



Telecommunications Sector in Latin America

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EXECUTIVE SUMMARY

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Given macroeconomic and political instability, the investment rate of the region tends to be low, leading to poor infrastructure, in particular, for telecommunications. Regulatory environments do not provide stable conditions for investment, presenting a further barrier to investment in the sector. As demonstrated by the reduced amount of radio spectrum allocated in the majority of the countries of the region by national governments, the environment is not very attractive to investment. In this context, the region lags behind considerably in the adoption of technologies: 4G has just become in 2019 the most used technology to transmit data, with only a few countries having plans to start the use of 5G. In addition, as the region consists of huge megalopolises with vast tracts of low population density, it requires efficient and clear incentives for investment.

Patterns of consumption have been changing rapidly for regional users, similar to many other regions in the world. Easier access to devices, digitalization of entertainment and the increase of streaming & mobile applications have contributed to a rapid increase in data consumption and mobile connectivity. In the coming years, this trend is expected to continue. This represents a challenge for the regulatory bodies to guarantee an environment adapted to these changes, and for companies that will need to continue adapting to the new demands.

The regional market is concentrated and dominated by only two companies. Mexican América Móvil and Spanish Telefónica which represent together across all segments (fixed line, mobile, fixed broadband) nearly 60% of the regional market share. In some countries, local companies like Chilean Entel, Argentinian Grupo Clarín and Brazilian Oi also play – or played until recently – a relevant role. The market is likely to change in the coming years as Telefónica is disinvesting in the region and selling its operations to focus solely on the Brazilian market. Some international players with a lighter foothold in Latin America, or with a stronger focus on Central America are already showing interest, such as Liberty Latin America or Millicom, which could play a more relevant role in the near future.

The telecommunications sector could be a key tool for development. An efficient sector encourages investment from providers of the service, increases the productivity of the companies using it, creates opportunities for new business, and allows consumers to access a good quality service at affordable prices. In a region like Latin America, where productivity is low and access to public goods is limited due to problems with infrastructure, the telecommunications sector is called-on to play a key role by contributing to sectors that can promote equality, such as e-learning or e-health, enhancing sectors that are already competitive, such as agro with agtech, and creating opportunities for new developments, exporting TIC-driven services.

SECTOR SNAPSHOT



The modern telecommunications sector requires huge levels of investment in infrastructure, acquisition of rights to use the radio spectrum, brand building and commercial deployment. The sector is also strongly regulated and controlled in terms of competition practices. Investment decisions in the sector require not only a stable macroeconomic environment but, also a stable and efficient regulatory framework. Healthy macroeconomic and political environments are key for companies that invest with time frames spanning decades. In this respect, Latin America represents a challenge for the development of the sector. Although in past decades the macroeconomic environment of the region has considerably improved, crises are still recurrent. With few tools to cope with macroeconomic shocks, the economic challenges tend to translate into political ones. In the next chapter of this paper, we analyse the improvements there have been in the region in recent decades and show how the mechanisms in place to manage the economy and coordinate public actions are nonetheless still weak, as demonstrated by the COVID crisis.

