US$1500

Individuals with a per capita annual income lower than US$1,500 in purchasing parity

(Prahalad, 2004; Prahalad, 2010)

Latin America: Composition of the Income Pyramid (2012)

Despite the differences in the cutoff point that separates the bottom from the rest of the pyramid, all four definitions coincide in determining that this segment represents an important portion of the population in developing countries.

This study considers the bottom of the pyramid to be comprised of those individuals and households in the three lowest income deciles. In Latin American countries, these three deciles cover those individuals whose average daily incomes fall below the US$2,50 cutoff point. Similarly, the utilization of the three bottom deciles allows the analysis to overcome the heterogeneity among countries in their determination of the poverty line[1].

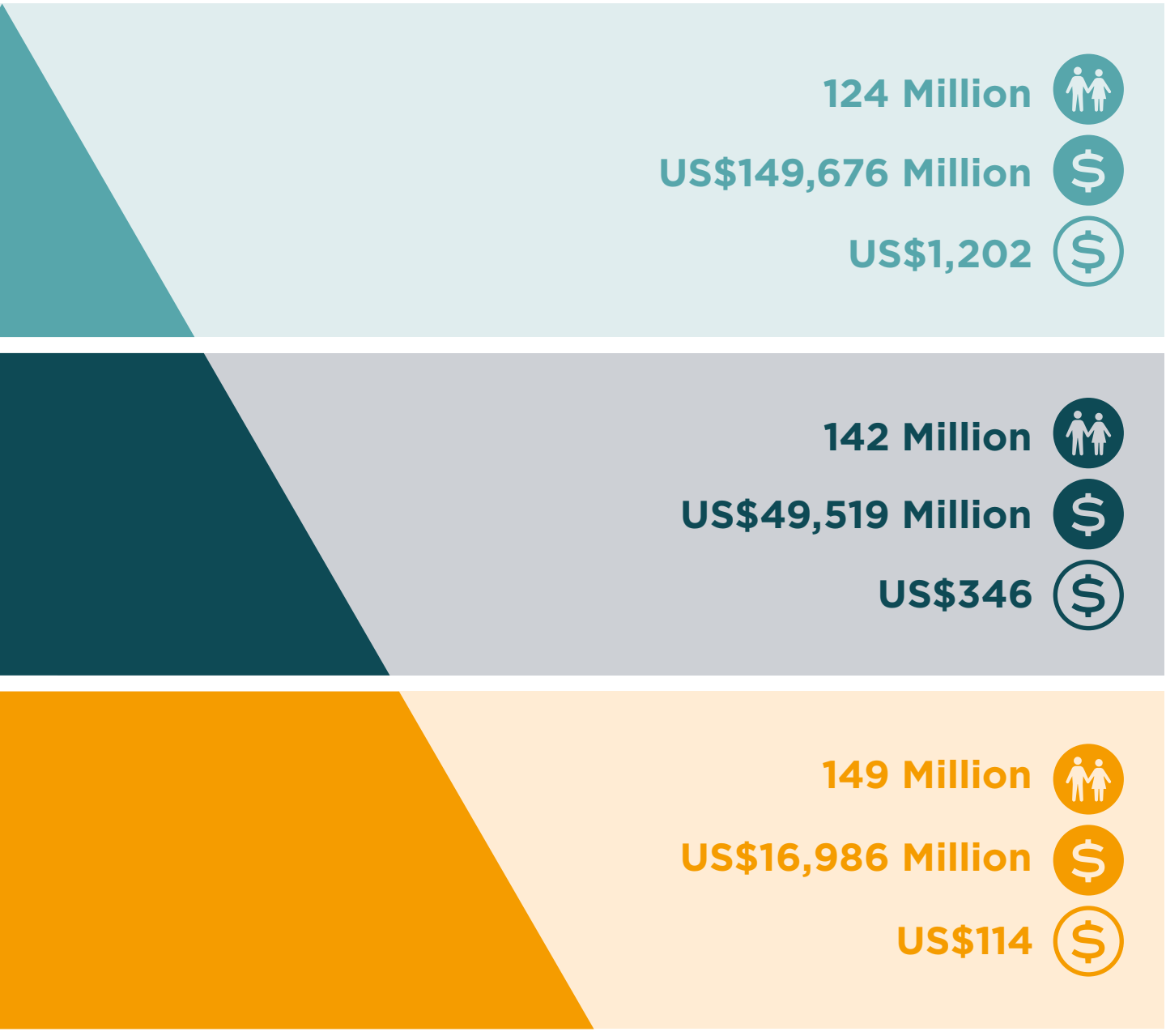
POPULATION

TOTAL INCOME (US$)

AVERAGE INCOME (US$)

1. For example, in Argentina, the poverty level is 5% while in Mexico it is 40%

Figure 1 presents the monthly per capita income by decile for the five countries that will be studied in detail.

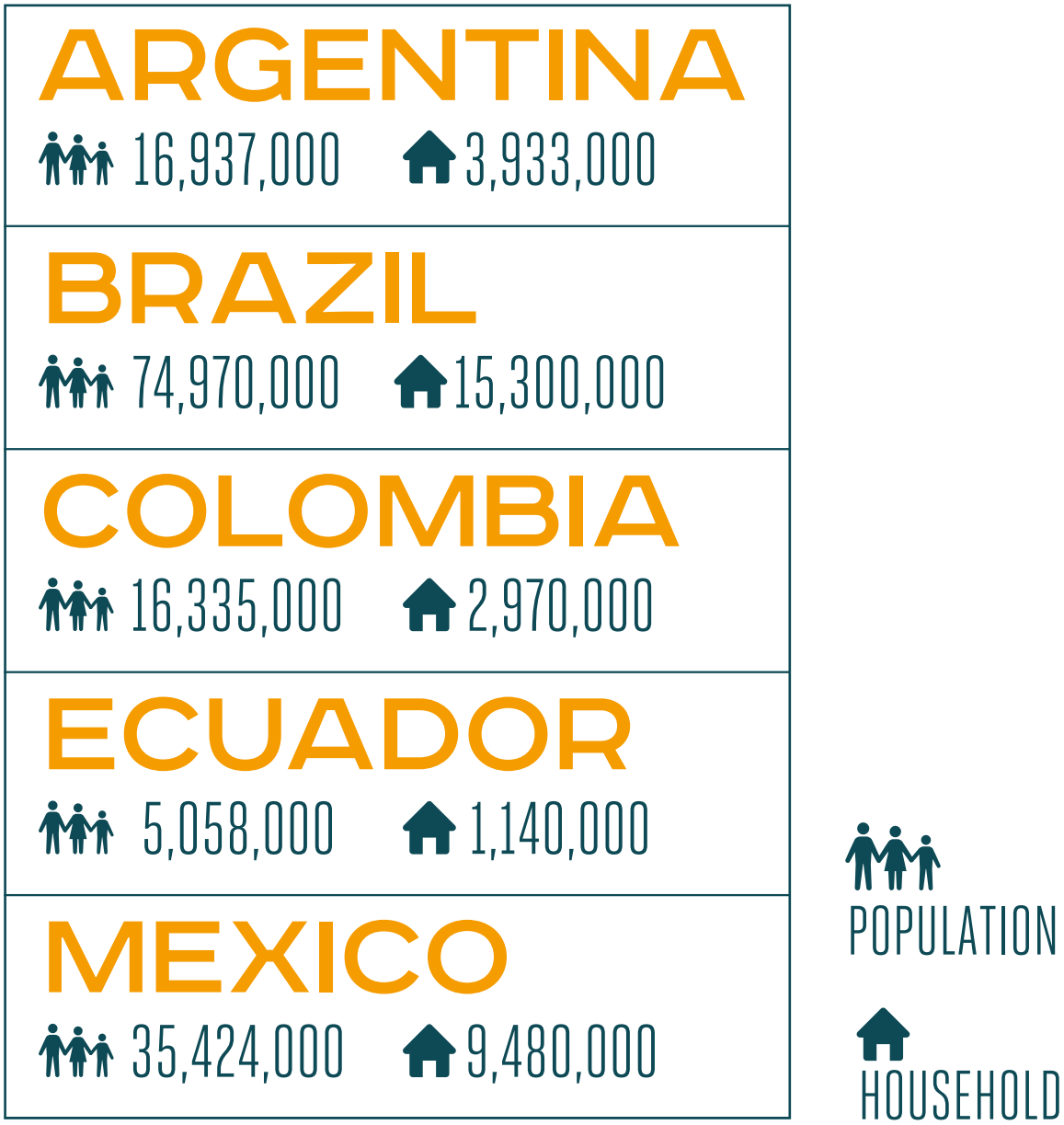


Note: The base of the pyramid corresponds to the 3 lowest income deciles, the top of the pyramid corresponds to the three deciles and average of the highest incomes, and the middle of the pyramid corresponds to the rest of the population.

Sources: Argentina (INDEC); Brazil (IBGE; Euromonitor); Colombia (DANE; Euromonitor); Ecuador (INEC); Mexico (INEGI; Euromonitor)

Figure 1

POPULATION AND HOUSEHOLDS AT THE BOTTOM OF THE PYRAMID (2012)



Sources: Argentina (INDEC); Brazil (IBGE); Colombia (DANE); Ecuador (INEC); México (INEGI)

Table 1

As the sum of the statistics in table 1 shows, the bottom of the Latin American socio-demographic pyramid in these five countries alone represents 149 million people and 33 million homes. By virtue of the fact that their average monthly income is US$114 by person, their capacity to afford broadband access is fundamentally limited.

THE BOTTOM OF THE SOCIO-DEMOGRAPHIC PYRAMID IN THESE FIVE COUNTRIES ALONE REPRESENTS

149Mn
PEOPLE

33Mn
HOMES

US$114
AVG MONTHLY INCOME

The three bottom income deciles of Latin American nations exhibit substantial differences across Latin American countries.

For example, the profiles of average income of Argentina and Mexico are relatively similar (first decile, US$96 and US$72 respectively; third decile, US$251 for both countries). On the other hand, while the average income of the first decile in Brazil and Colombia is relatively similar (US$39 vs US$34 respectively), the income for the third decile of the two countries is significantly different (US$161 and US$89, respectively).

The number of individuals and households that comprise the base of the pyramid also varies by country. Without a doubt, this number determines the magnitude of the digital demand gap challenge (see table 1).

THE ROLE OF MOBILE BROADBAND IN LATIN AMERICA

Mobile is seen as the true enabler for nearly

150M

people in Latin America

Population Coverage

2013 → 78%

The population covered by mobile services has now surpassed that of fixed across the countries analysed in this report (As of 2012)

2012 → 76%

Accessibility

Mobile is the perfect platform to address the broadband adoption gap in Latin America – it has not only easier connectivity issues than with fixed modems and in-house Wi-Fi set ups, but the content that is accessed can be in any language and also via icons for the non-literate or lack digital literacy.

Penetration of Mobile Broadband

20%

Mobile broadband poised to do for data what it did for voice and allow access for all – penetration of MBB still low but growth potential massive (average 20% across the countries analysed)

Economic Access

Government policies have resulted in launching "social" fixed broadband offers" – HOWEVER this has only really helped/supported the middle classes.

Operator Pricing Plan

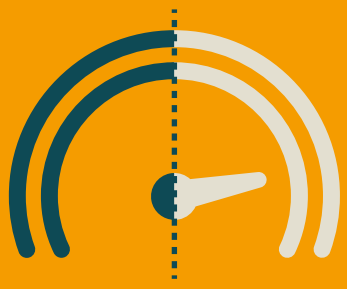
Operators have been creative in their pricing plans to address the BoP (as also seen in India etc) where pricing plans offer:

A LIMIT ON DOWNLOADS

Allowing for consumers to download Facebook alerts or access YouTube videos etc.

DAILY CHARGE PLANS

Allowing just internet access for a 24hr period but on an 'all you can eat' premise.



RESTRICTED USE PLANS

Pay for just the access you use most / like to use such as only email or social networking package etc.

03.

The broadband affordability barrier

In general, the individuals who do not utilize broadband services are divided into two groups:

SUPPLY GAP

Those who do not do so because they do not have access to the service in their place of residence.

DEMAND GAP

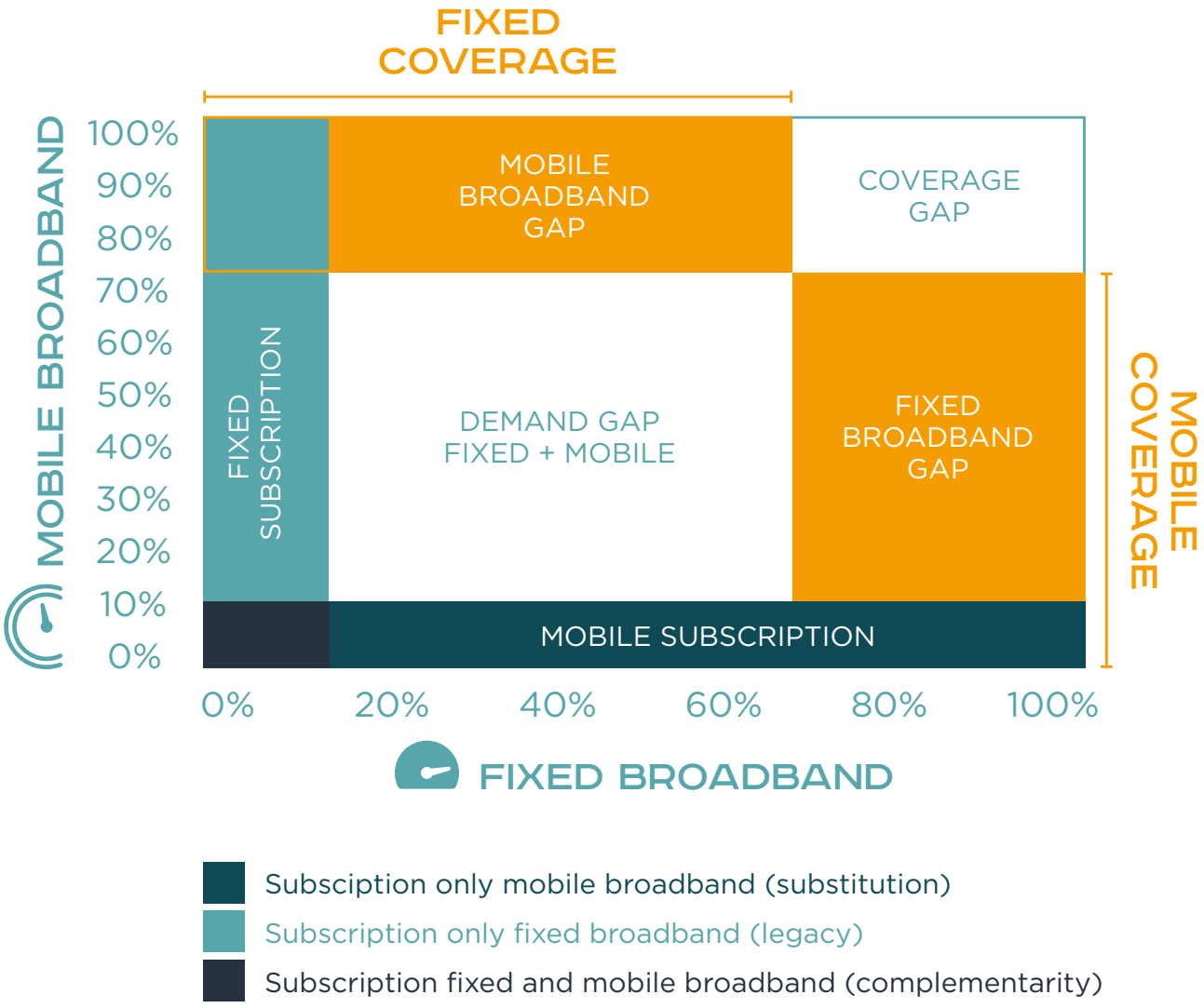
Those who, although they have the ability to purchase the service by virtue of living in a region served by telecom operators, still do not.

There are two types of demand gap:

- Users that are only able to access fixed broadband service and do not purchase the service
- Users that only have the ability to access the Internet through mobile broadband and do not acquire the service.

The relationship between both gaps should be studied in detail. For example, if a mobile broadband user does not access fixed broadband (even if this would be possible in their area of residence), he or she should not be included in the population considered as part of the demand gap because they are accessing the Internet service through a substitute technology (see figure 2).

RELATIONSHIP BETWEEN THE FIXED AND MOBILE BROADBAND DEMAND GAP



Source: Katz and Galperin (2013)

Figure 2

Our focus in this study is the population that is served by one or the other technology (fixed or mobile) and do not acquire service. The broadband demand gap in Latin America is significant (see table 2).

LATIN AMERICA: BROADBAND DEMAND GAP (2012)

	FIXED BROADBAND (4Q2012)			MOBILE BROADBAND (4Q2012)		
	COVERAGE	HOUSEHOLD PENETRATION	DEMAND GAP	POPULATION COVERED	CONNECTIONS PENETRATION	DEMAND GAP
ARGENTINA	96%	40%	56%	92%	21.87%	70.13%
BOLIVIA	40%	4%	36%	29%	6.92 %	22.08%
BRAZIL	94%	34%	60%	84%	32.83%	51.17%
CHILE	78%	50%	28%	82%	27.04%	54.96%
COLOMBIA	81%	32%	49%	96%	8.69%	87.31%
COSTA RICA	95%	36%	59%	93%	36.22%	56.78%
ECUADOR	80%	26%	54%	86%	21.92%	64.08%
MEXICO	62%	53%	9%	77%	20.63%	56.37%
PERU	59%	20%	39%	63%	11.70%	51.30%
AVERAGE	76%	33%	43%	78%	20.86%	57.14%

Source: For coverage, Katz and Galperin (2013); fixed broadband penetration based on data from the ITU and regulators; mobile broadband penetration based on GSMA Intelligence

Table 2

43%

of the Latin American population resides in zones where fixed-line broadband service is offered, and yet they still do not purchase a subscription.

57%

of the population could purchase mobile broadband, yet they still do not.

As shown in Table 2, 43% of the Latin American population resides in zones where fixed-line broadband service is offered, and yet they still do not purchase a subscription. Similarly, 57% of the population could purchase mobile broadband, yet they still do not.

In this last case, given the annual growth rate of mobile broadband in the region (38% since 2010), the demand gap in mobile broadband falls significantly year after year.

There are three ways to explain the demand gap:

1 **LIMITED AFFORDABILITY**
The cost of broadband exceeds the household income allotted for communication and entertainment expenses.

2 **A LACK OF DIGITAL LITERACY**
Limited ability to operate computers or access the internet from a mobile phone.

3 **ABSENCE OF RELEVANT CONTENT OR APPLICATIONS**
Due to cultural, educational, or language factors, the available content on the internet does not offer relevant information or entertainment.

Although all three factors affect broadband adoption at the bottom of the pyramid, this study concentrates on the first barrier:

LIMITED AFFORDABILITY

The affordability obstacle presents itself not only in emerging countries, but also in developed nations. In multiple primary research studies across several countries, the percentage of surveyed population that mention cost as a main reason for not adopting broadband is important (see table 3).

PERCENTAGE OF HOUSEHOLDS THAT MENTION PRICE AS THE MAIN REASON FOR NOT ADOPTING BROADBAND

UNITED STATES	24%	NTIA (2011)
UNITED KINGDOM	16%	OFCOM (2011)
SPAIN	42%	ONTSI (2011)
AUSTRALIA	26%	AGIMO (2009)
CHILE	37%	Subtel (2009)
BRAZIL	48%	CGI (2011)
COLOMBIA	40%	MITIC (2010)
COSTA RICA	60%	MINAET (2011)
MEXICO	60%	INEGI (2010)
PUERTO RICO	16%	PRBT (2012)

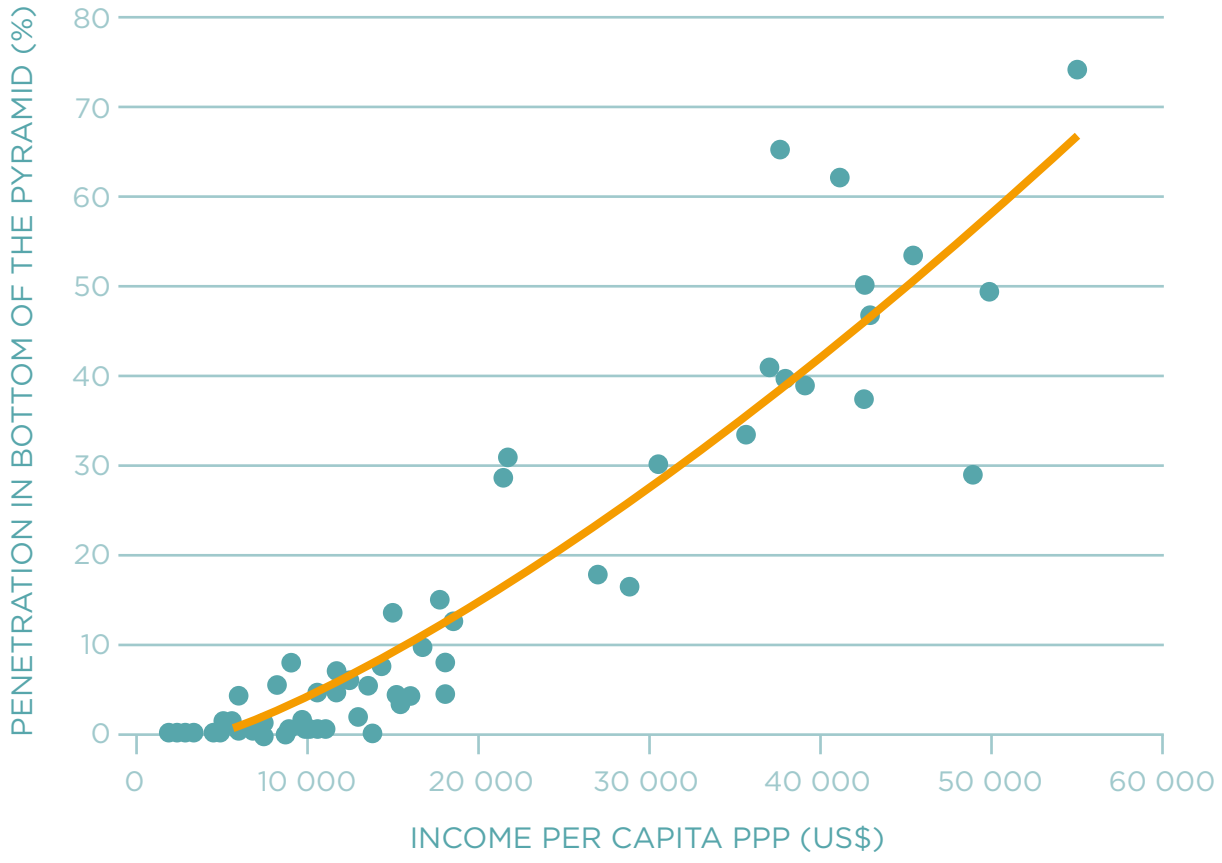
Source: compiled by Katz (2013)

Table 3

As shown in table 3, in developed countries like the United States, United Kingdom, and Australia, affordability is still mentioned as an explanation for lack of broadband take-up. This problem is only exacerbated in the emerging countries.

Not surprisingly then, limited affordability translates into low broadband penetration. Fixed-line broadband adoption at the bottom of the pyramid, defined as the bottom three income deciles in the socio-demographic structure, within developed countries is 38.83% compared to a mere 4.80% in emerging countries. This duality is magnified when looking at the difference in fixed broadband penetration at the cusp of the pyramid (the three highest deciles). In this segment, penetration in advanced countries reaches 84.60% while penetration in the same segment in emerging nations is 27.41%. While still present in developed nations, it is reasonable to conclude that the affordability barrier to broadband adoption at the bottom of the pyramid is a phenomenon more prevalent in emerging countries (see figure 3).

RELATIONSHIP BETWEEN LEVEL OF ECONOMIC DEVELOPMENT AND BROADBAND ADOPTION AT THE BOTTOM OF THE PYRAMID (2011)



Source: TAS Analysis based on Euromonitor (2012) and IMF

Figure 3

As observed in Figure 3, an exponential relationship exists between the per capita purchasing power parity in US dollars (horizontal access) and broadband penetration at the bottom of the income pyramid (vertical access).