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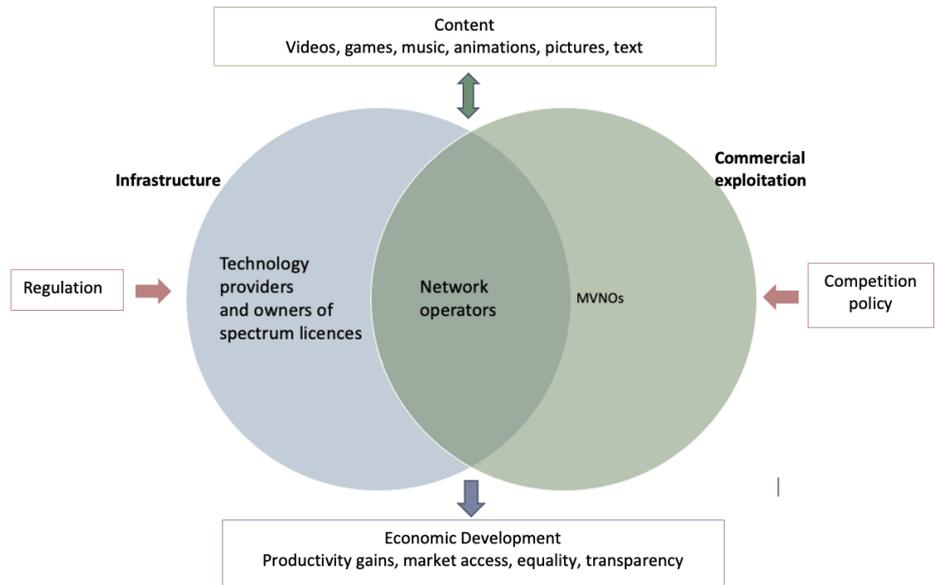
The complexity of the telecommunications market is formidable. It includes a variety of players providing technology and content; many of them new, as they are either undertaking activities that did not exist a few decades ago or are part of the sector transformation where massive mergers and acquisitions took place. Millions of consumers use telecommunications every second; their needs are changing constantly and volatility in their patterns of consumption reflects this. The huge increase in data usage all around the world has led to massive investment in technologies. Regulation is a key component of the market and takes place at different levels: international, national and, in some cases, at subnational level. Competition authorities also participate in the market to guarantee that consumers are enjoying the service at affordable prices.

As shown in Chart 1.1, the telecommunications market can be described as the interaction of two different and complementary activities. The first one consists of the technology and physical infrastructure. The second one focuses on commercial exploitation of the data (voice, internet, media) that runs through that infrastructure. The infrastructure segment is formed by a number of actors that produce that infrastructure, commercialise it and offer it for use by other actors. This ranges from producing or placing into orbit satellites, to building and managing towers, setting up cable networks, and developing or manufacturing devices (PC, routers and mobile phones, for example). This activity has changed substantially as the technology evolved, moving rapidly from 2G to 5G in the past 20 years, thus multiplying by 10 the data transmitted in the past decade. The number of users also doubled between 2010 and 2020. Constant investment in technology has therefore been necessary.



A few major players are operating in the sector. In Latin America, for example, American Towers and SBA operate around 50,000 towers. As owners of submarine cables, Globenet, Seaborn Networks, and even Google and Facebook are now present, alongside network operators such as Telefónica and América Móvil. A key element of the infrastructure is the Radioelectric spectrum that is managed by governments. Network operators obtained its exploitation through different allocation schemes which are examined later in this paper.

Chart 1.1: Market structure



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The second activity consists of commercialising data (voice, media, internet) flowing through the infrastructure (both through fixed and mobile networks). The commercial offer (bundles, pre-paid vs. post-paid, etc...), is shaped by patterns of consumption in each country and the strategy of each company. Commercialisation requires vast efforts in brand development and in constantly retaining customers, as well as searching for new ones. Network operators run most of this activity. In Latin America, Mexican América Móvil and Spanish Telefónica are the leaders in the majority of the countries and most segments (fixed line, mobile, fixed broadband). Some local operators in countries like Brazil, Argentina and Chile also have some presence but they have not managed to expand regionally. As a consequence of regulation allowing companies to share infrastructure, a new type of actor has appeared; the Mobile Virtual Network Operators (MVNOs). MVNOs are companies that rent data capacity to network operators and whose core business is to commercialise that data. They do not own any infrastructure and are solely focused on selling commercial packages to consumers. Network operators, on the other hand, both commercialise data and own the infrastructure behind it. We explore recent trends in the market and its main structure elsewhere in this paper.

Although it is not directly part of the telecommunications sector, content generation is also key to the eco-system. As customers can, and are, consuming an increasing amount of data, service providers need a huge amount of content to both satisfy that demand and sell more data. As the market develops, the

amount and type of content providers increases and changes. We explore in some detail this development in **Box 4.1 - The market of content**.

The telecommunications sector has opened-up as an opportunity for countries, like the ones in Latin America, to foster development. Efficient regulation of the market may allow not just a reduction in prices for consumers and increase the productivity of companies but can also help to expand market access to public goods that traditionally were not available, such as education and basic health care. At the same time, telecommunications can encourage companies to participate in global markets, selling knowledge-intensive services, which a few years ago was not possible. We explore the basis of this idea in **Box 4.2 - Telecommunications and Development**.

Finally, it is important to note the heterogeneity of the countries of Latin America. The differences between the countries are evident in different dimensions, including macroeconomic and political environment, capability to cope with shock, and level of investment & infrastructure. The differences are also noticeable in the functioning of the telecommunications sector, including regulation schemes, level of coverage and structure of the market. Elsewhere in this paper we provide a snapshot of each of the main relevant countries, including Brazil, Mexico, Argentina, Colombia, Chile and Peru.



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MACROECONOMIC & INVESTMENT ENVIRONMENTS

Economic activity in Latin America contracted by 7.4% in 2020 as a consequence of the COVID crisis, making it one of the most affected regions in the world. Economic recovery is expected to be slower than in the rest of the world, increasing pressure on both public finances and businesses, whilst putting at-risk the progress made in recent years to reduce inequality.

Although the picture has been gloomy for the region, some countries have managed the economic crisis better than others. Brazil and Chile, for example, experienced GDP contractions of just around 6.0%. Peru and Argentina, on the other hand, have struggled to maintain their level of economic activity and contracted by more than 10%. Mexico and Colombia showed drops a little bit above the region's average.

On a positive note, the political environment has been relatively stable. Governments have faced a substantial number of pressures linked to the management of the crisis but have kept control of the agendas without crisis escalation. However, in the majority of the countries of the region, society has become more fragmented, making less likely a return to a "smooth normality" once the COVID crisis is controlled.

Low levels of investment continue to be a challenge for the region. High macroeconomic volatility, underdeveloped financial sectors and political instability combine to limit the investment and therefore the chances to obtain productivity gains. With low investment, provision of public goods is reduced, impacting the more vulnerable among the population. The prominence of megacities, in conjunction with vast rural areas with low population density, is a big challenge for governments insofar as provision of some public goods - including the infrastructure for telecommunications, which is key for reducing inequality and fostering development.

The functioning of Latin American economies

Traditionally a region with high economic volatility, rampant inflation, unequal distribution of income and a large informal sector, Latin America has gone through a deep transformation in the past three decades. The most important factor has been a substantial reduction in the inflation rate, from above 30% in the 1990s, to below 10% in the 2010s. This was achieved thanks to a combination of fiscal discipline, increased independence of central banks, opening of the economy in many countries, and increased competition in key sectors of the economy, such as telecommunications, transport and energy, often thanks to

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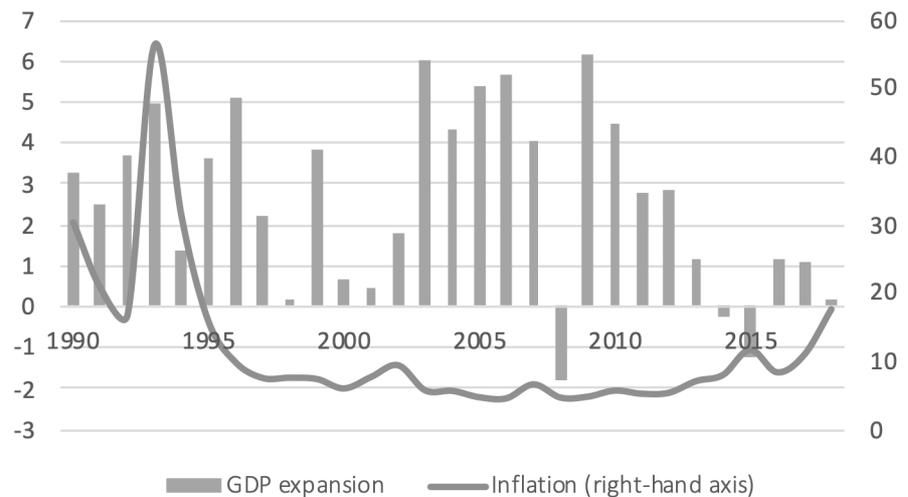
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privatisation programs. This stabilisation has helped strengthen financial sectors, expand domestic credit, decrease systemic pressure on the exchange rate, and allowed governments to focus on the provision of key public goods. Higher investments led to a reduction of informal labour markets, and the emerging middleclass adopted Western patterns of consumption. Considerable progress was made in reducing inequality; however, the region is still the most unequal globally