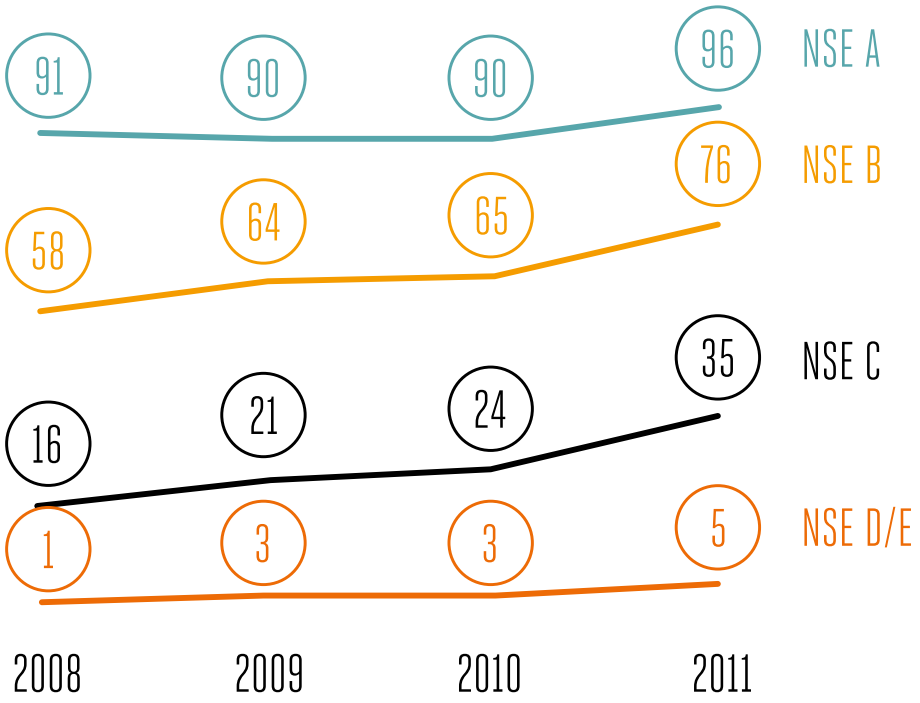
When per capita income of a country surpasses US$20,000, fixed broadband adoption at the base of the pyramid exceeds 20%. This situation confirms that higher income, to a large extent, largely solves the broadband affordability problem.

Based on this perspective, which of these strategies is adequate to address this marginalization? A series of public policies have been developed and already implemented, which have addressed part of the affordability gap.

Within Latin America, for example, several operators offer “social” fixed broadband service plans (known as “popular” broadband in Brazil, “solidarity” broadband in Venezuela, or “social” broadband in Costa Rica). This product provides basic functionality (for instance, 1Mbps of download speed) at a significantly lower price than the commercial plans. Other public policy incentives include subsidy grants to the consumers, special discounts, tax reductions, and coupons to use toward the price of the subscription. Finally, other initiatives attack the problem from the income redistribution side (such as subsidies to poor families). While these last initiatives do not focus specifically on the broadband gap, redistribution policies - like those public programs implemented in Brazil, Argentina, Mexico, and Venezuela – impact adoption to the extent that an increase in average household income makes broadband affordable for a portion of the population that cannot acquire the srvice.

Without taking away from these public policy initiatives, the results to date show that they have primarily benefitted the middle classes without significantly changing the affordability barrier at the bottom of the pyramid, as shown in the case of broadband adoption in Brazil (see figure 4).

BRAZIL: BROADBAND ADOPTION BY SOCIO-DEMOGRAPHIC SEGMENT (2008-11)



Source: CGI. Encuesta Nacional de los Hogares

Figure 4

Note: The classification of socioeconomic level in Brazil is based on the level of instruction and ownership of goods per the Criteria of Economic Classification Brazil (CCEB), which is a part of the Associacao brasileira de empresas de pesquisa". It is based on household presence of color TV (0 to 4 points), radio (0 to 4 points), bathroom (0 to 7 points), automobile (0 to 9 points), maid service (0 to 4 points), washing machine (0 to 2 points), DVD (0 to 2 points), refrigerator (0 to 4 points), and freezer (0 to 2 points). On the other hand, the head of the household's level of instruction is also considered depending on whether he or she has a complete higher education (8 points), incomplete higher education (4 points), complete secondary education (2 points), complete primary education (1 point), or if they are illiterate (0 points). In the event that the total number of points is greater than or equal to 35, the household falls into category NSE A; if it totals between 23 and 34 points, category NSE B; between 14 and 22 points, NSE C; between 8 and 13 points, NSE D; and if the points total between 0 and 7 points, they fall into category NSE E.

As demonstrated in Figure 4, the increase of fixed broadband adoption in Brazil between 2008 and 2011 is essentially a phenomenon of the upper and middle classes. The graph shows that the penetration jump in the B and C segments could be linked primarily to the income redistribution policies put in place by the administrations of presidents Lula and Rouseff. Segments D/E have not increased their adoption of fixed broadband over time in any significant way because the social policies put in place cannot break through the broadband affordability barrier.

It is for this reason that remedies for this market failure – the affordability gap at the bottom of the pyramid – should be sought out not only in the area of state intervention in the fixed broadband space, but also through alternative technologies like mobile broadband. In this sense, the proposal to explore the potential of mobile broadband to tackle the affordability barrier at the bottom of the pyramid merely replicates the experience of wireless in addressing the universalization challenge of the voice telephony. Table 4 illustrates how mobile telephony has been gradually penetrating the bottom of the socio-demographic pyramid in the region.

LATIN AMERICA: WIRELESS PENETRATION AT THE BOTTOM OF THE PYRAMID (THREE LOWEST DECILES)

%	2007	2008	2009	2010	2011	2012
ARGENTINA	43.27	48.30	54.10	58.97	62.90	65.93
BOLIVIA	21.10	27.50	38.23	49.37	59.97	69.37
BRAZIL	47.37	57.43	62.50	66.33	68.90	70.80
CHILE	49.80	57.53	69.97	78.07	82.07	85.47
COLOMBIA	51.50	64.20	68.13	73.47	76.63	78.87
COSTA RICA	35.13	44.17	45.80	51.00	55.27	58.20
ECUADOR	35.87	42.27	49.37	54.27	59.40	63.80
GUATEMALA	35.97	37.17	38.47	38.97	39.80	40.53
MEXICO	39.13	46.70	56.50	60.97	64.80	68.03
PERU	13.97	17.77	22.20	26.90	31.90	36.77
DOMINICAN REP.	34.10	40.90	46.67	50.43	53.83	56.97
URUGUAY	45.17	55.13	63.90	68.90	73.07	77.80
VENEZUELA	14.80	15.20	15.57	15.90	16.20	16.57
TOTAL	42.92	48.47	53.34	53.35	57.29	60.70

Source: Euromonitor (2012); TAS analysis

Table 4

As seen in Table 4, the combination of pre-paid offers and policies of "calling party pays" has enabled voice telephony penetration rates to reach, on average, 60.70% at the bottom of the socio-demographic pyramid in 2012, up from 42.92% in 2007.

In this sense, the question is whether or not the mobile platform can replicate the massification success achieved in voice telephony to broadband, but how it could be done.

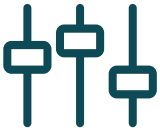
04.

The role of mobile broadband in lowering the affordability barrier

Mobile broadband is able to provide affordable service to households at the bottom of the pyramid in several ways.

REDUCED PRICES

First, driven by competition in the wireless market, mobile broadband prices, both in personal computer connectivity (through USB modems) plans and in data plans for smartphones, have been significantly reduced in recent years.



PRICING FLEXIBILITY

Secondly, mobile broadband offers pricing flexibility that allows consumers to purchase services based on what they can afford (by day, by download volume, or by type of Internet service been accessed).

MOBILE ACCESS TO THE INTERNET

Thirdly, mobile access to the Internet through smartphones overcomes other barriers to broadband adoption at the bottom of the pyramid (such as, for example, the cost of purchasing a personal computer, limited digital literacy, or lack of access to electricity).

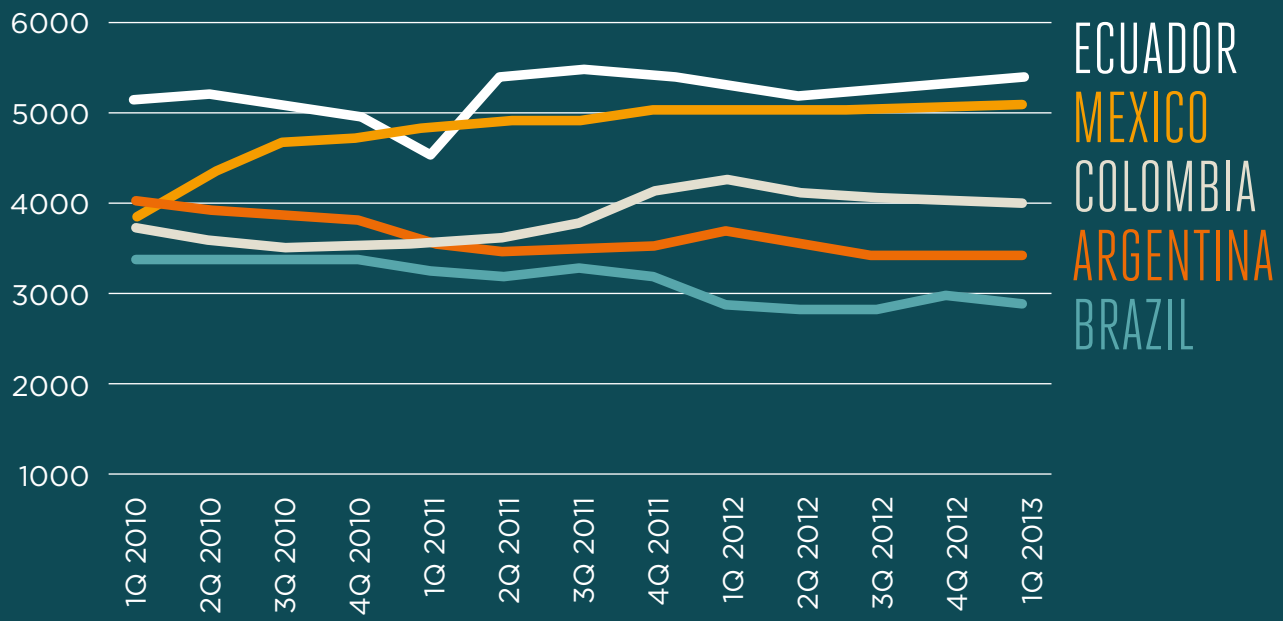
Each of these three aspects of the value proposition of mobile broadband will be analyzed in more detail in turn.

4.1

Reduction of the price of mobile broadband

The mobile broadband market experienced major growth in recent years. This process increased the incentives for operator entry and expansion (building or increasing the coverage of 3G networks or launching LTE services). Figure 5 shows the evolution of the competitive intensity in terms of the Herfindahl Hirschman Index (HHI)[2] between the first quarter of 2010 and the first quarter of 2013 for the five countries examined as case studies in this document.

LATIN AMERICA: HERFINDAHL-HIRSCHMAN INDEX OF COMPETITIVE INTENSITY IN THE MOBILE BROADBAND MARKET (1Q10-1Q13)



Source: Telecom Advisory Services estimates based on data from GSMA Intelligence

Figure 5

2. The HHI index measures industry concentration or fragmentation, and is calculating by adding the square of the market shares of operators serving a particular market. As such, it serves to indicate the intensity of competition. A lower index points to higher industry fragmentation and, therefore, more competition, while a higher index points to higher concentration, and increase in market power.

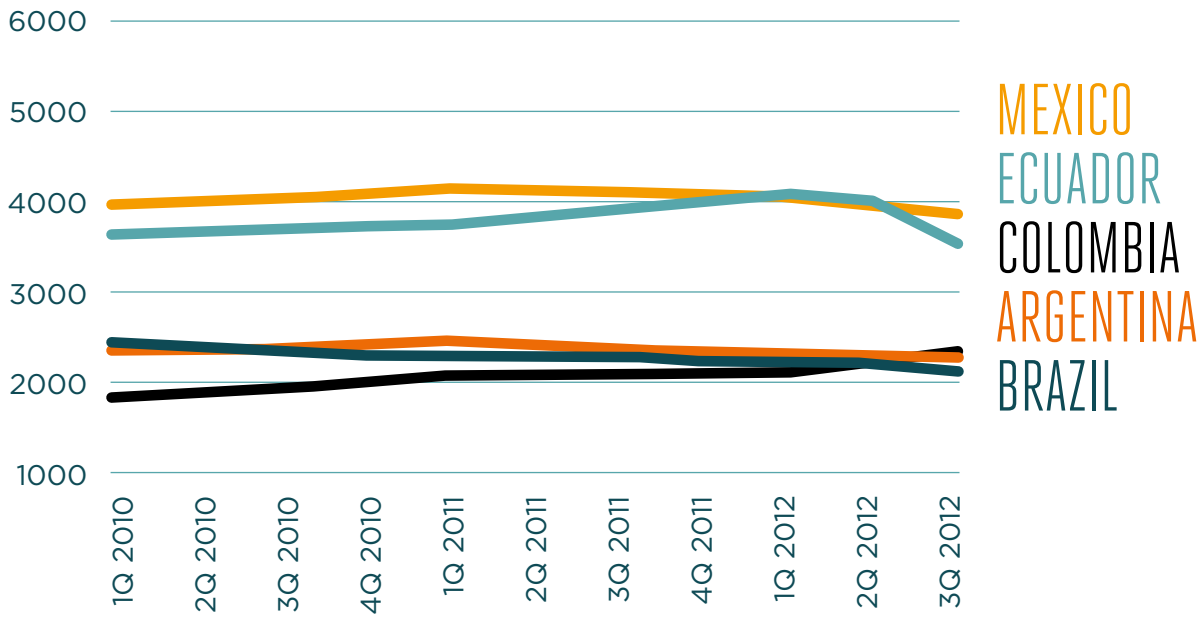
In the period covered in this analysis, the average value of the HHI index for the mobile broadband market in Latin America fell to 4,064 from the previous level of 5,419, an average annual reduction of 9.15%.

This finding demonstrates that the intensity of competition in the mobile broadband market within the region is increasing as a whole. In some countries like Brazil (HHI: 2,911) and Argentina (HHI: 3,406), competition in the mobile broadband market is intense. While the competitive intensity in these countries has increased in recent years, it has declined in Mexico (and to some extent in Colombia) while remaining stable in Ecuador.

On the other hand, competition in fixed broadband has not changed substantially within the same time period. Fixed broadband entered 2010 with an HHI regional average of 4,462 and ended the third quarter of 2012 with an average of 4,257 (which equates to an average annual reduction of 1.86%). This growth in the level of competition is substantially lower than that which occurred in the mobile broadband (1.86% vs. 9.15%). This is probably because the fixed broadband market is a more mature market, which results in great stability in player market shares. It could also relate to more concentrated market structures

The stability of competitive intensity can also be seen in the evolution of the HHI index of the fixed broadband market in the five countries unders study (see figure 6).

LATIN AMERICA: HERFINDAHL-HIRSCHMAN INDEX OF COMPETITIVE INTENSITY IN THE FIXED BROADBAND MARKET (1Q10-3Q112)



Source: Telecom Advisory Services estimate based on data from GSMA Intelligence

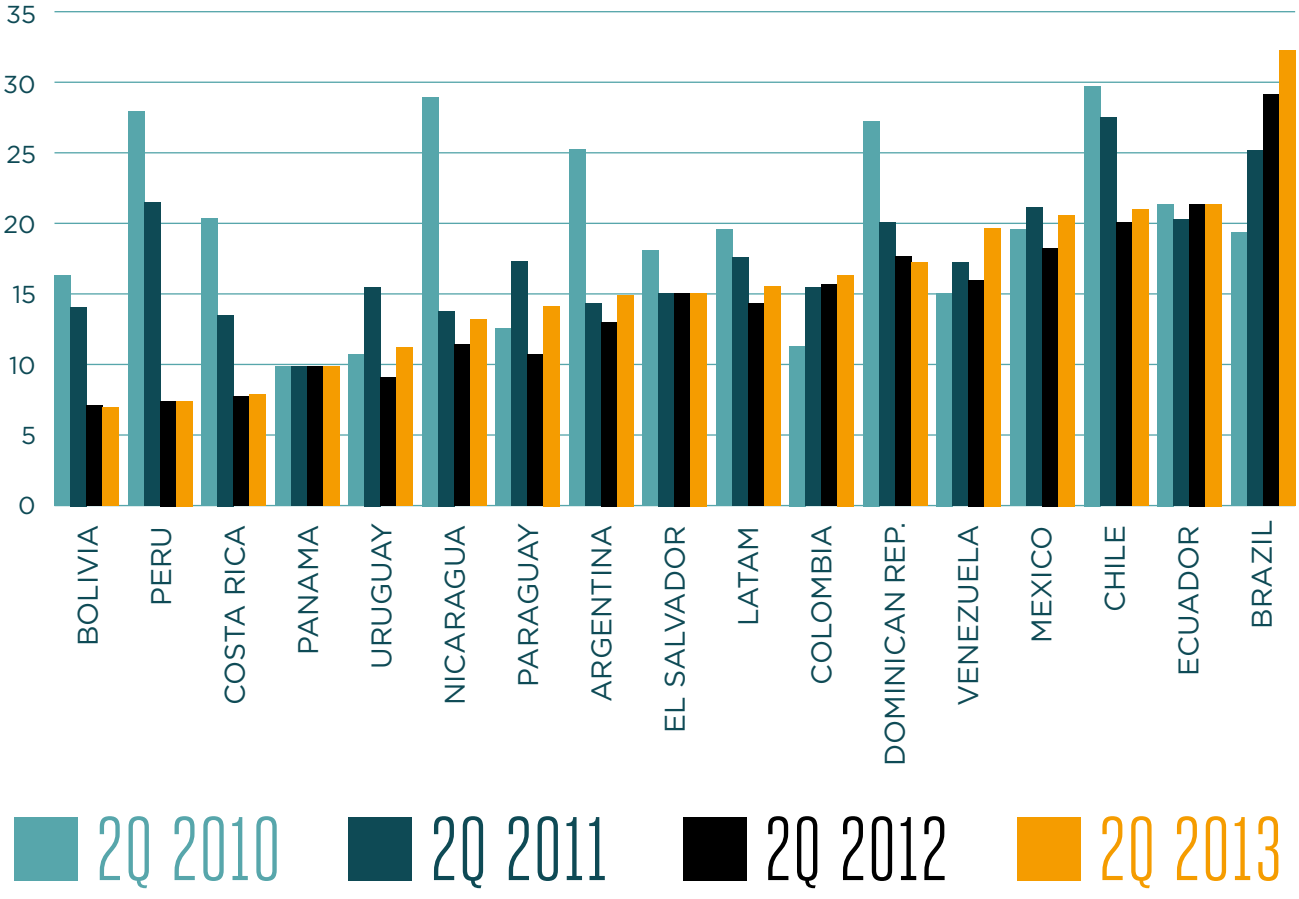
Figure 6

To sum up, the fixed broadband market in Latin America began the period under analysis with a higher level of competitive intensity than the mobile broadband market (HHI 4,257 for fixed, compared to HHI 5,419 for mobile). However, as of the third quarter of 2012, mobile broadband exhibited lesser concentration, and therefore more competition (HHI of 4,247 for fixed, in relation to an HHI of 4,088 for mobile).

As expected, the greater the competitive intensity, the more pronounced the price reduction. As an example, in Costa Rica the mobile broadband plan with at least 1GB of monthly download cap went from US$20.34 in 2010, with the presence of just one player in the market, to a monthly price of US$13.56 in 2011 (months before the entry of two competitors) and later to US$7.94. In 2012, with the presence of three operators; it finally fell to US$5.05.

Figure 7 shows the price of the most economic mobile broadband plans that offer a monthly download capacity greater than or equal to 1GB for the years 2010 through 2013 in each Latin American country.

LATIN AMERICA: MOST ECONOMIC MOBILE BROADBAND PLAN FOR COMPUTERS WITH AT LEAST 1GB OF DOWNLOAD VOLUME CAP (US$)



It should be noted that data plans of 1GB are not found in all markets. In some cases, it was used twice the price for a data plan of 500 MB or 600 MB, or even a data plan of 2GB, which ever was cheaper at the time.

Source: TAS Analysis based on data from Galperin (2012) and TAS research

Figure 7

*Brazil used a 2GB plan.

As shown in Figure 7, the average price of this type of data plan in Latin America has consistently fallen in a significant way. In 2010, the average price of the least expensive plan was US$19.59. By 2011 it had dropped to US$17.60 and by 2013 it reached US$15.60 (an annual decline of -7.31%). In this regard, it should be noted that the trend toward price reduction is most notable between 2010 and 2012; by 2013, pricing stayed relatively constant in the majority of the countries.

The slowdown in price reduction is largely a consequence of the plan's success. Mass adoption of the offering resulted in a spike in demand for mobile network capacity and, consequently, its saturation. This in turn led operators to moderate their commercial aggressiveness in their sales push of least expensive data products. This effect has spectrum availability implications to the extent that if operators had access to additional spectrum, they would be able to continue to aggressively market these products, thus maximizing penetration.

Furthermore, network capacity could be improved if operators had less restrictions regarding infrastructure deployment.

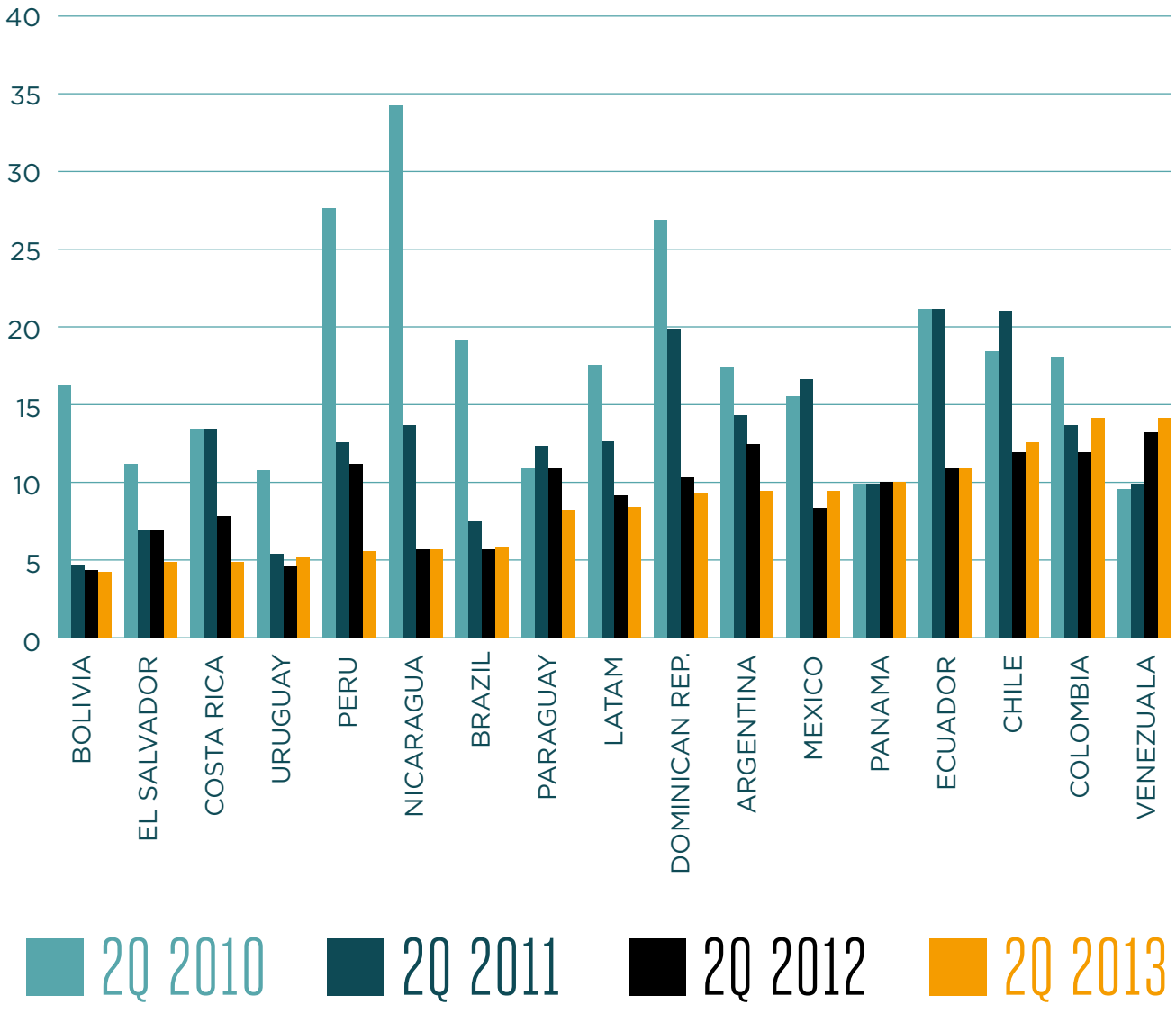
On the other hand, it is interesting to note that the most economic plans of mobile broadband (for computer connectivity using a USB modem) are found in Bolivia and Peru, countries that have the most onerous plans for fixed broadband. In particular, it is important to highlight the case of Bolivia, where in the first quarter of 2010 there was only one mobile broadband provider, offering its least expensive plan at US$16.38. With the entrance of VIVA (Nuevatel) to the market, the price of the cheapest plan dropped significantly, reaching US$7.13 per month in the second quarter of 2013. This decline in prices generated a cross-elastic substitution effect that resulted in a fall in fixed broadband penetration during the studied period, and a dramatic increase in the penetration of mobile broadband connections.

The example of Bolivia demonstrates that a disruptive decrease in the price of mobile broadband plans can generate a substitution effect (away from fixed broadband).

This, combined the ability to extend deployment of the 3G network (in relation to the deployment of ADSL or cable modem), allows the technology to serve regions that otherwise would not be able to access the service, thus satisfying the needs of the most vulnerable social sectors.

Beyond plans offering computer connectivity through USB modems, mobile broadband offers plans to access the Internet through mobile devices (smartphones or tablets). The prices for this type of plan generally start with a minimum content download cap. Figure 8 presents each country's most economic plans for accessing mobile broadband from a smartphone or tablet with a download limit of at least 250MB per month.

LATIN AMERICA: MOST ECONOMIC BROADBAND PLAN FOR SMARTPHONES WITH AT LEAST 250MB DOWNLOAD CAP (US$)



Source: TAS Analysis based on data from Galperin (2012) and TAS survey

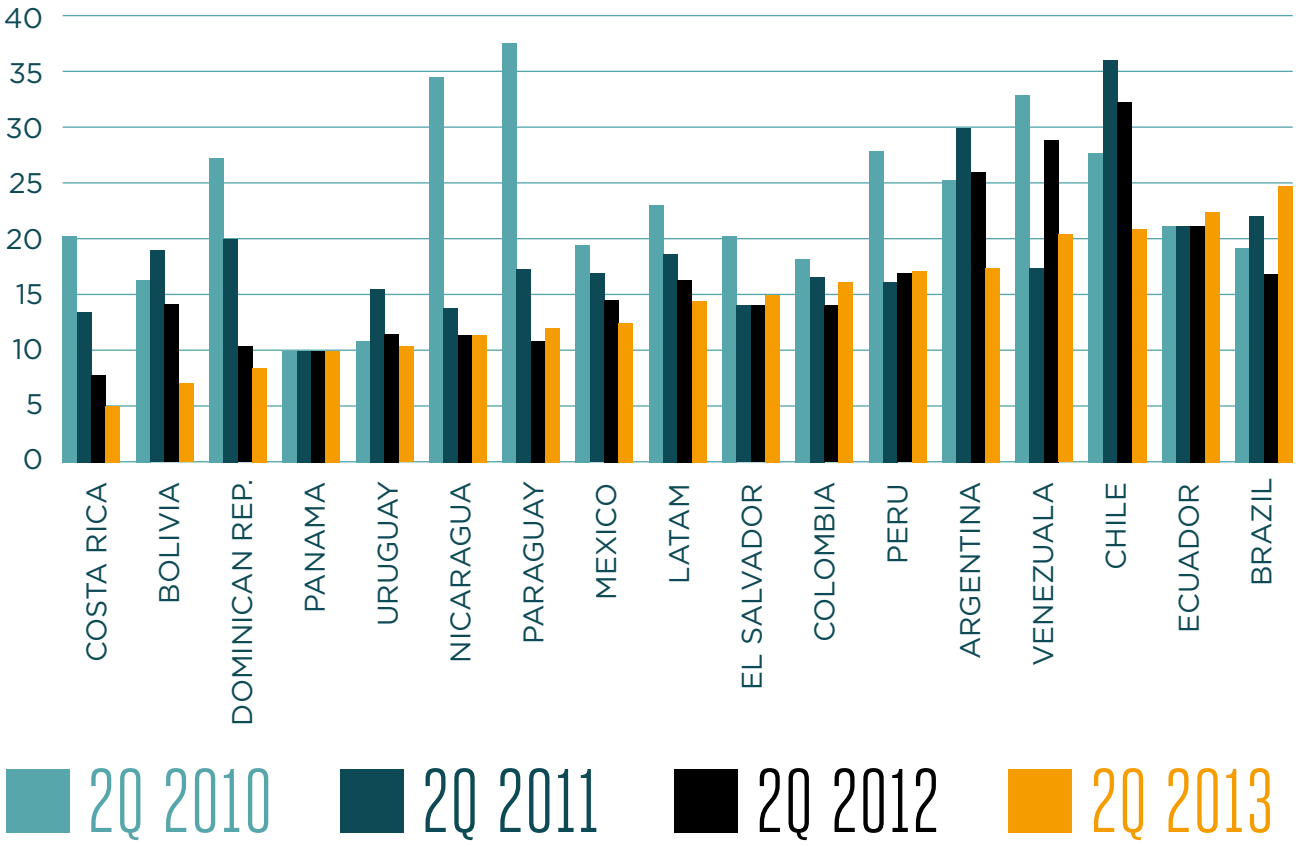
Figure 8

According to figure 8, in all of the countries in the region, basic smartphone data plans are offered for less than US$15 per month (from as low as US$4.28 in Bolivia to US$14.29 in Venezuela). Further, it is important to highlight the declining price of these plans between 2010 and 2013 in, with the exception of Venezuela, all of the countries.

The second quarter of 2010 showed an average monthly price of US$17.68, which fell to US$12.79 in 2011 and, finally, to US$8.33 in 2013 (a 52% reduction in three years). These mobile broadband plans with more affordable prices relative to fixed broadband plans contribute to an increase in broadband adoption amongst mobile phone users. In this way, mobile broadband not only complements fixed line services - offering access to email, social networks, or web browsing outside the home – but also serves as a gateway to Internet access for the population in the bottom of the pyramid who otherwise cannot afford the monthly cost of fixed access.

Because the download cap of 250MB per month only allows for a limited number of functions (like access to social networks or email), Figure 9 presents the evolution of low-cost plan pricing for mobile devices with a monthly download capability of at least 1GB (the amount needed for smartphone users to regularly access most Internet content, except for video-streaming).

LATIN AMERICA: MOST ECONOMIC MOBILE BROADBAND PLANS FOR SMARTPHONES WITH A MINIMUM DOWNLOAD CAP OF 1GB (US$)



Source: TAS analysis based on data from Galperin (2012) and TAS survey

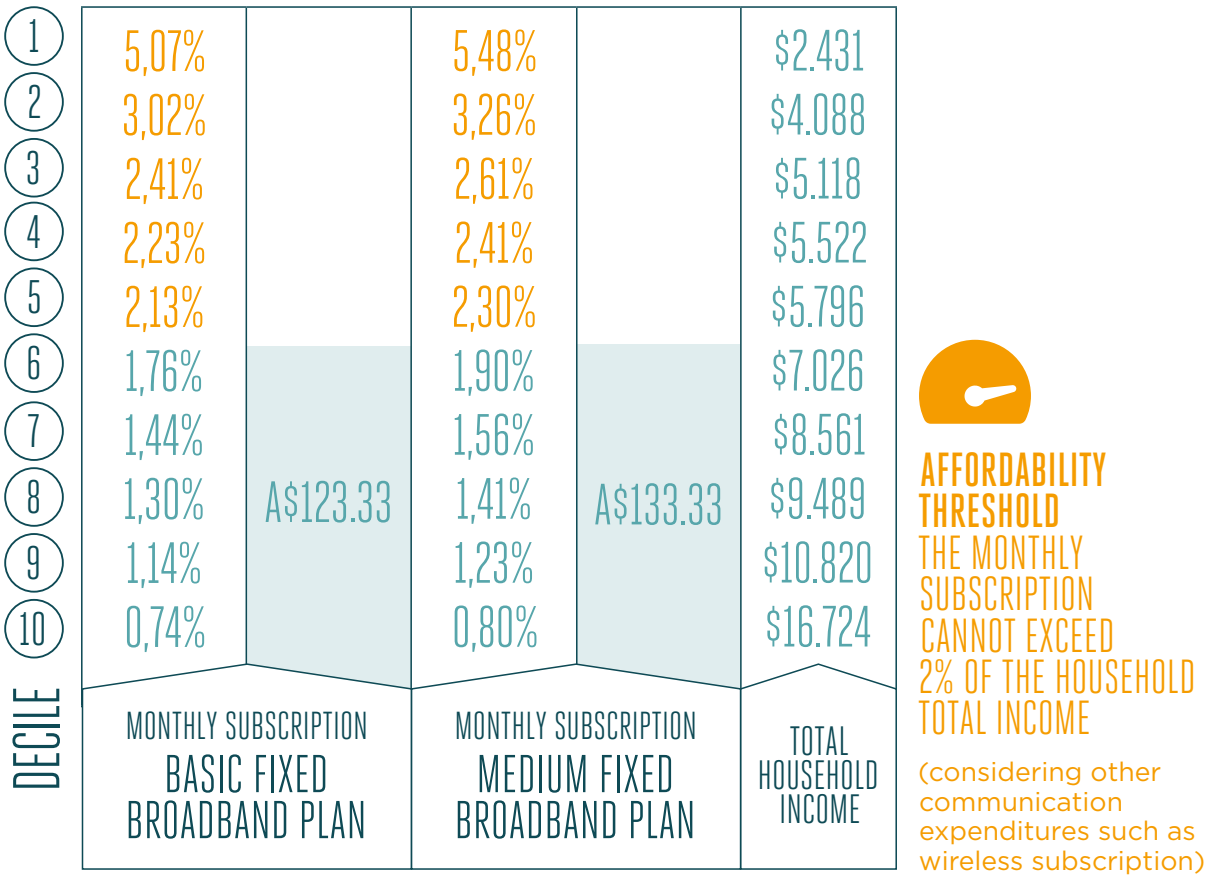
Figure 9

Pricing of this type of plans also fell sharply in recent years[3] from an average US$23.07 per month in 2010, to US$18.71 in 2011, and to US$14.44 in 2013 (a decline of 37% in three years).

To conclude, since competitive intensity is inversely related to price reductions, high competition in the mobile broadband market played an important role in pricing[4]. The dramatic decline in mobile broadband pricing raises the possibility for the service to meet the needs of the population at the bottom of the pyramid. As an example, the basic mobile broadband plan with USB modems for computers in Argentina raised the level of broadband affordability through the third income decile of the population.

The bottom of the Argentine socio-demographic pyramid is comprised of 3,933,000 homes in the lowest three deciles exhibiting a range of average monthly household income between A$2,431 and A$5,118[5]. Considering this income level, even under the conditions where fixed broadband pricing has not increased commensurately to salaries, fixed broadband plans, at prices ranging between A$123.33 and A$133.33, is beyond the economic reach of these households. This premise is based on the assumption that broadband is not affordable if it exceeds 2% of total household income (considering that, of the 5% of income spent in communications and entertainment, 3% must be assigned to other services like cellular telephony)[6] (See figure 10).

ARGENTINA: AFFORDABILITY OF FIXED BROADBAND PLANS (2013)



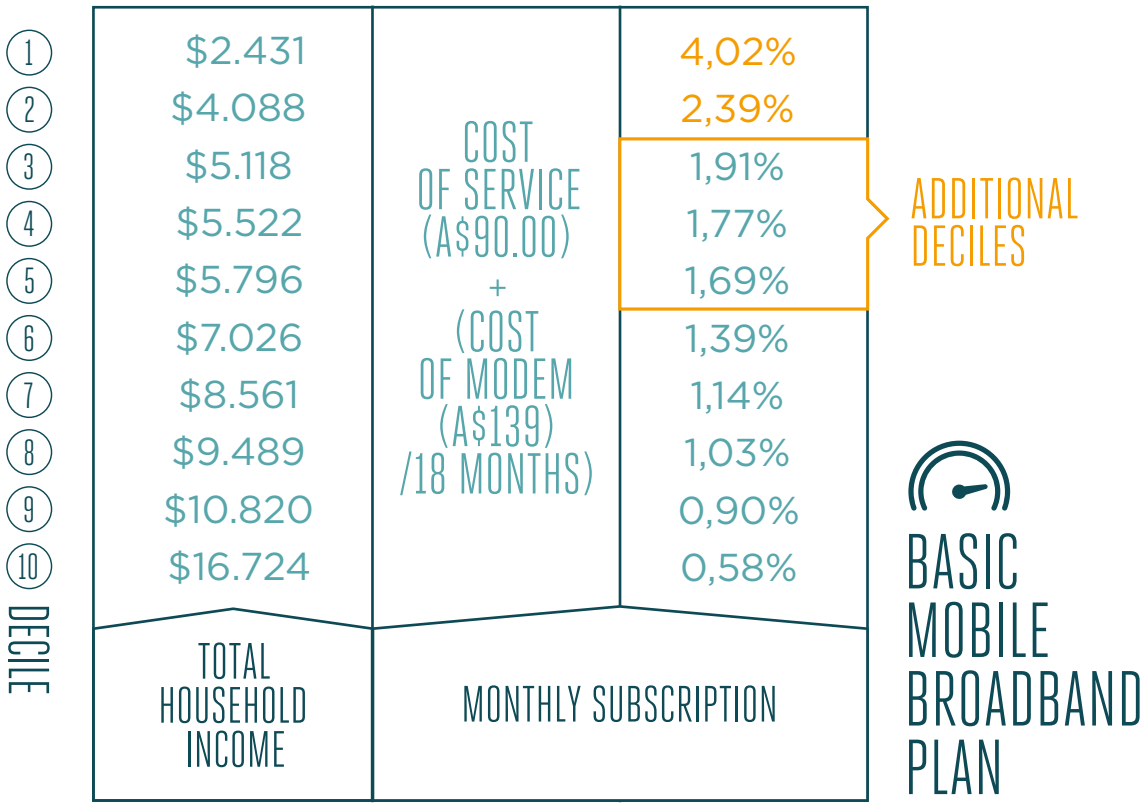
Source: INDEC; TAS analysis

Figure 10

3. The only exceptions are Panama and Ecuador, where it remained virtually constant, and Brazil, where the price of this product increased.
4. The correlation between the decrease in the competition index (HHI) and the decline of mobile broadband prices in 2011 was 40%.
5. This equates to 4,389,000 individuals with a monthly income between A$510 and A$1,329.
6. The International Broadband Commission establishes a limit of 5% of income for communication and entertainment costs

According to Figure 10, considering that the monthly price of a basic fixed broadband plan starts at A$123.33 and the average home does not spend more than 2% on a broadband subscription, this product is not affordable to homes whose income is below the average of the sixth decile. In this context, mobile broadband can help address this market failure. For example, the basic mobile broadband plan for USB modems for PCs brings the level of affordability down to the third income decile. For this, the sum of the monthly service subscription (A$90.00) and the cost of the modem (A$139) divided by 18 months[7] is taken. Under this premise, the total cost of ownership does not exceed 2% of the income of households through the third income decile (see figure 11).

ARGENTINA: AFFORDABILITY OF BASIC PLAN OF MOBILE BROADBAND FOR PC



Source: INDEC; TAS analysis

Figure 11

The same effect, although somewhat more moderate in terms of affordability, is seen in Colombia.

7. Which assumes a replacement rate of 18 months

4.2

Pricing Flexibility

Beyond the aggregated decline of mobile broadband prices, operators have introduced an extensive array of plans that support a variety of broadband use cases. Through a daily charge plan, for instance, the subscriber acquires the right to access the Internet on a daily basis at a price paid each month as a function of the number of days purchased. This allows the user to control the amount spent per month based on what is economically feasible. Table 5 presents examples of ths type of plan offered in the region.

LATIN AMERICA: EXAMPLES OF DAILY CHARGE PLANS

	OPERATOR	TERMINAL	DAILY PRICE	
ARGENTINA	CLARO		A$5,00	US$0,96
			A$1,00	US$0,19
BOLIVIA	TIGO		B$2,00	US$0,29
BRAZIL	VIVO		R$2,99	US$1,48
	TIM		R$0,50	US$0,25
CHILE	CLARO		C$1.886,00	US$3,98
	ENTEL		C$250,00	US$0,53
COLOMBIA	MOVISTAR		C$2.900,00	US$1,56
MEXICO	MOVISTAR		$M 15,00	US$1,24
			$M 19,00	US$1,58
URUGUAY	CLARO		$U 20,00	US$1,57
			$U 10,00	US$0,52

Source: Compilation of operators performed by TAS

Table 5

Beyond daily use mobile broadband access, customers can also purchase plans based on download volume cap (20MB or 100MB per month), which also promotes flexibility. This option allows the subscriber to have permanent access to the Internet while adapting the consumption pattern to the type of content accessed.

For example, if the subscriber uses the Internet primarily to access social networks (like Facebook and Twitter), the 20Mbps package is adequate. Obviously, this alternative substantially restricts access to "heavier" content, like video clips and YouTube. However, it is an initial option for those members of the population who do not otherwise have access and goes beyond the basic access offered in a public center. Capped access download plans are very popular in Latin America, as seen in the examples below (see table 6).

LATIN AMERICA: EXAMPLES OF PLANS WITH LIMITED DOWNLOAD VOLUMES

	OPERATOR	DOWNLOAD LIMIT (MB)	DAILY PRICE (LOCAL CURRENCY)	DAILY PRICE (US$)
ARGENTINA	CLARO	100	A$55.00	US$10.53
BRAZIL	OI	100	R$9.90	US$4.90
BOLIVIA	VIVA	7	B$1.00	US$0.19
CHILE	ENTEL	50	C$500	US$1.06
COLOMBIA	CLARO	100	C$2,890.00	US$1.56
ECUADOR	CLARO	20	US$1.11	US$1.11
MEXICO	TELCEL	50	M$49.00	US$4.07
PARAGUAY	PERSONAL	100	P$100,000	US$2.43

Source: Compilation of operators performed by TAS

Table 6

Finally, another mechanism used by regional operators to increase service penetration is to offer differentiated prices based on the user's type of broadband use.

In this way, the plans that only include email (Gmail) or chat (MSN, Talk, and Yahoo Messenger) are more affordable. A variety of those plans are the ones that offer unlimited use of that particular access mode during the month. Along these lines, the price will increase by an additional 50% when purchasing unlimited use of social networking (Facebook and Twitter); finally, the most expensive plan includes unlimited use of YouTube and Google. The following table shows the rates for these plans in Latin America.

LATIN AMERICA: PRICING OF RESTRICTED USE PLANS

PACKAGE	COLOMBIA	NICARAGUA	MEXICO
	$9,900	N/D	N/D
	US$5.25	N/D	N/D
	$9,900	N/D	$100
	US$5.25	US$10.99	US$8.33
	$15,900	US$13.99	$80
	US$8.43	US$24.99	US$6.66

Source: TAS Analysis based on a review of operator web pages (in all cases, the operator that offers these packages is Movistar).

Table 7

The following examples of use cases show how flexible pricing can offer a solution to the demand gap at the bottom of the socio-demographic pyramid (see table 8).

USE CASES WHERE MOBILE BROADBAND CAN CONTRIBUTE TO ADDRESSING THE GAP AT THE BOTTOM OF THE PYRAMID

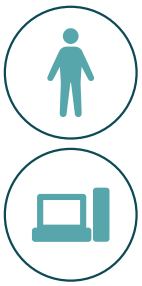
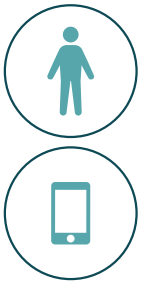
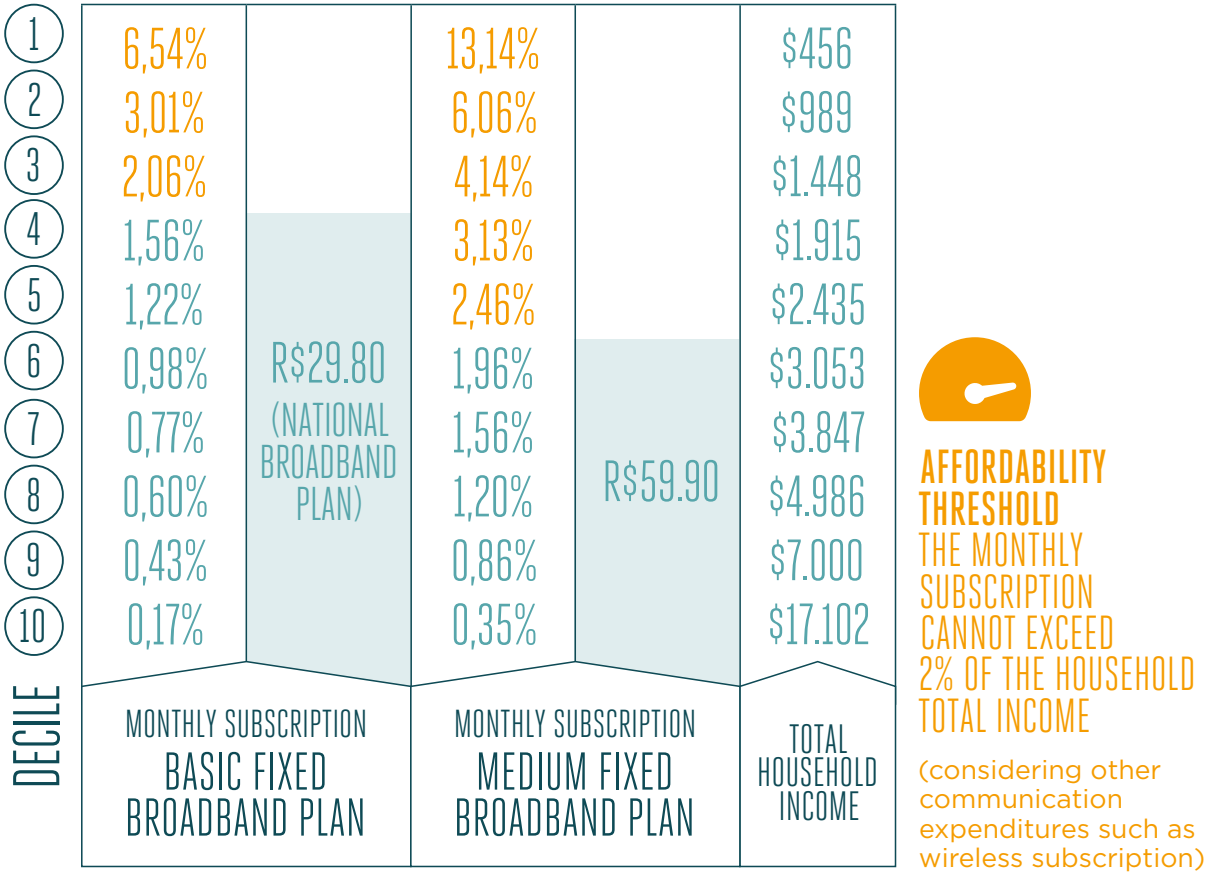
	SITUATION	COMPLICATION	SOLUTION
	User has purchased a used computer at an affordable price	Difficulty with monthly payments for fixed broadband	Purchase a USB modem at a low price (to control download volume or use frequency)
	User has purchased a subsidized smartphone, either as part of a handset replacement or through payment installments	User wants to access the Internet but cannot afford a computer or tablet	Purchase a plan with capped download volume (sometimes operators include this offer as part of a subsidized package)
	User has purchased a computer at an affordable price	The limited coverage of fixed broadband does not allow for affordable access	Purchase of a USB modem at a low price (for control of download volume or use limited to a reduced number of days)

Table 8

These examples of "use cases" are possible in many countries. For example, the daily computer connection plans make Internet access significantly more affordable for the population at the bottom of the pyramid in their respective countries. That effect has been found in the case of limited consumption plans, like the offers in Ecuador (as shown in case study below). In another case, in Brazil, considering that the average individual income at the bottom of the pyramid is between R$456 and R$ 1,448, fixed broadband (even the "popular broadband") is not affordable beyond the fourth decile of the population (see figure 12).

BRAZIL: AFFORDABILITY OF "POPULAR" BROADBAND PLAN

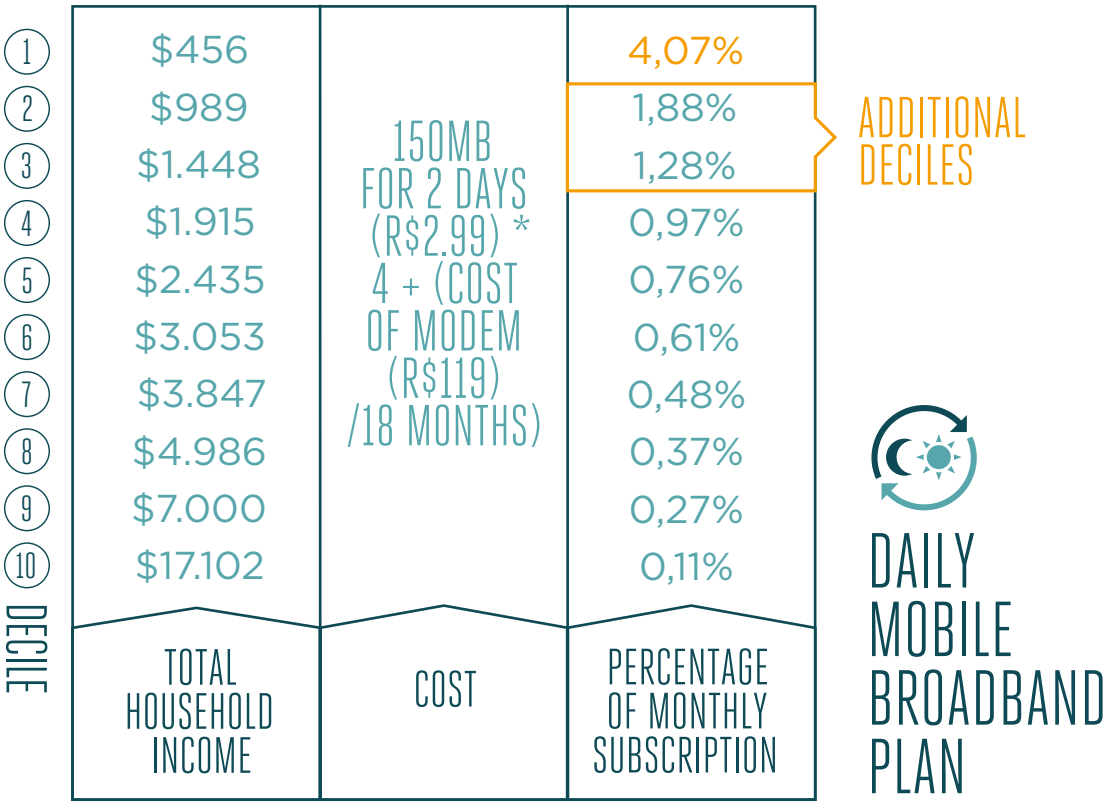


Source: IBGE; TAS analysis

Figure 12

In this sense, while the "social" fixed broadband offer emphasizes the positive effect of income redistribution policies for the middle classes, they do not solve the gap at the bottom of the pyramid. In this context, mobile broadband plans with utilization caps (in terms of the number of days per month) are able to resolve this failure. For example, the daily mobile broadband service used eight days a month in Brazil is able to shift the affordability barrier through the second decile (see figure 13).

BRAZIL: AFFORDABILITY OF THE DAILY OFFER OF MOBILE BROADBAND



Source: IBGE; TAS analysis

Figure 13

The same effect is observed in the plans of limited consumption, like the offers in Colombia, Argentina, Mexico, and Ecuador (see case studies).

4.3

Smartphone Contribution

Beyond the price of the service, the relative low cost of the mobile broadband device (smartphone) involves other benefits. In the first place, smartphones serve as a terminal for accessing the Internet whose purchase price is much lower than that of a computer. In this sense, these terminals contribute to reduce the demand gap of the most vulnerable economic sectors.

On the other hand, mobile broadband has characteristics that allow for the provision of connectivity to individuals who otherwise would not be able to purchase it, because of limited digital literacy. For example, mobile broadband does not require significant abilities compared to those skills necessary to operate a computer, as in the case of fixed broadband. This would solve certain barriers posed by lack of digital literacy.

Further, for the individuals in the lowest-income decile, lack of electricity can restrict computer use. For example, in Ecuador, 7.80% of homes do not have electricity. In Colombia, the percentage of homes without electricity is 6.40%. In this situation, the smartphone, which can be charged outside the home, offers access even for homes that do not have electricity.


Mobile is seen as the
true enabler for nearly
150M
people in Latin America

05.

Conclusion

The broadband adoption gap in Latin America is very large. While many public policy initiatives have contributed - in conjunction with a decline in prices – to the increase in penetration of fixed broadband, the effect has been concentrated primarily in the middle of the socio-demographic pyramid.

To attack the broadband demand gap at the bottom of the pyramid, that is to say the sectors in the most need, it is necessary to appeal to new strategies that go beyond direct state intervention. Indirect mechanisms that stimulate private investment and competition could be even more fruitful. Mobile broadband, in terms of products that provide connectivity to personal computers and smartphone Internet access plans, represents a solution to this social problem.

In the first place, due to the intense competition within the mobile broadband market, prices have declined signifcantly, thus increasing the affordability of the product.

Secondly, the introduction of capped offers, both in temporary terms (days of access) and monthly volumes (MB per month), allow economically vulnerable users to regulate their consumption of and access to the technology, however limited it may be.

Finally, Internet access through smartphones can secondarily resolve the gap in the poorest sectors, whose lack of digital literacy prevents them from using a computer.

The importance of these effects within the bottom of the pyramid highlights the need to provide the mobile industry with the necessary inputs to maximize the supply of mobile broadband. In particular, spectrum availability will expand the supply of computer connectivity services, which will result in a reduction of prices and increased service availability. Furthermore, a reduction of taxes to be born by the consumer could have an additional contribution to price declines, which would result in a positive impact on service adoption.

Finally, a highly restrictive network neutrality policy could lessen the positive contribution of “variable”mobile broadband effects. In other words, operators should have the freedom to develop mobile broadband offers, based on a transparent promotion of their services.

CASE STUDY 01

ARGENTINA

In Argentina, mobile broadband pricing has allowed a further three additional deciles to be added into the affordability bracket for access to the internet.

BROADBAND IN ARGENTINA

2012

13Mn
TOTAL BROADBAND CONNECTIONS

4Mn
FIXED LINE BROADBAND CONNECTIONS

9Mn
MOBILE BROADBAND CONNECTIONS

Bottom Of Pyramid

HOUSEHOLDS **3,933,000**

POPULATION **16,937,000**

MONTHLY HOUSEHOLD INCOME Between **A$ 2,431** and **A$ 5,118**

Affordability

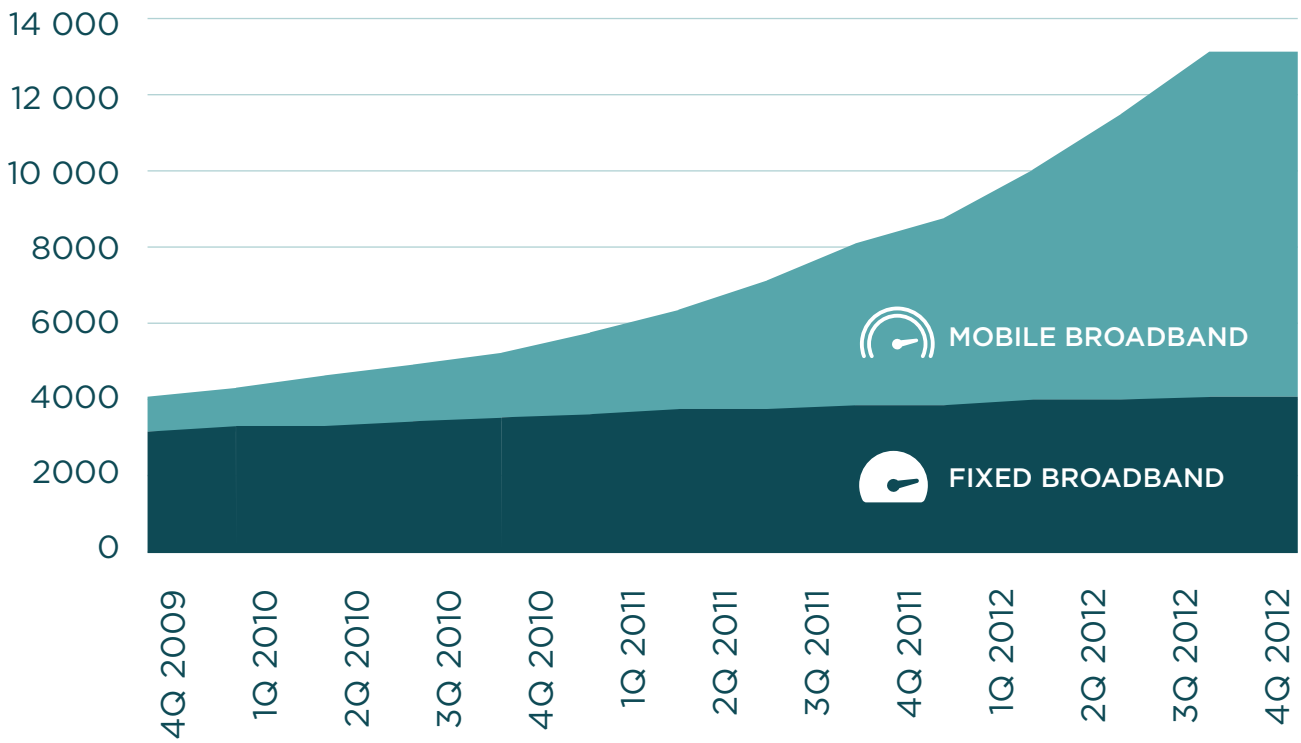
Fixed broadband does not remain within economic reach for these households.

The mobile broadband plan that covers daily use (A$ 5.00 a day) is flexible enough to allow households in all income deciles to use broadband on a limited use basis.

By the end of 2012, broadband in Argentina has reached 13 million total fixed and mobile connections. Fixed line broadband lines comprise 4,052,000, while mobile broadband connections total 9,148,000.

As such, fixed line broadband penetration equates to 9.82% of the population. The corresponding figure for mobile broadband, which has experienced exponential growth over the past four years, is 16.78%, (see figure 14).

TOTAL NUMBER OF BROADBAND CONNECTIONS ('000)

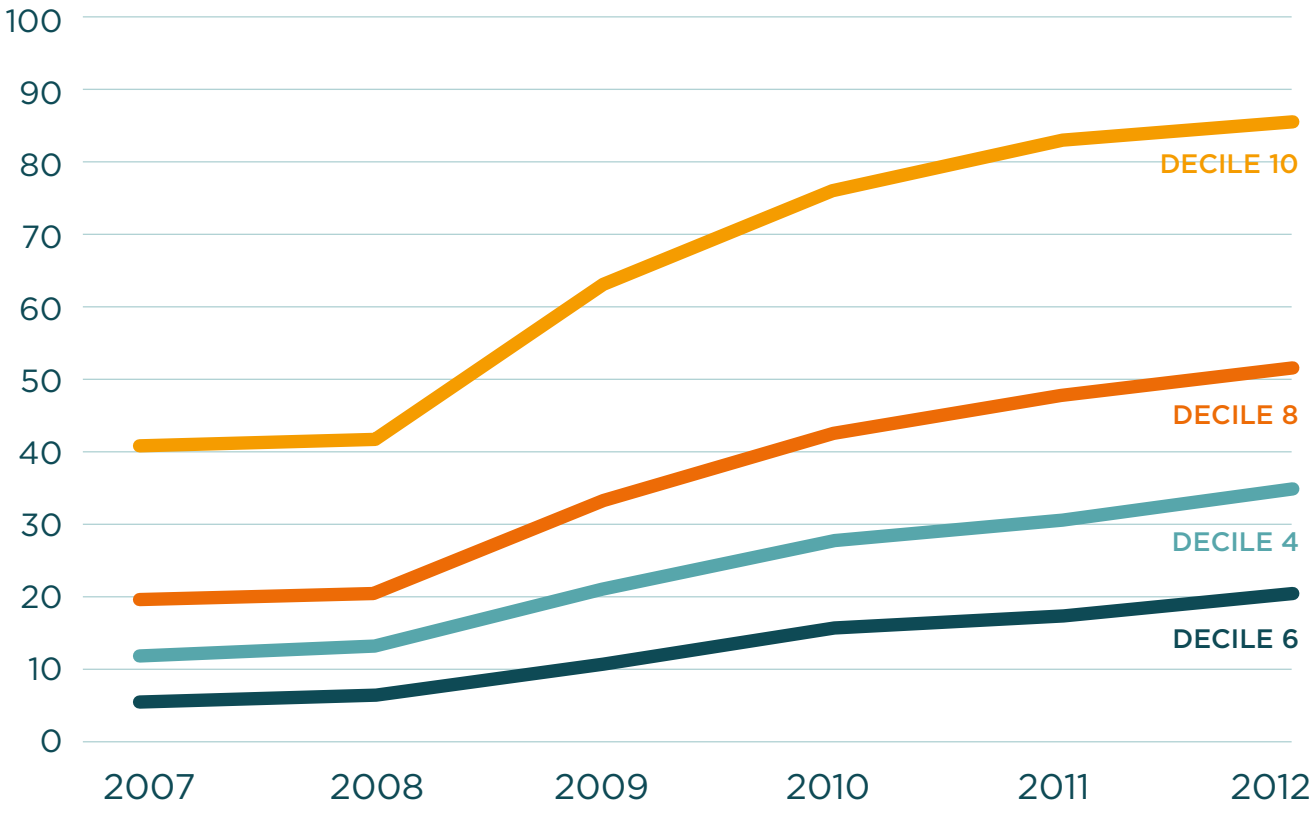


Source: for fixed broadband, INDEC; for mobile broadband, GSMA Intelligence (the statistics from INDEC for 4Q2012 do not reflect the growth of mobile broadband connections as reported by the operators)

Figure 14

A reduction of tariffs in light of increased wages has led to the growth in fixed broadband penetration. The pricing of basic fixed broadband plans has increased nominally by 15.71% annually, while salary increases have averaged 23%. The lag of fixed broadband rates to salaries is even more important in products of at least 2.5Mbps of download speed, given that the annual average price growth since 2010 has been a mere 4.51%. The relative lag of the fixed broadband prices has encouraged adoption amongst a broader sector of the population (see figure 15).

FIXED BROADBAND PENETRATION BY INCOME DECILE IN UPPER AND MIDDLE CLASSES (%)



Source:Euromonitor
Note: the chart excludes deciles 9,7, and 5 for increased clarity

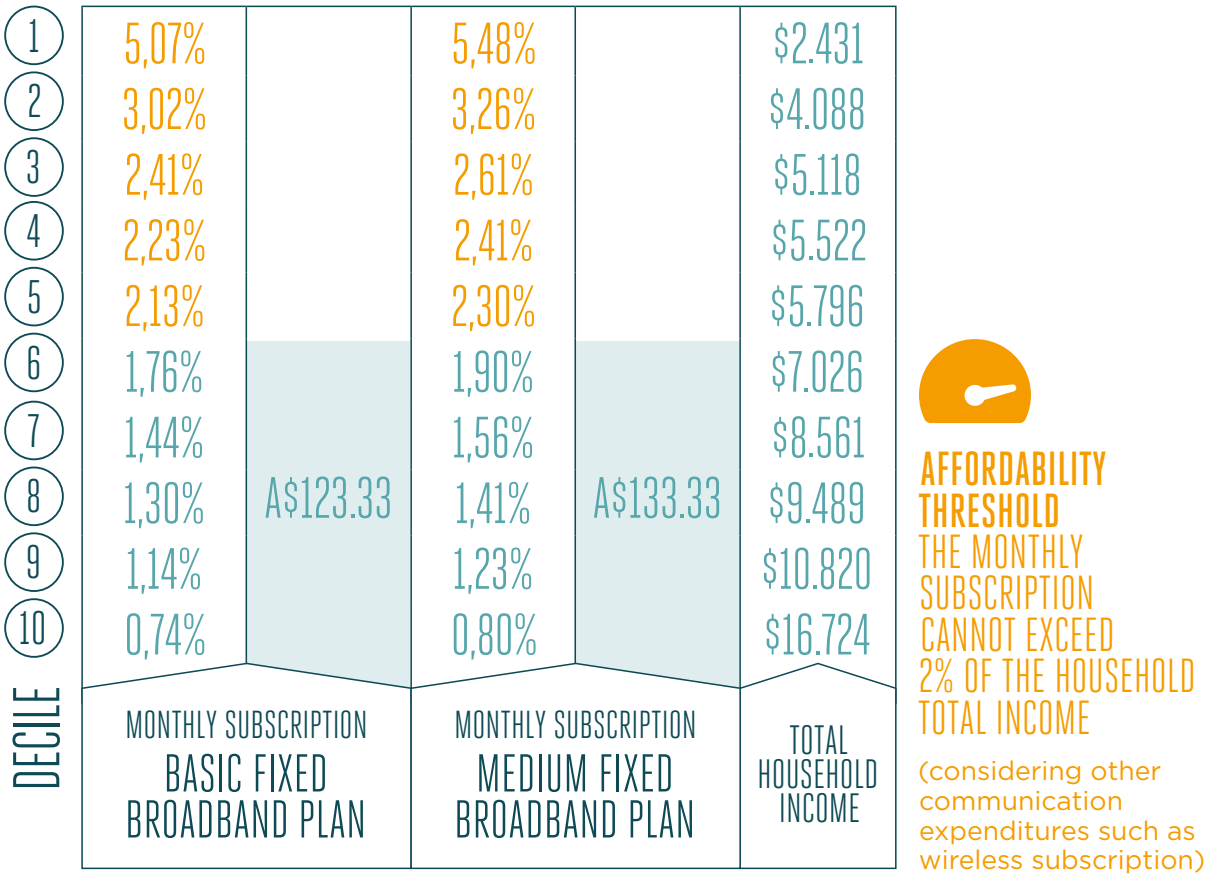
Figure 15

As figure 15 indicates, fixed broadband has nearly reached total penetration at the cusp of the socio-demographic pyramid (84.3% at the end of 2012), while it has grown from between 11.5% and 19.9% in 2007 to between 33.6% and 51% in the middle classes (deciles 6 and 8). The problem is found at the base of the pyramid, where fixed broadband penetration by households hovered between 13.2% (decile 3) and 4.5% (decile 1) at the end of 2012.

3,933,000 households in three deciles with a monthly household income range between A$2,431 and A$5,118[8] comprise the base of Argentina's socio-demographic pyramid. Considering this income level, even under the conditions of a tariff lag with regards to salary increases, fixed broadband does not remain within economic reach for these households. This statement is based on the assumption that the affordability threshold for broadband cannot exceed 2% of total household income (considering that 3% of the remaining 5% of income spent in communications and entertainment should be assigned to other communication and entertainment costs like a cellular telephone)[9].

In reality, considering average income by decile, fixed broadband is not affordable beyond the sixth decile of the Argentine population (see figure 16).

AFFORDABILITY OF FIXED BROADBAND PLANS (2013)



Source: : INDEC; TAS analysis

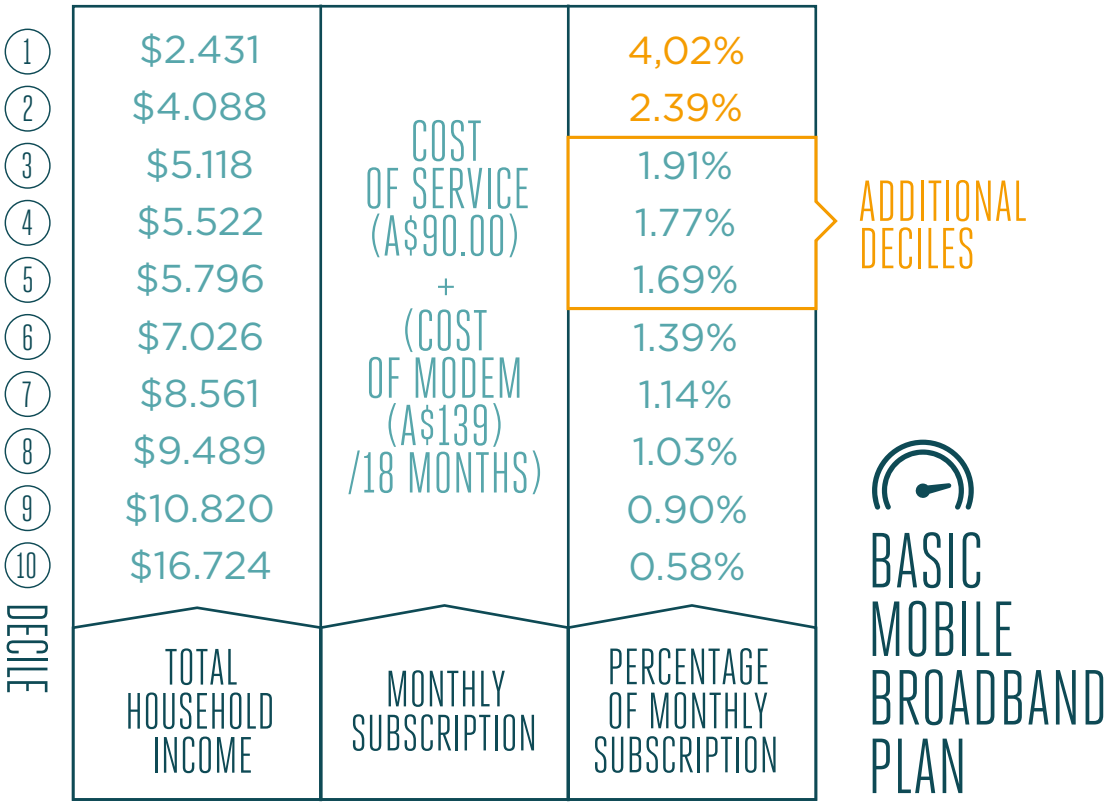
Figure 16

8. This is equivalent to 16,937,000 individuals with a monthly income between A$510 and A$1,329.
9. The International Broadband Commission establishes a limit of 5% of income for communication and entertainment expenses

As seen in figure 16, considering that the monthly charge of a basic fixed broadband plan starts at A$123.33 and the average household does not allocate more than 2% of income to a broadband subscription, this product is not affordable to those households whose income is less than that of the sixth decile. Without a price reduction for basic and mid-level plans, the difference in pricing does not change the affordability situation.

In this context, mobile broadband can resolve this market failure. For example, the basic mobile broadband plan for USB modems for PCs increases the level of affordability through the third income decile. The user makes a monthly payment (A$90.00) for the service and also pays the cost of the modem (A$139 total), which is divided by 18 months . Based on these figures, the total cost of ownership does not exceed 2% of the household income through the third decile (see figure 17).

AFFORDABILITY OF THE BASIC MOBILE BROADBAND PLAN FOR PC CONNECTIVITY



Source: INDEC; TAS Analysis

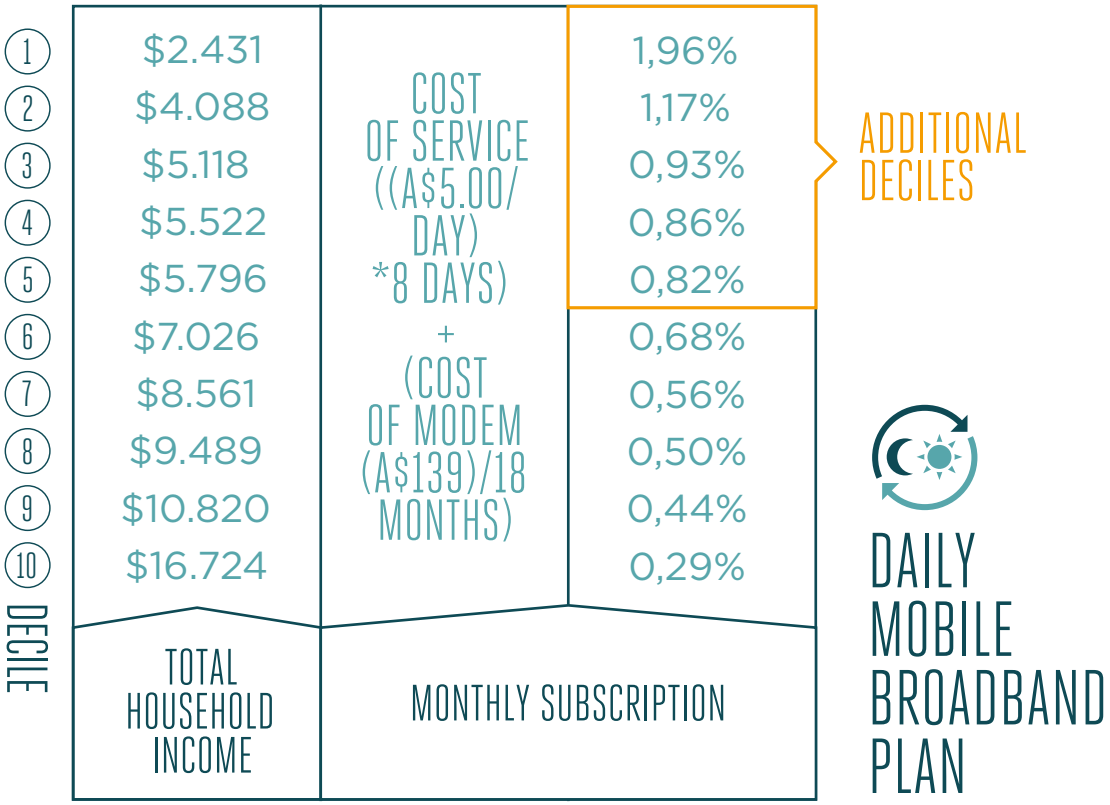
Figure 17

10. Which assumes a replacement rate of 18 months

Alternatively, the mobile broadband plan that covers daily use (A$5.00 a day) is flexible enough to allow households in all income deciles to use broadband on a limited use basis.

In effect, assuming a usage of 8 days out of the month and including the total cost of the modem (divided by 18 months), the cost of broadband represents 1.96% of the income of households in the first decile (see figure 18).

AFFORDABILITY OF THE DAILY MOBILE BROADBAND PLAN FOR PC CONNECTIVITY

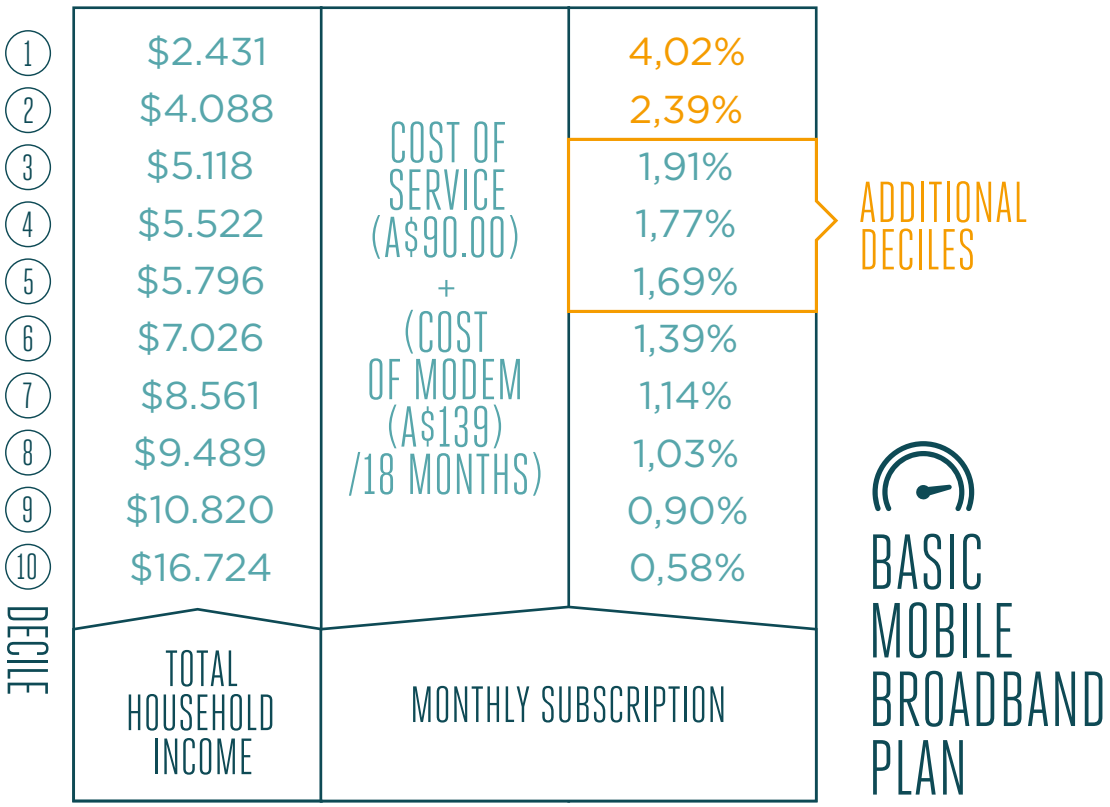


Source: INDEC; TAS Analysis

Figure 18

Extrapolating the situation through the future, two possible scenarios are evaluated where mobile broadband could further decrease the demand gap at the bottom of the Argentine pyramid. First, the 20% projected annual growth in salaries combined with price stabilization makes mobile broadband more affordable (see figure 19).

AFFORDABILITY OF THE DAILY MOBILE BROADBAND PLAN FOR PC CONECTIVITY



Source: INDEC; TAS Analysis

Figure 19

Per the analysis from Figure 19, an extrapolation of the salary adjustments in Argentina combined with the stabilization in the costs of basic mobile broadband plans (for computer connectivity) will extend affordability through the second income decile, or one decile further than the example shown in figure 19. Alternatively, this scenario would still occur even if salaries only grew by 10%. In this case, the bonus of the USB modem would also extend affordability to the second decile.

Conclusion

In sum, the reduction of fixed broadband prices in Argentina has promoted incremental technological adoption in the middle class of the population, where it is now serving between 30% and 50% of households. Without a doubt, to continue expanding broadband diffusion, mobile technology is fundamental. It explains broadband's exponential growth over the last two years, now reaching 22% of the population. This is due to the fact that mobile broadband is already addressing the demand gap at the bottom of the pyramid. Both USB modem access to PCs (that offers access through the third decile), as well as the limited daily access plan (that brings access to the first income decile), combined with a stabilization of prices (both registered in the last two years), will allow the population through the second decile to access basic mobile broadband plans.

CASE STUDY 02

BRAZIL

Broadband in Brazil, particularly fixed service, has grown significantly as a result of the income redistribution policies of the Lula and Rousseff administrations. Additionally, the introduction of “popular broadband” through the National Broadband Plan has contributed to the adoption of the service primarily in the middle classes.

BROADBAND IN

BRAZIL

2012

86Mn

TOTAL BROADBAND CONNECTIONS

20Mn

FIXED LINE BROADBAND CONNECTIONS

66Mn

MOBILE BROADBAND CONNECTIONS

Bottom Of Pyramid

HOUSEHOLDS	**15,300,000**
POPULATION	**74,970,000**
MONTHLY HOUSEHOLD INCOME	**R$ 1,448**

Affordability

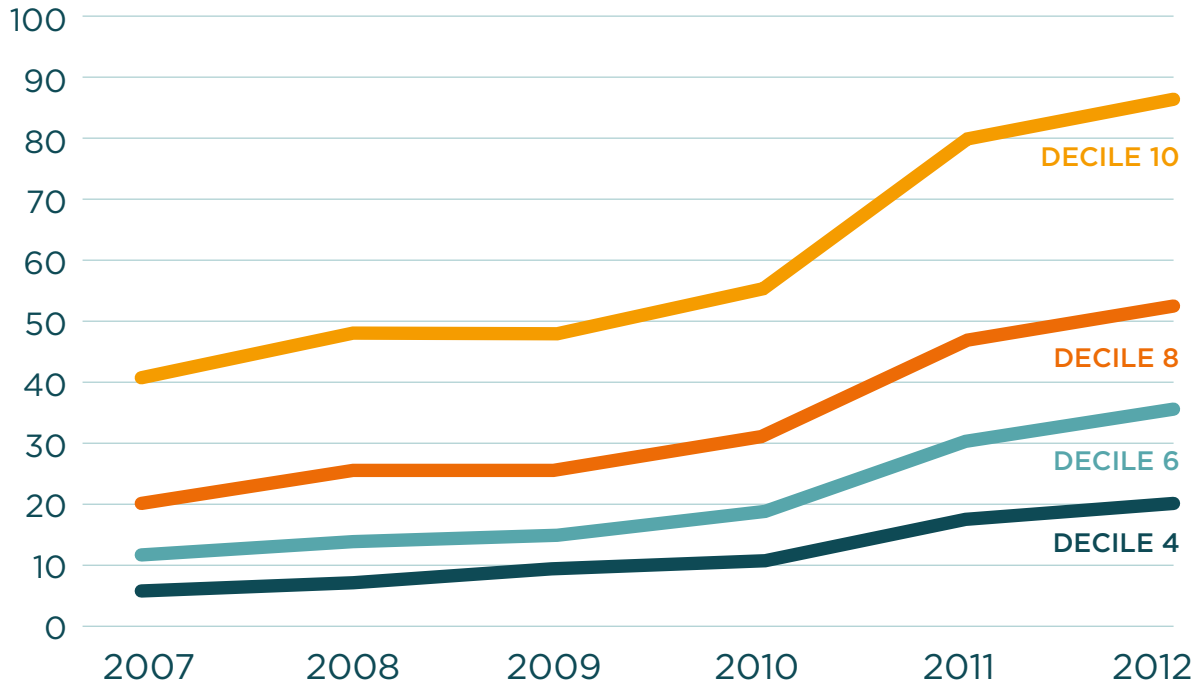
Fixed broadband is not affordable to the population below the fourth decile.

Flexibility of mobile broadband, which offers restricted daily use, allows households in the second decile to access mobile broadband.

Broadband in Brazil reached 86 million connections by the end of 2012. As confirmed by operators and analysts, fixed broadband lines reached 20,000,000, while mobile broadband connections (including USB modems and smartphone connections) reached 65,941,000. Since the beginning of 2011, fixed broadband has grown 4.6% per quarter while mobile broadband has grown an average of 14.4%. Based on these figures, fixed broadband has reached 10.17% penetration and mobile broadband has reached 33.53% amongst the Brazilian population.

The growth in fixed broadband penetration has predominantly benefitted the upper and middle classes (see figure 20).

FIXED BROADBAND PENETRATION BY INCOME DECILE IN THE UPPER AND MIDDLE CLASSES (%)



Source: Euromonitor
Note: the chart excludes deciles 9,7, and 5 for more clarity

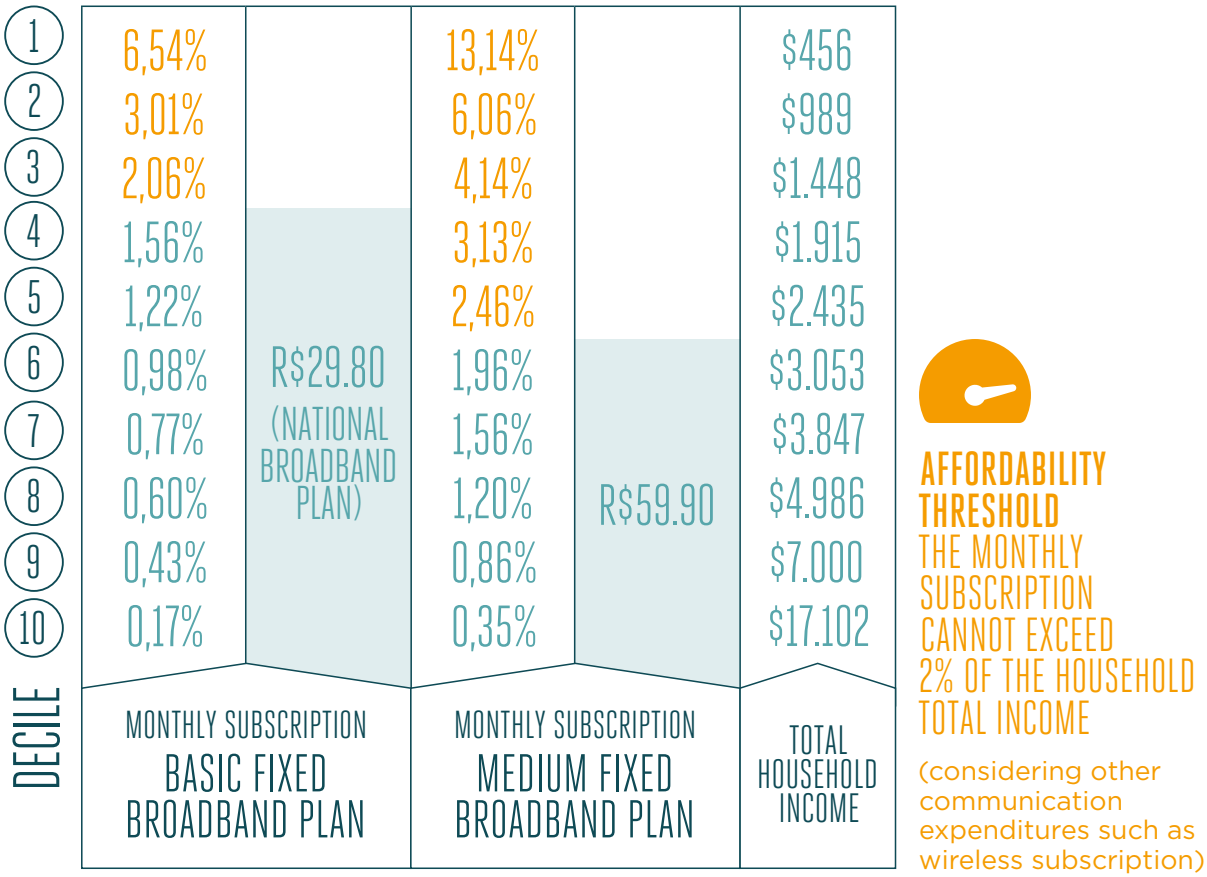
Figure 20

As observed in Figure 20, fixed broadband has nearly reached full penetration at the top of the socio-demographic pyramid (86.10% at the end of 2012), while penetration in the middle-class (deciles 6 and 8) grew between 11.5% and 20.2% in 2007 to between 35.5% and 53.1%. This growth is primarily a result of the income redistribution policies put in place by the recent Brazilian administrations and not a result of a price reduction of fixed line broadband. In effect, since mid-2010, the basic broadband plan has not changed from the equivalent of US$29.80, while the plan with at least 2.5Mbps of download speed has decreased by only 5.02% annually.

The problem falls in the bottom of the income pyramid where household fixed broadband penetration ranged from 13.0% (decile 3) to 3.3% (decile 1) at the end of 2012. These numbers demonstrate that redistribution policies by themselves cannot solve the market failure at the bottom of the pyramid. If the prices of fixed broadband do not fall, the corresponding mobile broadband plans, by virtue of their flexibility, can bridge the demand gap at the base of the Brazilian pyramid.

The bottom of the Brazilian socio-demographic pyramid comprises 15,300,000 households across the three deciles with an average monthly income less than 1,448 reales (equivalent to 74,970,000 individuals with an income ranging between R$456 and R$1,448). Again, considering that this income level falls below the necessary limit when assuming that broadband cannot exceed 2% of total household income, fixed broadband (based on the price of the "popular broadband" offering) in reality is not affordable to the population below the fourth decile (see figure 21).

AFFORDABILITY OF "POPULAR" BROADBAND PLAN



Source: IBGE; TAS analysis

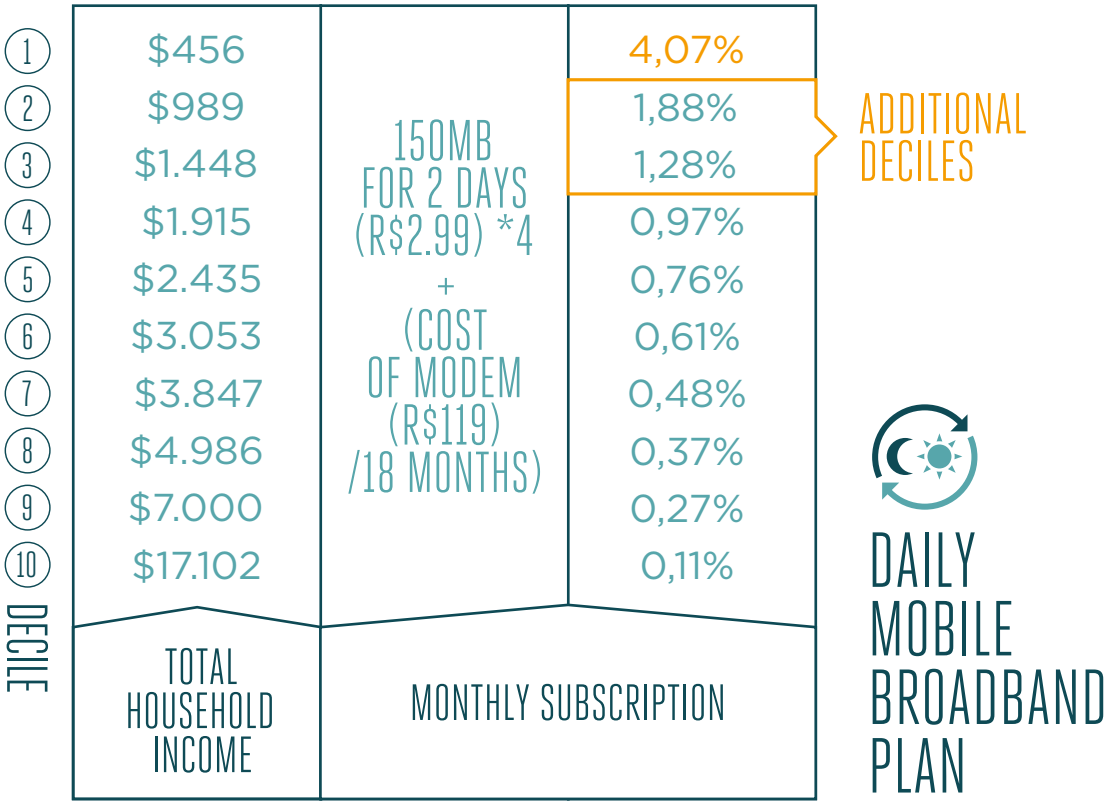
Figure 21

Figure 21 shows, by manner of comparison, the affordability grade of two fixed broadband offers. The first, the basic plan, corresponds to the plan established in the context of the National Broadband Plan, whose monthly subscription is 29.80 reales. Below the affordability threshold of 2% of household income, "popular broadband" would be accessible to households in or above the fourth decile. In this sense, the "social" fixed broadband plan offer only serves to magnify the effect that income redistribution policies have on the middle class without resolving the gap at the bottom of the pyramid. On the other hand, the second plan, which corresponds to the fixed broadband plan with download speeds higher than 2.5Mbps, priced at 59.90 reales, accentuates the demand gap, given that this price is only affordable to households in deciles six or higher.

The conclusions of this analysis are fundamental in terms of the capacity that certain public policy tools can have on tackling the affordability gap. Even in the context of public policies that promote social equality, the market failure at the base of the pyramid in emerging countries still stands. To address this barrier, it is necessary to deploy mobile broadband solutions.

In this context, mobile broadband with usage limits (in terms of the number of days per month) can help to solve this market failure. For example, the daily offer for mobile broadband used for eight days a month can shift the affordability barrier down through the second decile (see figure 22).

AFFORDABILITY OF DAILY OFFER OF MOBILE BROADBAND



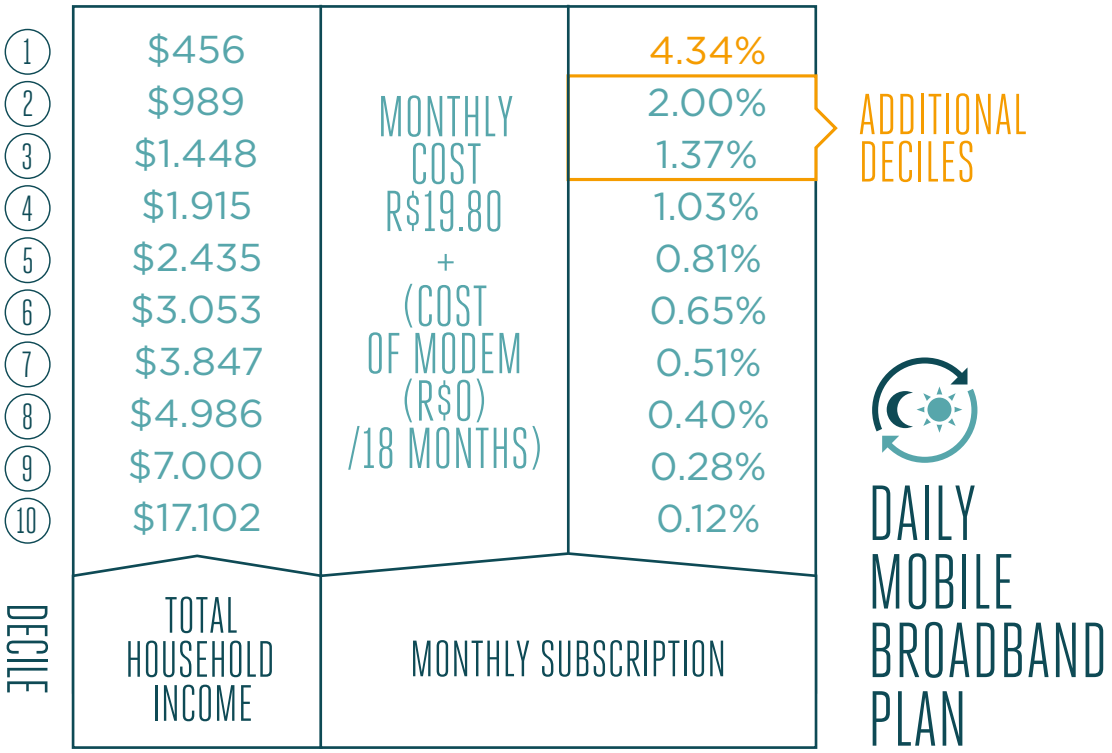
Source: : IBGE; TAS analysis

Figure 22

The mobile broadband plan referred to in Figure 22 includes the possibility of providing access via USB modem to a computer for two days with a download limit of 150MB. Assuming that this plan is purchased four times per month (which equates to 8 days of access), and that the total cost of the modem (R$119) is prorated over 18 months makes this offer affordable up to the second income decile. Obviously, the imposed restrictions are important considering that users at the base of the pyramid (deciles 2 and 3) are receiving a more limited service. Regardless, it is important to remember that this option at least allows these users some Internet access.

Considering potential scenarios of evolution that equate to the level of unrestricted service enjoyed by middle- and upper-class users, public policies that would encourage the launch of an equivalent mobile product with a monthly rate of R$19.80 (see figure 23) should be considered.

AFFORDABILITY OF "POPULAR" BROADBAND PLAN



Source: : IBGE; TAS analysis

Figure 23

Based on this assumption, if a "popular mobile broadband" plan was introduced at R$19.80 a month for post-paid service, unrestricted service would reach the second decile.

Conclusion

In conclusion, broadband in Brazil, particularly fixed service, has grown significantly as a result of the income redistribution policies of the Lula and Rousseff administrations. Additionally, the introduction of "popular broadband" through the National Broadband Plan has contributed to the adoption of the service primarily in the middle classes. However, given Brazil's social inequalities, even with the aforementioned policies, the bottom of the socio-demographic pyramid does not have the ability to afford fixed broadband. It is in this context that the flexibility of mobile broadband, which offers restricted daily use, allows households in the second and third decile to access mobile broadband, albeit in a limited manner. Coincidentally, if the "popular mobile broadband" service is offered at a price below that of fixed popular broadband, the affordability seen in the second income decile would extend to the post-paid plans.

CASE STUDY 03

COLOMBIA

Colombia – prices still too high, both for fixed and mobile and therefore the affordability of internet/ broadband services for the BoP is still far out of reach.

BROADBAND IN COLOMBIA

2012

6.36Mn
TOTAL BROADBAND CONNECTIONS

4.047Mn
FIXED LINE BROADBAND CONNECTIONS

2.316Mn
MOBILE BROADBAND CONNECTIONS

Bottom Of Pyramid

HOUSEHOLDS **2,970,000**

POPULATION **16,335,000**

MONTHLY HOUSEHOLD INCOME Under **C$ 863,920**

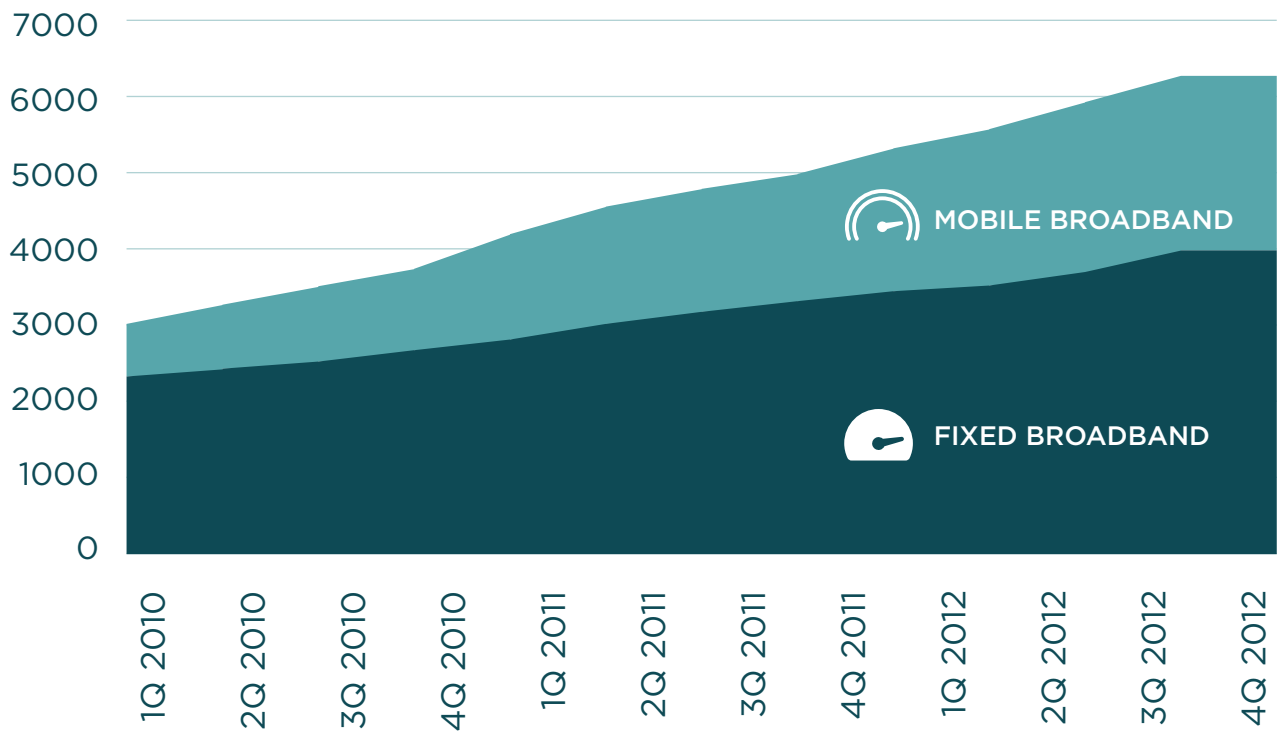
Affordability

Fixed broadband in Colombia is not affordable beyond the seventh decile of the population.

The cost of the basic mobile broadband would make broadband affordable to an additional 1,713,000 Colombian households.

Broadband in Colombia has reached 6.36 million fixed and mobile connections by the end of 2012. Fixed broadband lines total 4,047,000, while mobile connections total 2,316,000. Based on these numbers, fixed broadband penetration represents 8.69% of the population. The corresponding figure for mobile broadband is 4.98%, demonstrating the moderate growth of mobile broadband in the last four years (see figure 24).

TOTAL NUMBER OF BROADBAND CONNECTIONS ('000)



Source: MINTIC

Figure 24

When comparing to Argentina and Brazil, fixed broadband has continued to experience growth in parallel with mobile broadband. This trend is explained in part by the fact that prices of mobile broadband plans in Colombia have stayed relatively stable while the prices of fixed broadband have continued to fall (see table 9).

EVOLUTION OF BROADBAND PRICES (IN COLOMBIAN $)

	MINUMUM CAP	2Q2010	2Q2011	2Q2012	2Q2013	CAGR
BASIC FIXED BROADBAND PLAN	2GB	$42,000	$38,017	$38,017	$38,017	-3.27%
AVERAGE FIXED BROADBAND PLAN	6GB	$75,430	$52,586	$52,120	$41.379	-18.14%
BASIC MOBILE BROADBAND PLAN (PC)	1GB	$28,884	$42,000	$42,000	$42,000	1.16%
AVERAGE MOBILE BROADBAND PLAN (PC)	3GB	$39,990	$49,900	$49,900	$49,900	7.66%
SMARTPHONE BASIC MOBILE BROADBAND PLAN	250GB	$29,000	$24,900	$21,465	$25,900	-3.70%
SMARTPHONE AVERAGE MOBILE BROADBAND PLAN	1GB	$29,000	$29,000	$25,776	$35,000	6.47%
DAILY MOBILE BROADBAND PLAN (PC)	-	$3,990	$3,990	$3,700	$2,900	-10.09%
SMARTPHONE DAILY MOBILE BROADBAND PLAN	-	$3,990	$3,990	$2,900	$2,900	-10.09%

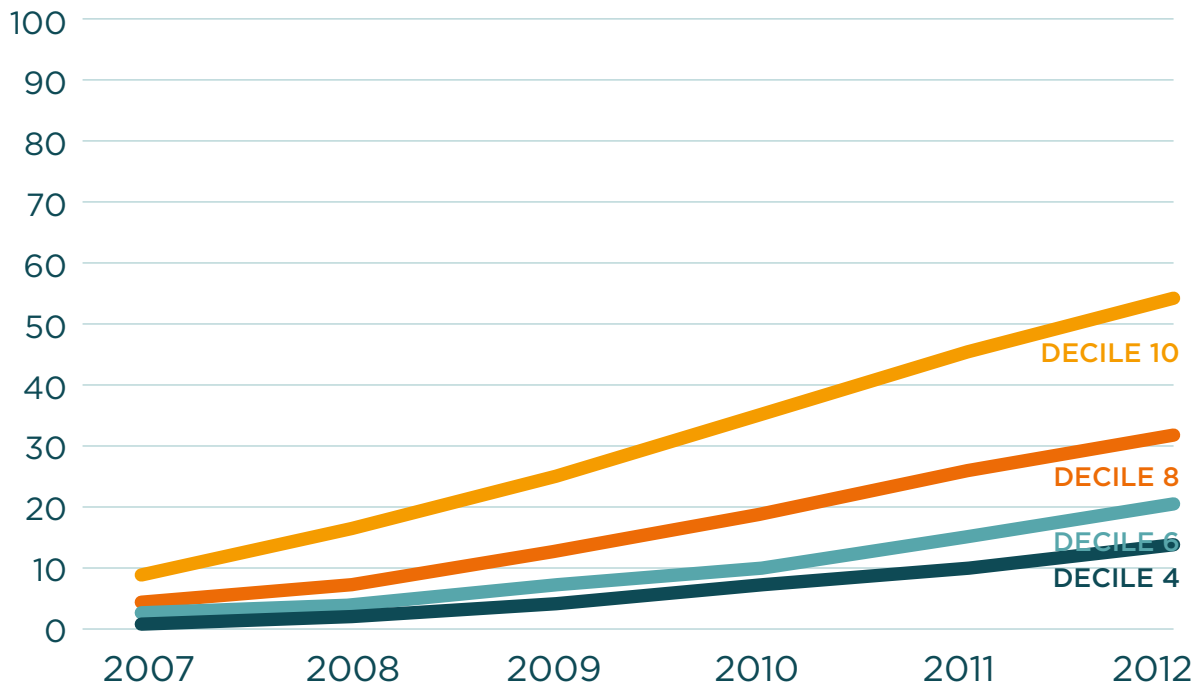
Source: : IBGE; TAS analysis

Table 9

As observed in Table 9, since mid-2010, fixed broadband prices have fallen between 3.27% (basic plan) and 18.14% (plan with 2.5Mbps of download speed and monthly cap greater than 6GB). On the other hand, the post-paid plans for personal computer connectivity have grown between 1.16% (basic plan) and 7.66% (plan with monthly 3GB cap). The only plans that have decreased significantly in price have been the daily plans for PC or smartphone connectivity (-10.09%).

The decline in fixed broadband prices has resulted in moderate penetration rates within the upper- and middle- classes of the Colombian socio-demographic pyramid (see Figure 25).

FIXED BROADBAND PENETRATION BY INCOME DECILE IN THE UPPER- AND MIDDLE- CLASSES (%)



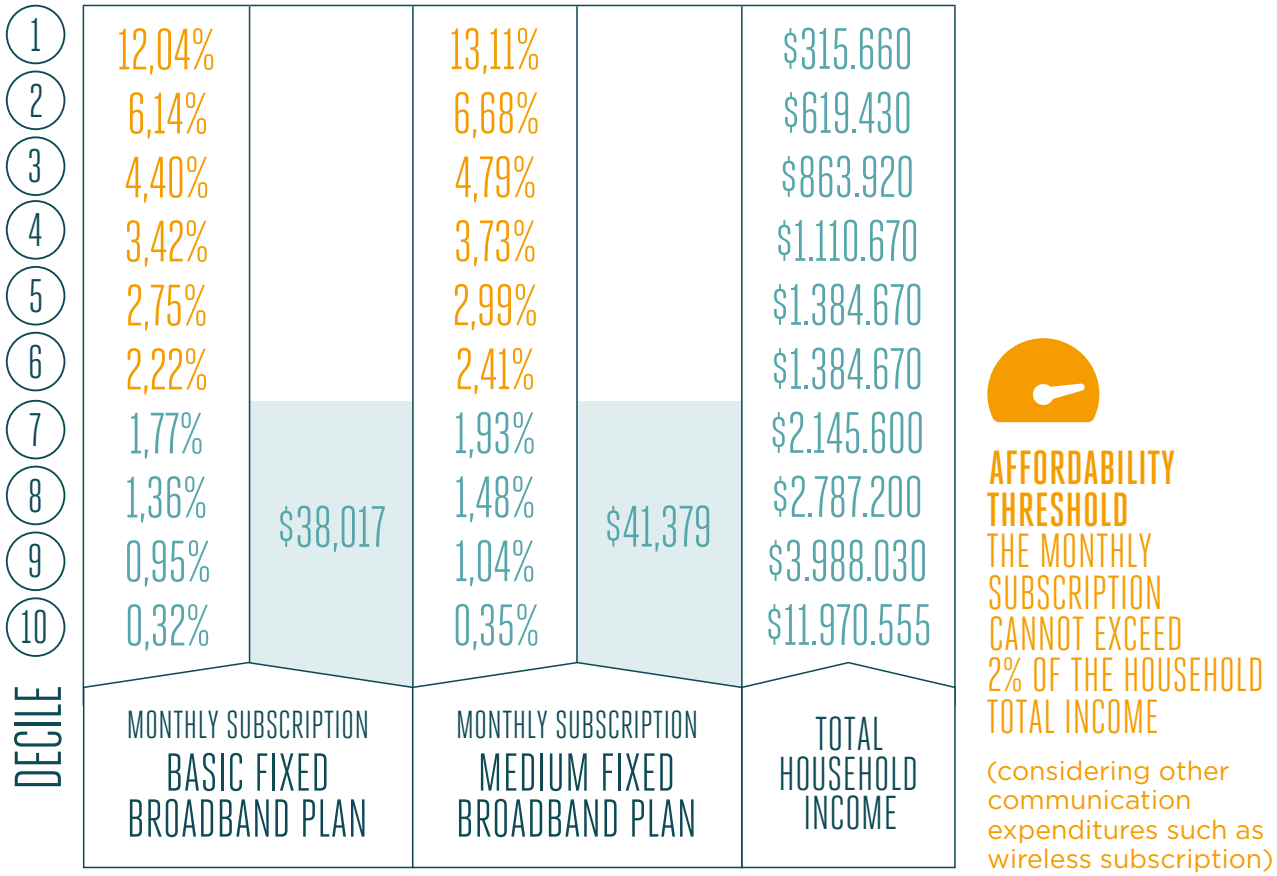
Euromonitor
Note: the chart excludes deciles 9, 7, and 5 for more clarity

Figure 25

As observed in Figure 25, fixed broadband is at the halfway mark toward total penetration at the cusp of the socio-demographic pyramid (54.00% at the end of 2012), while penetration in the middle-class sectors (deciles 6 and 8) is growing between 1.80% and 4.0% in 2007 and between 19.60% and 31.50% in 2012. In this context, the adoption of fixed broadband at the bottom of the pyramid is minimal.

The bottom of the Colombian socio-demographic pyramid comprises 2,970,000 households with a monthly income under C$863,920. Considering the average incomes by decile, fixed broadband in Colombia is not affordable beyond the seventh decile of the population (see figure 26).

AFFORDABILITY OF FIXED BROADBAND PLANS (2013)



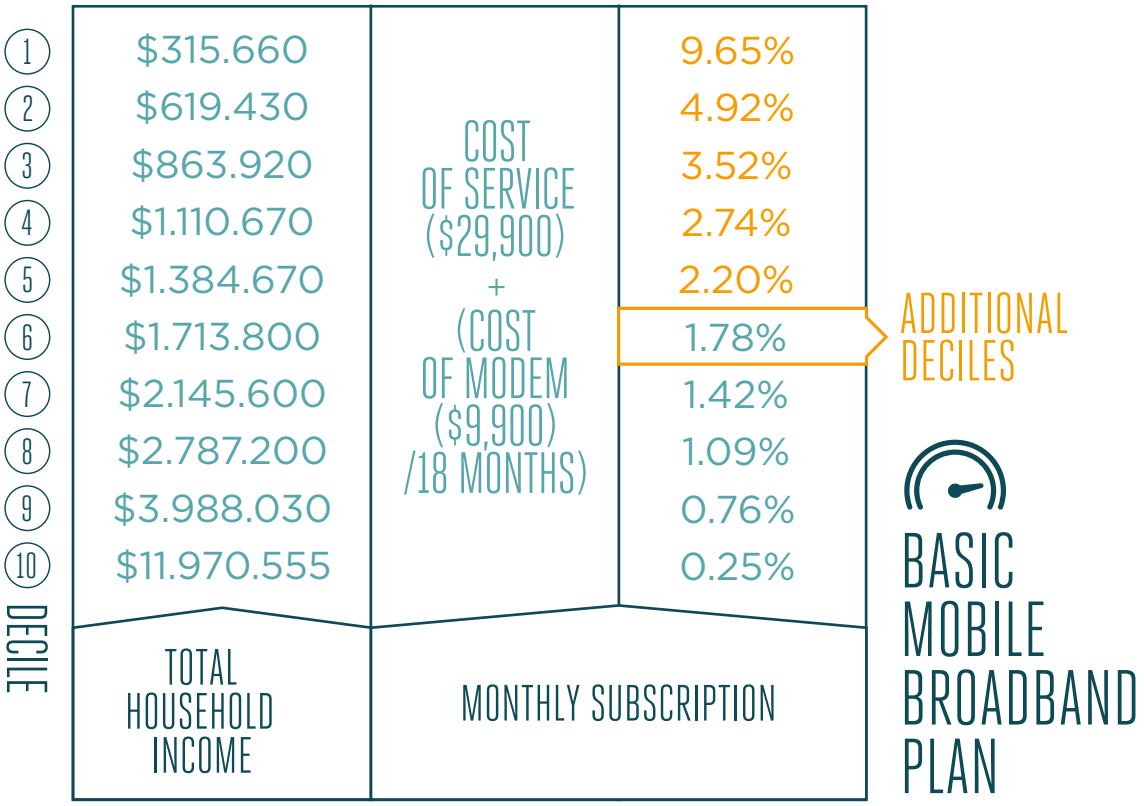
Source: DANE; TAS analysis

Figure 26

In this context, mobile broadband can, in the current situation, partially solve this failure. The solutions in this case are similar to the situation in Argentina. For example, the basic mobile broadband plan increases the affordability level by one decile, now reaching the sixth decile (see figure 27).

As Figure 27 demonstrates, the cost of the basic mobile broadband monthly subscription (29,900 Colombian pesos), added to the cost of the USB modem (9,900 Colombian pesos) prorated over 18 months, represents 1.78% of the average income of households in the sixth decile, which would make broadband affordable to an additional 1,713,000 Colombian households. This conclusion is fundamental given that, even in the case of Colombia where the price of the basic plan has suffered an increase of 1.16% over the last 2 years, mobile broadband remains still more affordable than fixed broadband.

AFFORDABILITY OF THE BASIC MOBILE BROADBAND PLAN

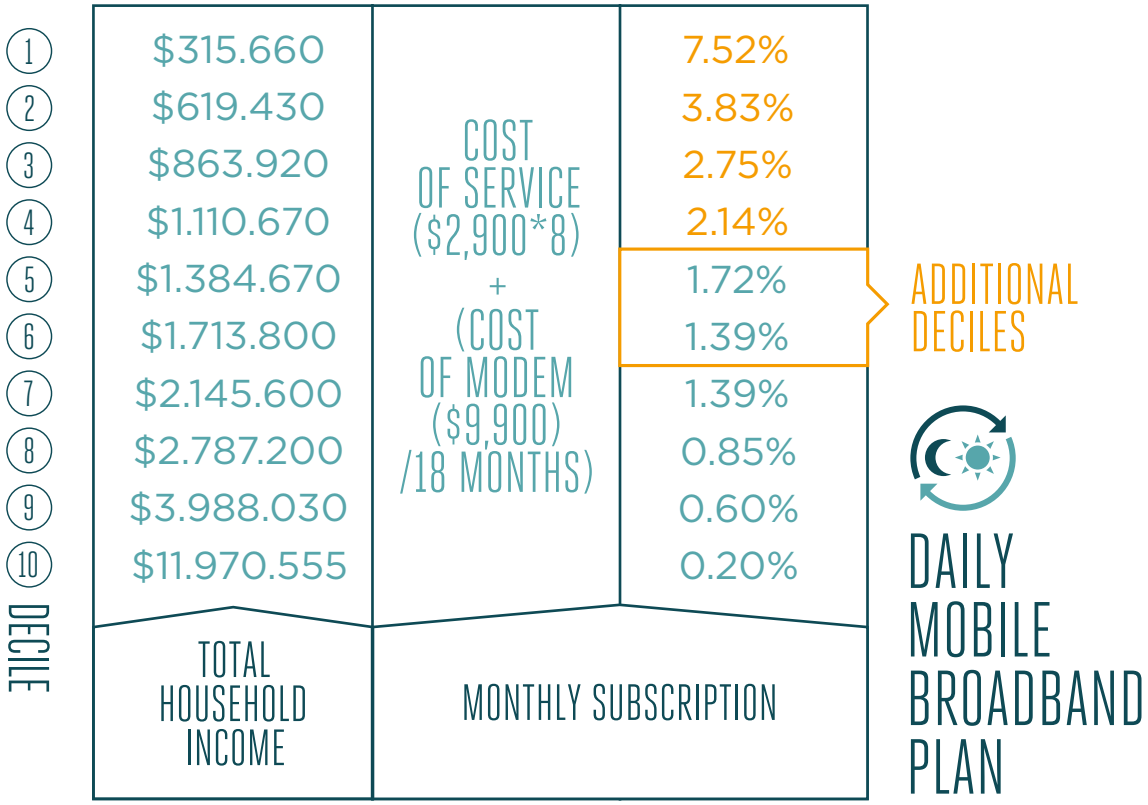


Source: DANE; TAS analysis

Figure 27

Beyond the benefits of the basic mobile broadband plan, the daily option, due to its flexibility, can expand affordability to the fifth decile (see figure 28).

AFFORDABILITY OF DAILY MOBILE BROADBAND PLAN



Source: DANE; TAS analysis

Figure 28

Following this analysis, the sum of the price of eight days of service (C$2.900 x 8) and the prorated cost of a modem for 18 months makes broadband affordable through the fifth decile. Obviously, the same considerations regarding the connection time limits that were made in the prior examples are applicable in this context as well.

However, if assumed that the daily plan reduces its price point to the equivalent US$1 per day (similar to the actual price in Argentina), the affordability will extend to the third income level. This is due to the fact that the equivalent in the daily price of service will be 1.800 Colombian pesos plus the prorated cost of the modem (the same as the previous case). With that, the cost of eight days of mobile broadband service would equate to 1.73% of the monthly income of a household in the third decile.

Conclusion

In conclusion, as opposed to the Argentine and Brazilian cases where fixed broadband has witnessed slowed growth in comparison to mobile broadband, fixed broadband in Colombia has continued to grow. Part of this trend is due to the fact that mobile broadband prices in Colombia have remained relatively stable, while the prices of fixed broadband have continued to decline. Recently, unlike in Argentina and Brazil, the reduction in prices has resulted in only a mid-level penetration of fixed broadband in the upper- and middle-section of the Colombian socio-demographic pyramid, while in the other two countries the penetration has reached levels near total saturation in the highest deciles. Despite the reduction in the price of fixed broadband, it is still not affordable beyond the seventh decile of the Colombian population.

In this context, mobile broadband can, as seen already in the current situation, partially solve this failure. As in the Argentina case, the basic mobile broadband plan raises the level of affordability by one additional decile, reaching the sixth decile. As mentioned above, even when the price of the basic plan for mobile telephony has suffered an increase of 1.16% in the last two years, mobile broadband continues to become more affordable than the fixed plans, whose prices fell between 3.27% and 18.14%. Beyond the benefits of the basic mobile broadband plan, the flexibility of the daily offer expands the affordability level to the fifth decile. Assuming that the price of this offer is aligned with that of Argentina, a limited daily use plan would be able to render broadband affordable to Colombia's third income decile.

Fixed broadband in Colombia is not affordable beyond the seventh decile of the population.

The cost of the basic mobile broadband would make broadband affordable to an additional

1,713,000

Colombian households

CASE STUDY 04

ECUADOR

Ecuador – shows usage of internet / mobile for people at the BoP is really no different to those in the middle and top part of the pyramid – once it's affordable, the usage for social networking and emailing is relatively similar.

BROADBAND IN ECUADOR

2012

4Mn

TOTAL BROADBAND CONNECTIONS

819,000
FIXED LINE BROADBAND CONNECTIONS

3.3Mn
MOBILE BROADBAND CONNECTIONS

Bottom Of Pyramid

HOUSEHOLDS	1,140,000
POPULATION	5.058.000
MONTHLY HOUSEHOLD INCOME	Under US$ 323

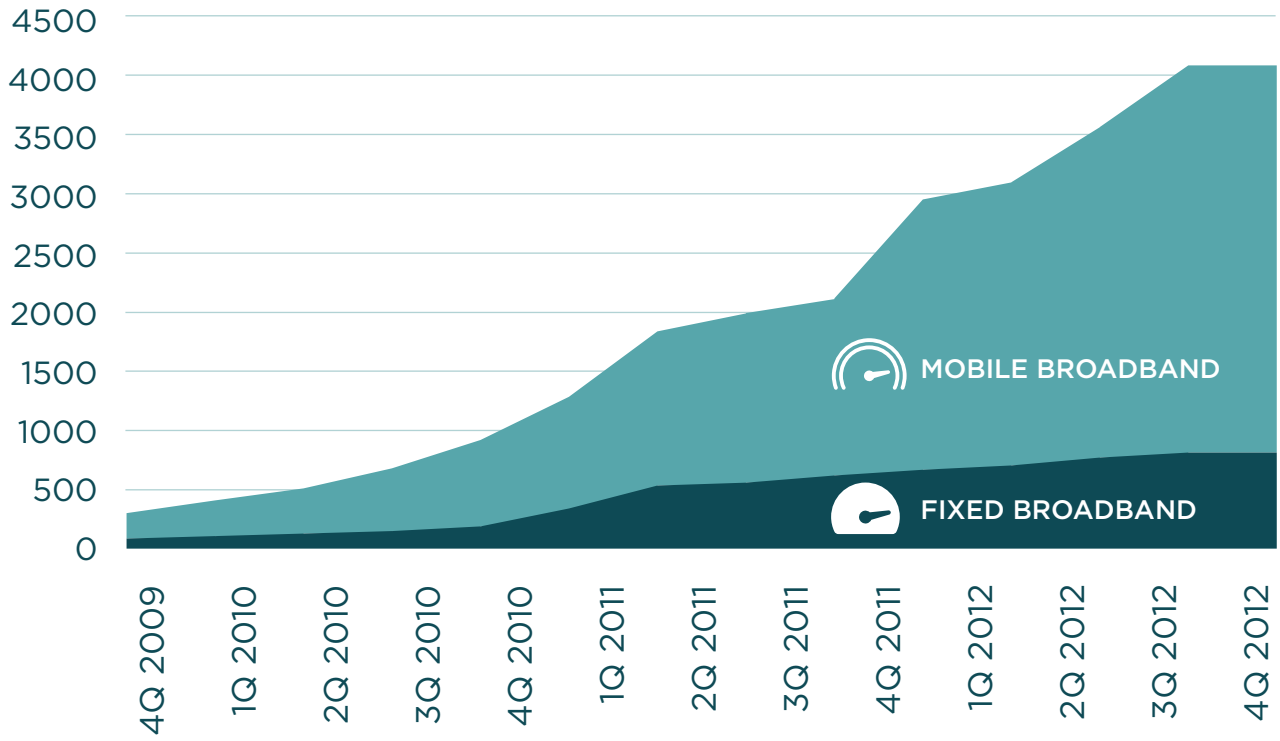
Affordability

The basic fixed broadband plan is only affordable to the deciles 10 and 9, while the average plan is only affordable to the tenth decile.

The data plan for smartphones with a monthly cap of 20 MB is affordable for all deciles.

By the end of 2012, broadband in Ecuador has reached more than four million connections when considering fixed and mobile services. The fixed broadband lines total 819,000 while mobile broadband connections reach 3,300,000. As such, fixed broadband has reached a penetration rate of 5.44% of the population while mobile broadband has reached a penetration rate of 21.97%. This situation is the complete opposite of the case of Colombia (see figure 29).

TOTAL NUMBER OF BROADBAND CONNECTIONS ('000)



Source: Senatel

Figure 29

As Figure 29 demonstrates, the explosive growth of mobile broadband highlights the quasi-stagnation of fixed broadband. The determining factors of this trend are numerous, ranging from the intense competition found in both sectors, to economic barriers, to adoption. Regardless, the growth of mobile broadband has been so explosive that at present, the gap between the base and the rest of the socio-demographic pyramid is lower in the case of accessing mobile Internet than it is in the case of general Internet use (see table 10).

TECHNOLOGY ADOPTION BY LEVEL IN THE SOCIO-DEMOGRAPHIC PYRAMID

	BOTTOM OF THE PYRAMID	REST OF THE PYRAMID	DIFFERENCE
USE OF CELLULAR TELEPHONE	42.86%	47.60%	4.74%
POSSESSION OF SMARTPHONE	1.65%	4.72%	3.07%
USE OF MOBILE INTERNET	1.16%	3.63%	2.47%
USE OF INTERNET	6.40%	33.90%	27.50%
ONLY AMONGST USERS OF THE SERVICE			
UTILIZE MOBILE INTERNET FOR SOCIAL NETWORKS	64.29%	74.46%	10.20%
UTILIZE MOBILE INTERNET FOR EMAIL	59.18%	70.23%	11.05%
PRIMARY REASON FOR USING THE INTERNET			
OBTAIN INFORMATION	42.26%	31.11%	-11.15%
COMMUNICATION IN GENERAL	30.45%	35.83%	5.38%
EDUCATION AND LEARNING	17.32%	34.28%	16.96%

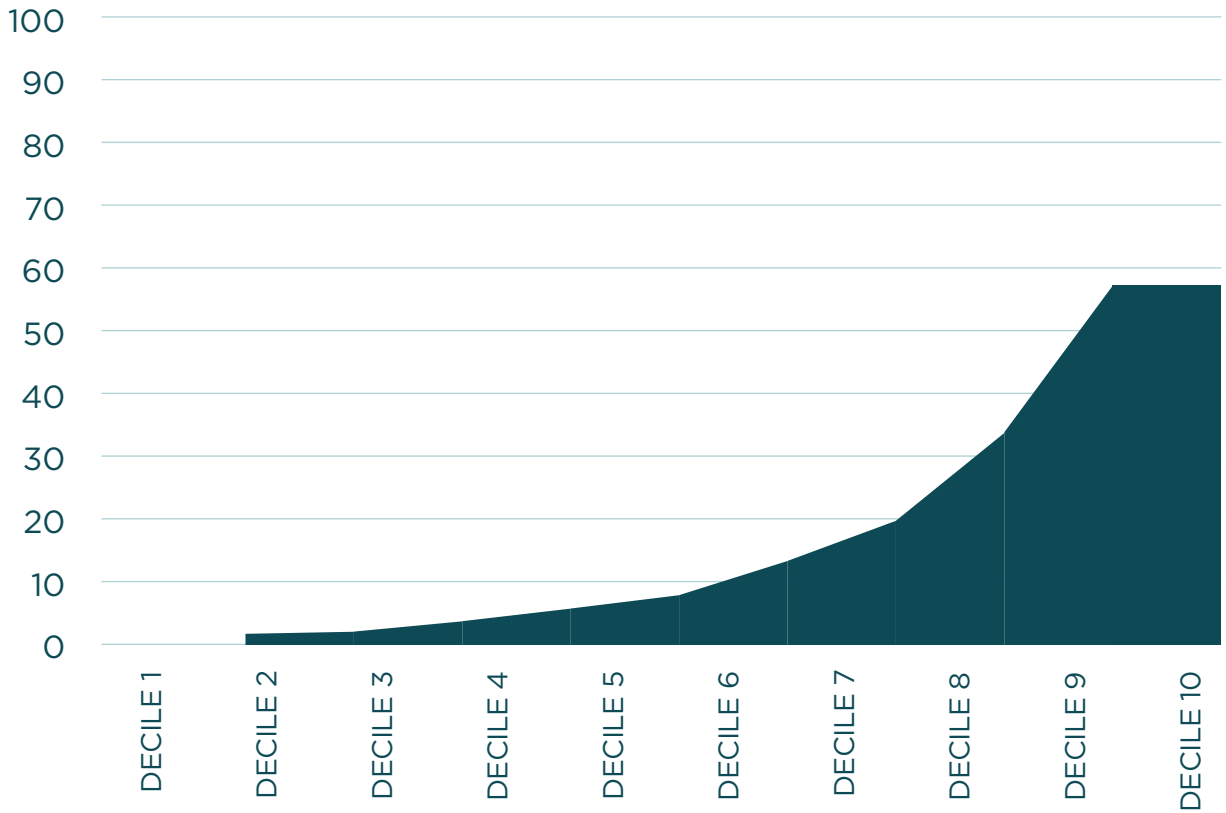
Source: TAS analysis based on micro data from Encuesta TIC del INEC in December 2012

Table 10

Table 10 is particularly revealing in terms of emphasizing the role mobile technology plays in reducing the gap between the bottom of the pyramid and the rest of the population in Ecuador. While there is a significant difference in overall Internet use between the segments, when evaluating mobile broadband access, the difference is minimal. The same occurs in terms of utilization: mobile broadband subscribers at the base and the rest of the socio-demographic pyramid tend to show the same intensity when it comes to accessing social networks and using email.

The growth in mobile broadband in Ecuador has been driven, like in the case of Argentina, by the reduction of the price of basic services, an offer that primarily benefits the individuals at the bottom of the socio-demographic pyramid. For example, in the last three years, the price of the basic fixed broadband plan has grown at a compound annual rate of 2.87% while the price of the basic mobile broadband plan for smartphones has fallen 14.84%[11]. The analysis confirms that the price trends of fixed broadband have not stimulated the massification of the service and are the main factor in the difference in penetration rates between the cusp and the rest of the pyramid (see figure 30).

BROADBAND HOUSEHOLD PENETRATION (%)



Euromonitor

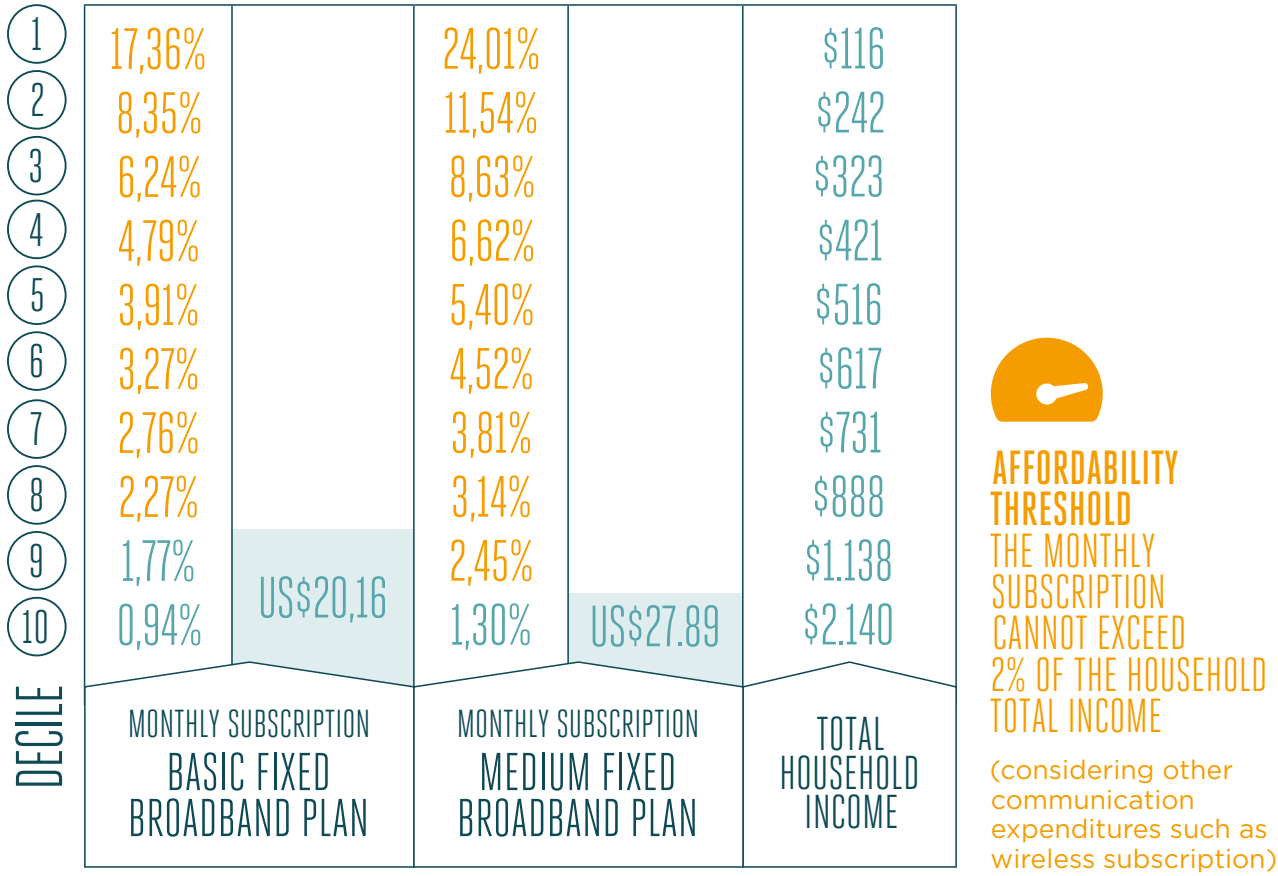
Figure 30

As Figure 30 indicates, fixed broadband penetration in the 9th and 10th deciles (the cusp of the pyramid) in Ecuador ranges from 34.7% to 58.4% while the penetration in the middle sectors (deciles 8,7,6,5, and 4) is in the range of 19.9% and 3.7%.

11. The basic mobile broadband plan for PCs has been virtually stable, with a decrease in the same period of .33%

As mentioned above, the social inequality in Ecuador is one of the reasons behind this marked duality. The base of the Ecuadorian pyramid is comprised of 1,140,000 homes with a monthly income under US$323. In this context, it is not surprising to conclude that with a threshold of 2% of the income, the basic fixed broadband plan is only affordable to the deciles 10 and 9, while the average plan is only affordable to the tenth decile (see figure 31).

AFFORDABILITY OF FIXED BROADBAND PLANS



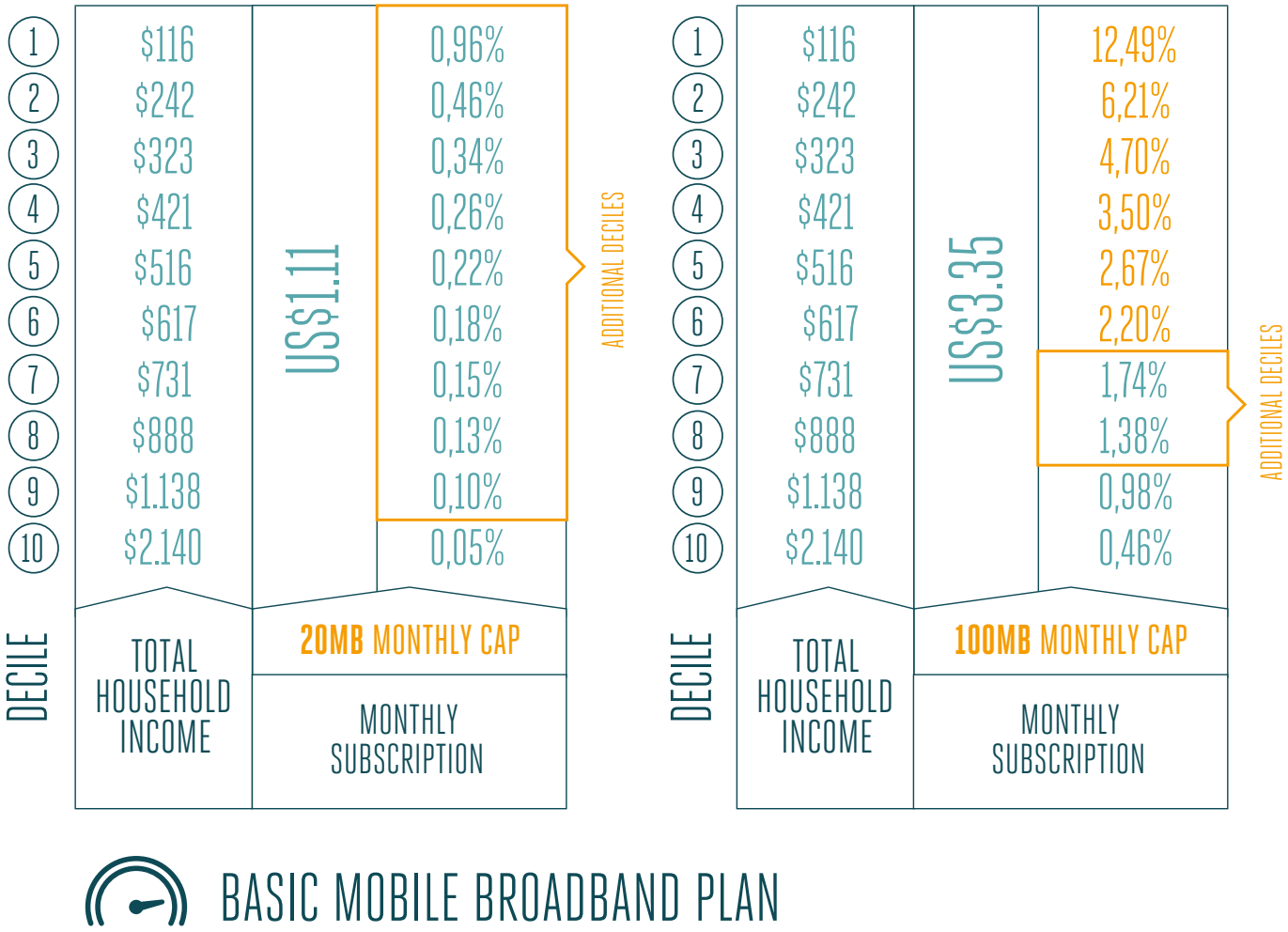
Source: INEC; TAS analysis

Figure 31

At a price of US$20.16 for a monthly subscription, the basic fixed broadband plan can only be affordable through the ninth and tenth deciles, while the average plan at US$27.89 is only affordable for the tenth decile.

In this context, it is not surprising to observe that flexible mobile broadband offers that cap the download volume are affordable by large segments of the population in Ecuador. In a situation of pent-up demand characterized by low income and high fixed line broadband prices, the mobile alternative tends to solve the affordability gap (see Figure 32).

AFFORDABILITY OF MOBILE BROADBAND PLANS



Source: INEC; TAS analysis

Figure 32

In the first example of Figure 32, the mobile broadband plan for computer or smartphone that caps monthly downloads to 20MB is being offered for US$1.11. This offer already resolves the affordability barrier by equating to 0.96% of the income of an average household in the first decile. The second example is not as beneficial in terms of affordability because increasing the download limit to 100MB will increase the price to US$3.35, which is only affordable to the seventh decile (even so, it is still an increase of 760,000 households).

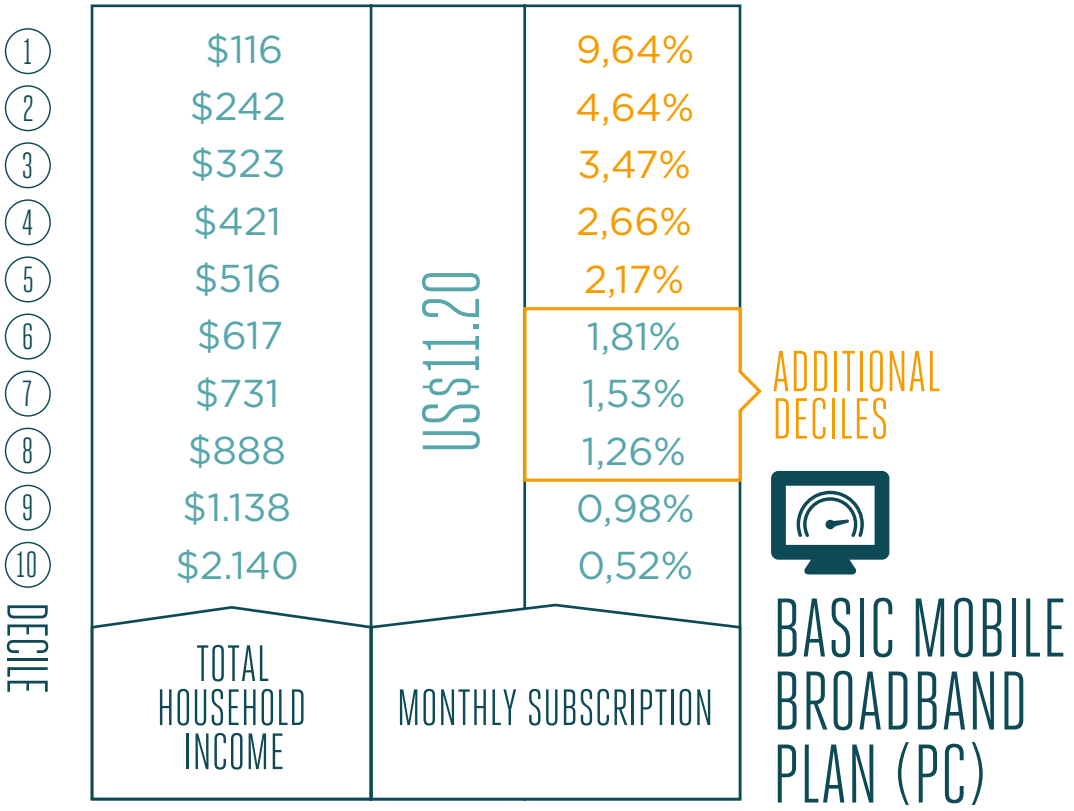
In the future, mobile broadband can enhance its role at the base of the pyramid in part with the award of more electromagnetic spectrum. The mobile broadband market in Ecuador is particularly complex to the extent that the public operator is primarily offering USB modems, while the private operators, Claro and Movistar, control the smartphone market. The current spectrum award in part determines this situation where private operators have reduced their emphasis on commercializing USB modems because of the saturation that they generate over their networks. In this sense, the future role of mobile broadband is primarily determined by spectrum policies.

The impact scenario responds to the assignment of the majority of the 700MHz band that has already been awarded to CNT, the public operator; in this sense, the latter would have sufficient spectrum to actively commercialize the product via PC dongle, offering a competitive product in respect to the private operators, which would result in a decrease of 40% in the basic and average plan (see figure 33).

THE FUTURE ROLE OF MOBILE BROADBAND IS PRIMARILY DETERMINED BY SPECTRUM POLICIES.

The 700MHz band that has already been awarded to CNT, the public operator, would result in a decrease of 40% in the basic and average plan.

IMPACT ON AFFORDABILITY OF THE ASSIGNMENT OF SPECTRUM TO CNT



Source: INEC; Senatel; TAS analysis

Figure 33

On the basis of the spectrum allocation, CNT would be able to reduce its prices of USB modems by approximately 40%, bringing affordability to the sixth income decile.

Conclusion

In conclusion, given the low salary levels at the base of the Ecuadorian pyramid, mobile broadband is the only technology that can resolve the market failures. Fixed broadband penetration in Ecuador shows a significant gap between the cusp and the bottom of the pyramid. The penetration rate in the three deciles at the cusp reaches an average of 37.67% while the penetration rate in the three deciles at the bottom of the pyramid reaches an average of 1.43%. The challenge is how to increase the broadband penetration rates amongst the base of the pyramid that represents 1,140,000 households with a monthly income below US$71.31. Considering the prices of fixed broadband, the basic plans (256 kbps and at least 2GB of capacity) and the average plans (2.5Mbps of download and at least 6GB of capacity) are not affordable below the ninth decile of the population (marginally, to the sixth decile).

It is for this reason that mobile broadband has grown so dramatically in the last two years; in particular, the data plan for smartphones with a monthly cap of 20MB is affordable for all deciles. Looking into the future, the assignment of additional spectrum in the 700MHz, 850MHz, and 1900MHz bands will allow the operators to reduce mobile broadband prices without experiencing network saturation problems. The public operator, the primary provider of PC connectivity, can extend the affordability of the basic USB plan marginally through the fourth decile.

CASE STUDY 05

MEXICO

Mexico – mobile broadband has been growing at a quarterly rate four times faster than fixed broadband since 2010 and perhaps something on the affordability has allowed mobile broadband to address nearly all the deciles in Mexico with daily plans.

BROADBAND IN MEXICO

2012

38Mn
TOTAL BROADBAND CONNECTIONS

13.9Mn
FIXED LINE BROADBAND CONNECTIONS

24.5Mn
MOBILE BROADBAND CONNECTIONS

Bottom Of Pyramid

HOUSEHOLDS	**9,480,000**
POPULATION	**35,424,000**
MONTHLY HOUSEHOLD INCOME	Below **$M 11,373**

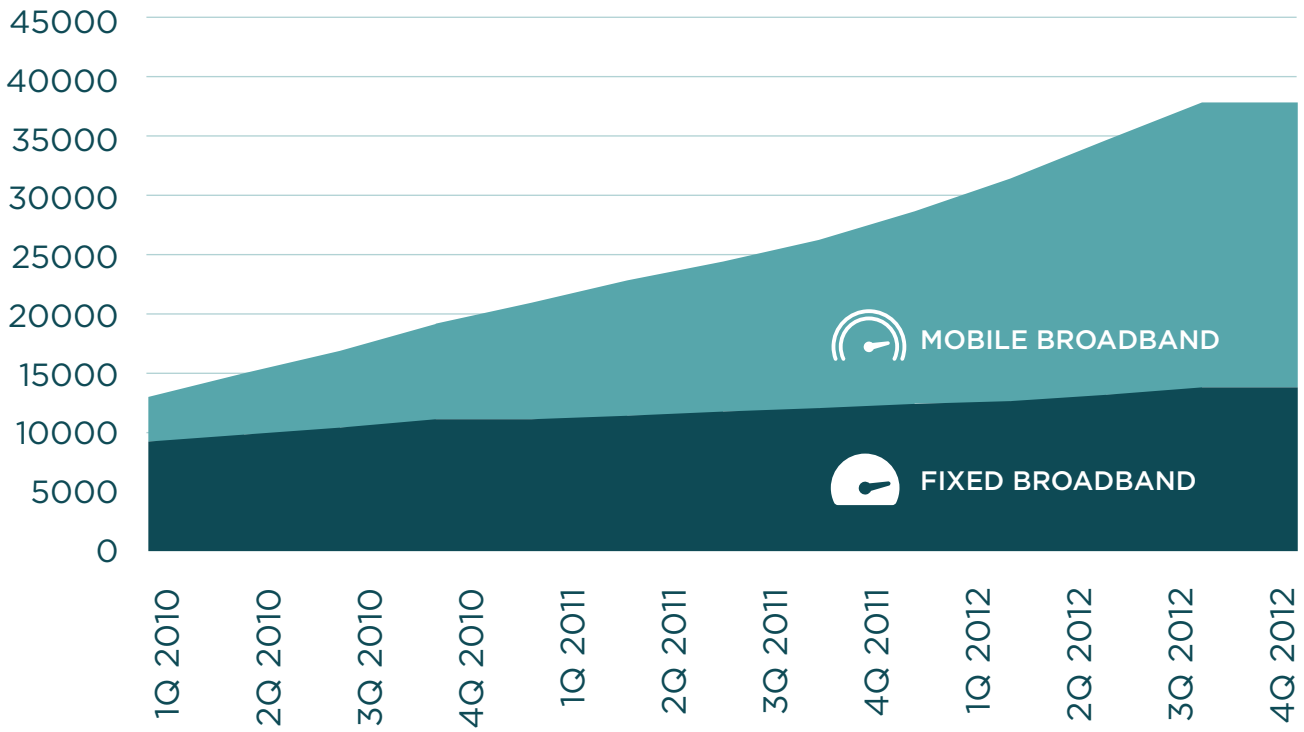
Affordability

An analysis of the affordability of fixed broadband shows that households up to the second decile can afford the basic fixed service.

Broadband in Mexico has significantly grown in recent years. However, mobile broadband has not grown at similar rates when compared to the other countries in the region due to a relative stabilization of the prices.

Broadband in Mexico has reached 38,000,000 connections at the end of 2012. Fixed broadband lines total 13,904,000 while mobile broadband connections add to 24,484,000. As such, fixed broadband penetration represents 11.98% of the population. The corresponding figure for mobile broadband is 20.96%. Mobile broadband has been growing at quarterly rates four times faster than fixed broadband, which is reflected in the total installed base (see figure 34).

TOTAL NUMBER OF BROADBAND CONNECTIONS ('000)

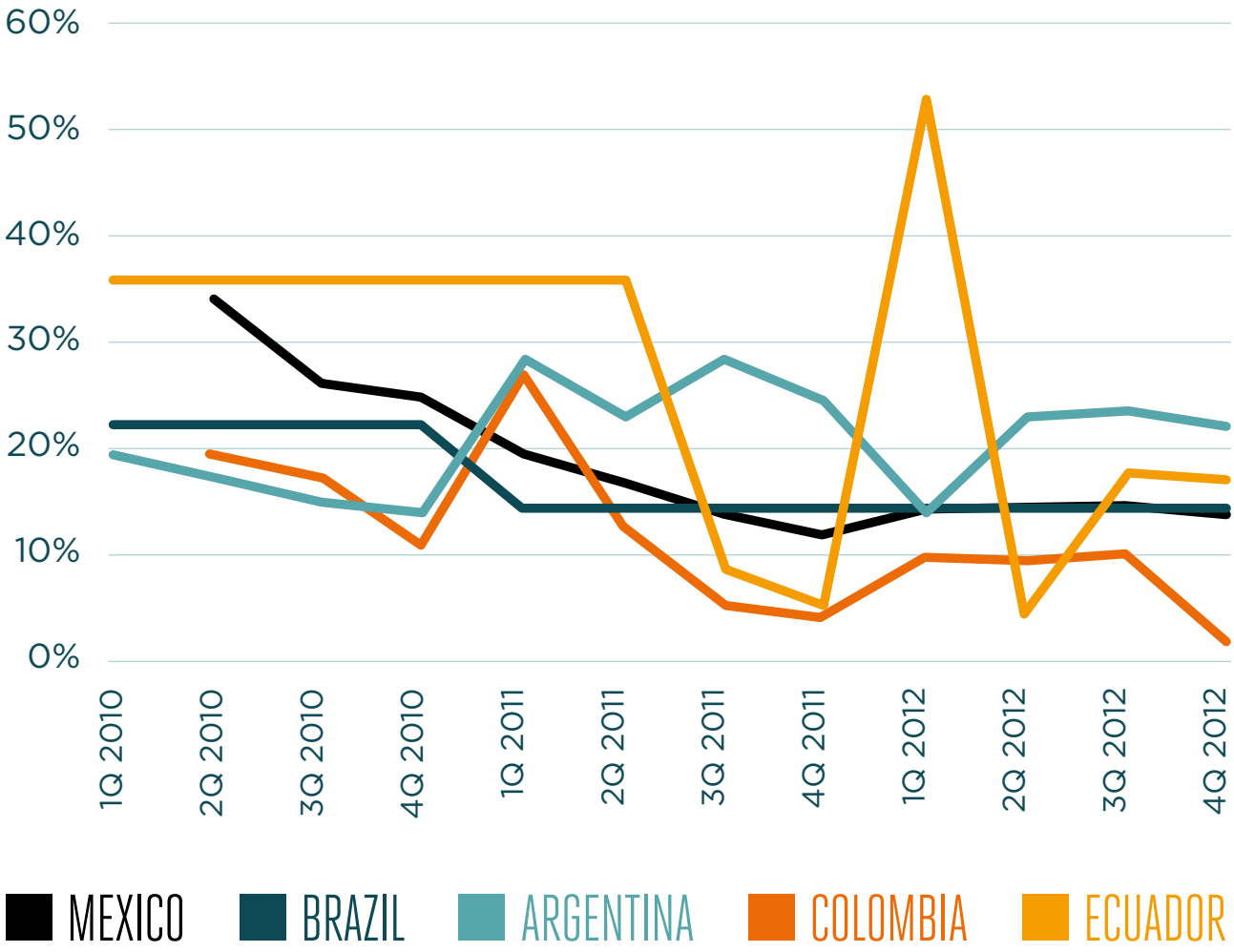


Source: TAS analysis based on data from INEGI; GSMA Intelligence; ITU

Figure 34

Broadband penetration in Mexico has grown at rates below those of some of the other countries in the region (see figure 35).

QUARTERLY GROWTH RATE OF MOBILE BROADBAND CONNECTIONS (2010-2012)



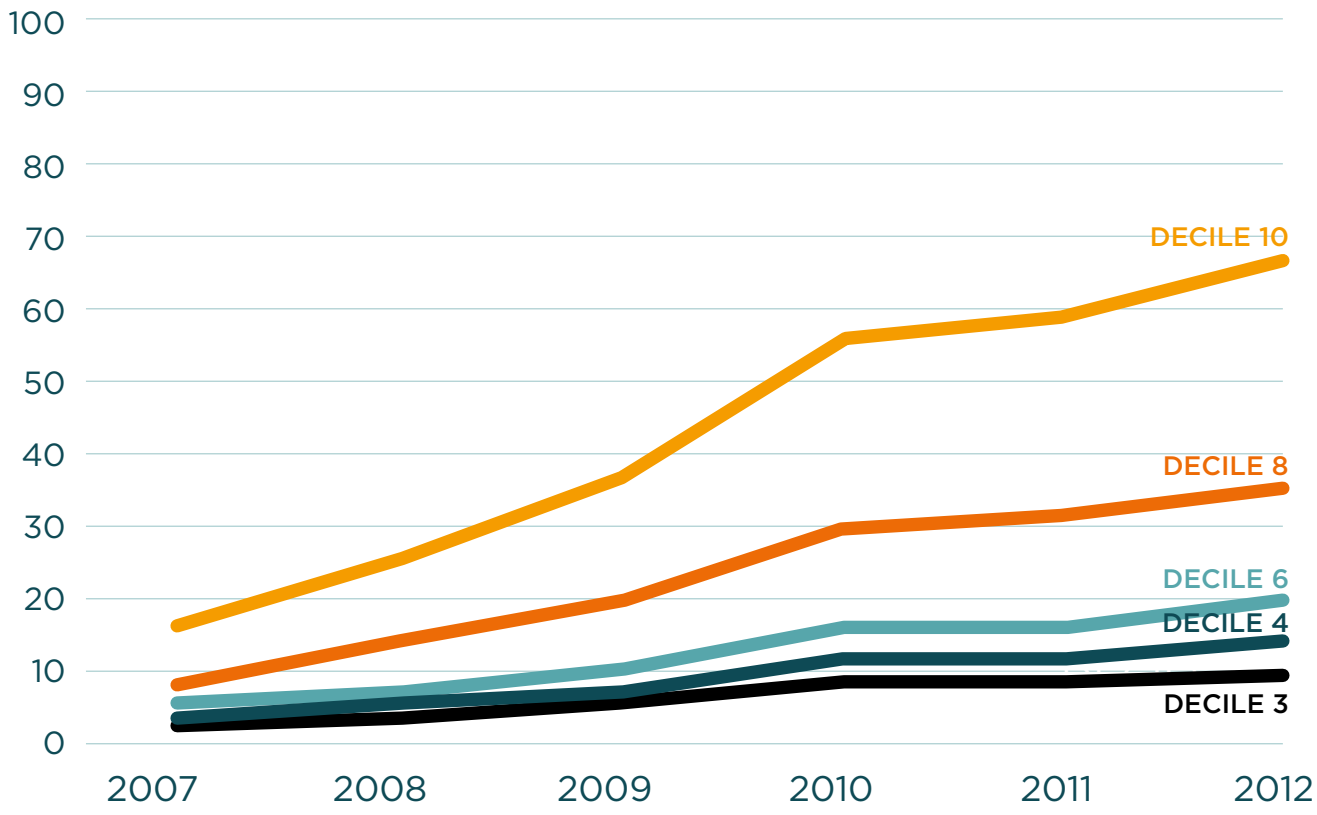
Source: Argentina (GSMA Intelligence); Brazil (operators and Teleco); Colombia (Mintic); Ecuador (Senatel); Mexico (GSMA Intelligence)

Figure 35

As Figure 35 shows, since early 2011, the number of mobile broadband connections in Mexico has grown at an average rate of 14% per quarter (similar to Brazil), while the rate in Argentina is 23% and 22% in Ecuador.

Part of this trend is explained by the high prices of mobile broadband and relative stability in Mexico market shares. The basic mobile broadband plan for computer connectivity has not changed since the second quarter of 2010 (at 249 Mexican pesos) while the plan with average capacity has suffered an increase 4.68% in the same time. In terms of smartphone plans, the basic rate (at least 250Mb of maximum volume per month) has decreased 6.98% since the third quarter of 2010, while the daily plan has only decreased at a rate of 1.27%. This trend is similar to that of fixed broadband, where the basic plan rate has only fallen 2.89% while the average plan has increased 2.56%. Even so, Mexico managed to surpass 10% in fixed broadband penetration within the third income decile in 2012 (see figure 36).

FIXED BROADBAND PENETRATION BY INCOME DECILE (2007-12) (%)



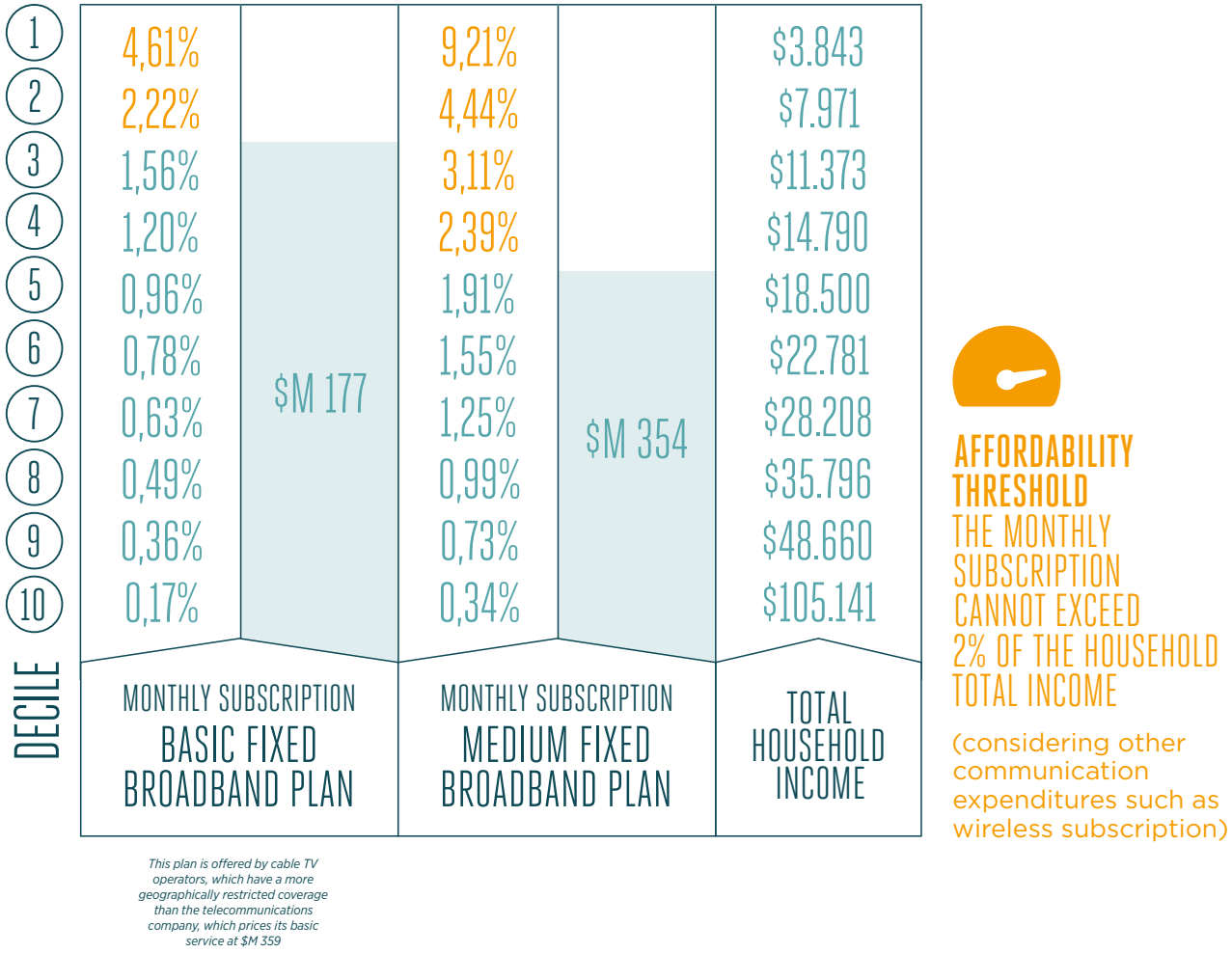
Source: Euromonitor

Figure 36

As seen in Figure 36, while fixed broadband penetration at the cusp of the pyramid (tenth and ninth deciles) has reached between 49% and 66%, the middle classes exhibit penetration rates that range from 35.40% (eighth decile) to 13.90% (fourth decile). The bottom of the pyramid still has not surpassed 10.30% at the third decile.

Per data from the INEGI, the base of the Mexican socio-demographic pyramid is comprised of 9,480,000 households with incomes below $M 11,373. An analysis of the affordability of fixed broadband shows that households up to the second decile can afford the basic fixed service (see figure 37).

AFFORDABILITY OF FIXED BROADBAND PLANS



Source: INEGI; Euromonitor; TAS analysis

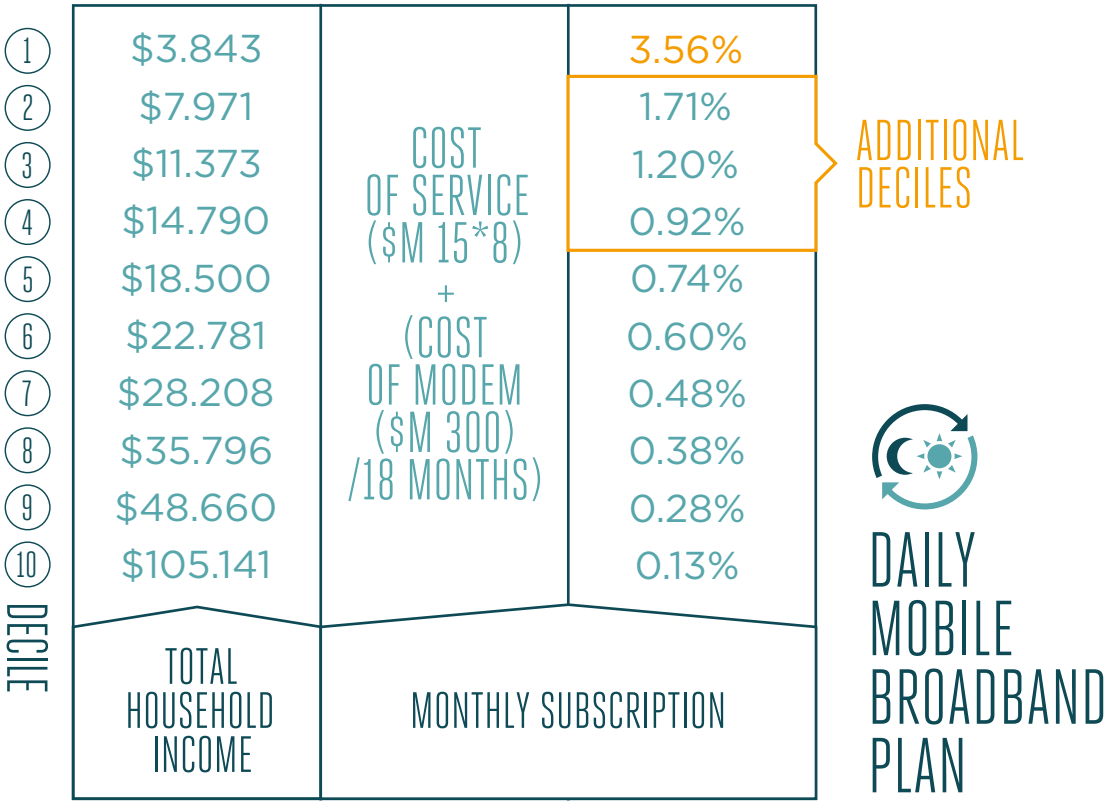
Figure 37

As observed in Figure 37, at $M 177, the basic fixed broadband product is affordable through the third decile, which is explained when observing that the penetration in this segment has reached 10% of households (see figure 37 above)[12] . Additionally, as expected, the affordability of the average fixed plan does not pass beyond the fourth income decile.

In this context, the basic mobile broadband plan does not raise the affordability to the third decile. With a monthly subscription of $M199, to which the additional prorated cost of the USB modem ($M300) must be added, mobile broadband represents 1.90% of the monthly income of households in the third decile. The contribution of mobile broadband to the affordability for Mexican households is based on the possibility of having daily service for eight days, as was the case in the earlier examples (see figure 38).

12. It is important to mention, however, that this product is offered by the cable operators only in a portion of the Mexican territory

AFFORDABILITY OF DAILY MOBILE BROADBAND PLAN



Source: INEGI; Euromonitor; TAS analysis

Figure 38

At $M 15 for daily use, the cost of purchasing services for eight days plus the prorated cost of the USB modem makes mobile broadband affordable to households in the second decile. Based on this analysis, to reach the first decile, the daily price of broadband should be reduced to $M 9.50, combined with the bonus of the USB modem.

Conclusion

In conclusion, broadband in Mexico has significantly grown in recent years. However, mobile broadband has not grown at comparable rates when compared to the other countries in the region due to a relative stabilization of the prices.

On the other hand, the introduction of a basic fixed broadband product at moderate prices has helped to increase adoption in the highest segment at the base of the pyramid (third decile). Even in this context, mobile broadband, through its daily offer, can help to increase the affordability, to the extent that it offers an affordable product through the second decile.

Bibliography

Euromonitor International (2012). Passport database. London and Chicago.

Katz, R. Broadband Strategies Toolkit: Driving Demand for Broadband Networks and Services. World Bank: June 2013.

InfoDev (2012), "Mobile Usage at the Base of the Pyramid in South Africa". Available on the web: www.infodev.org/en/Publication.1193.html

NsrinJazani, Ahdiedh y Khatavakhotan, Sadat (2011) "A novel model for estimating bottom of the pyramid market size in IRAN based on inflation rate and income rate", IPEDR vol.13 (2011) IACSIT Press, Singapore

Prahalad, C.K. y Hart, S.L *"The Fortune at the Bottom of the Pyramid"* in Strategy and Business 26: 54-67

Prahalad, C.K. The Fortune at the Bottom of the Pyramid. Wharton School Publishing, 2004)

Prahalad, C.K. y Coimbatore Krishna (2010). The fortune at the bottom of the pyramid: eradicating poverty through profits. Upper Saddle River, NJ: Wharton School. p. 407. ISBN 978-0-13-700927-5.

Shah, Anup (2013), "Poverty Facts and Stats", Global Issues. Enero 2013. Available at: www.globalissues.org/article/26/poverty-facts-and-stats

DANE, "Gran Encuesta Integrada de Hogares" (2012), Available on request www.dane.gov.co

IBGE, "Pesquisa Nacional por Amostra de Domicilios" (2012), Available at: www.ibge.gov.br

INDEC, "Encuesta Permanente de Hogares" (2012), Available at: www.indec.gov.ar

INEC, "Encuesta Nacional de Empleo Desempleo y Subempleo" (2012) – ENEMDUR – Módulo "Tecnologías de la Información y Comunicaciones", Available at: ww.inec.gob.ec

INEGI, "Encuesta Nacional de Ocupación y Empleo" (2012) - Módulo sobre Disponibilidad y Uso de Tecnologías de la Información en los Hogares, Available at: www.inegi.org.mx

For the full report on please visit
www.gsma.com/latinamerica/