During the past 20 years, the expansion of GDP was driven by the dynamism of the Chinese economy. High prices of natural resource-based commodities (both food and minerals), pushed by China, kept export prices for Latin America at a record level, generating substantial amounts of resources to fuel consumption and private investment. The economy of the region dropped as a consequence of the recession of 2007 but recovered rapidly as commodity prices went up again, driven by the momentum regained by China. However, this new wave of expansion would be different from the previous one, as China started a cycle of low growth. As a result, even before the COVID outbreak, the Latin American economy was already growing at a low rate.

Chart 2.1- GDP and inflation in Latin America



Source: Baker Ing with data from CEPAL

Despite improvements in the economic sphere, the political environment continues to be relatively unstable. In recent years, several political crises have emerged in a number of countries which ended with changes of government. The most important was probably the impeachment of Dilma Rousseff in 2016 in Brazil. Changes in top-level offices through institutional crisis occurred as well in recent years, in Paraguay, Bolivia and Peru. Regardless of political crises however, the political process in the region tends to be complicated and characterised by a lack of cooperation between participants. This has created incentives for incumbents to undertake bold reforms, arguably without a clear cost-benefit analysis, which tend to be reverted once the opposition gains power. Consensus of political participants tends to be limited to a few areas of the agenda only, with a few exceptions, such as Uruguay, where continuity of policies is more frequent.

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In general, policy implementation skills are limited, with a notorious lack of coordination between different areas of the government or between different levels of government (a situation particularly relevant in countries with more federal schemes, such as Argentina and Brazil). Although some progress has been made in developing independent control mechanisms, corruption continues to be an endemic problem affecting all levels of public governance.

Box 2.1 - Heterogeneity in GDP per capita performance

In 2019, and after expanding on average by 3.9% per year since 1990, Latin America reached a GDP per capita of USD 8,340. This virtuous performance has not been homogeneous for all the countries of the region. A group of countries, made up of some Central American countries (e.g., Guatemala, Dominican Republic, Panama and Costa Rica) and Chile and Peru in South America, saw their GDP per capita expand at around 6% over the past 30 years. Costa Rica and Panama managed to reach respectively USD 12,000 and USD 16,000 of GDP per capita, with Panama reaching the status of a high-income country by the World Bank classification. Chile also experienced rapid growth, reaching a GDP per capita of USD 15,000. Peru, with a slightly lower rate, managed to achieve a GDP per capita of USD 7,000; a value similar to Colombia with USD 6,500. Mexico, Argentina and Brazil (traditionally the three biggest economies of the region) followed a more moderate expansion, and their GDP per capita is around USD 9,000 for the first two and around USD 8,000 for the latter.

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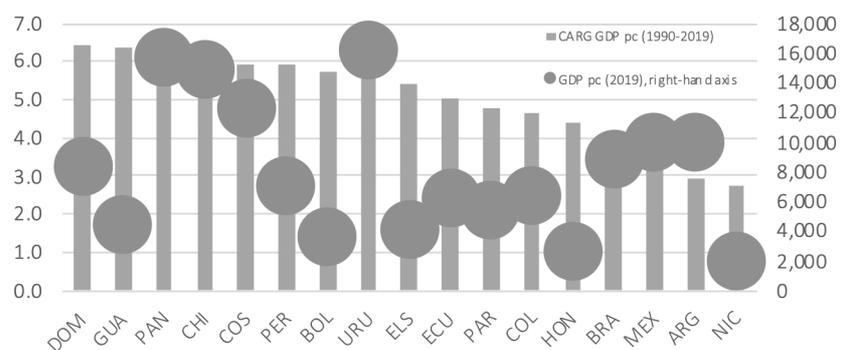
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Chart 1.2- GDP per capita and economic expansion of selected countries



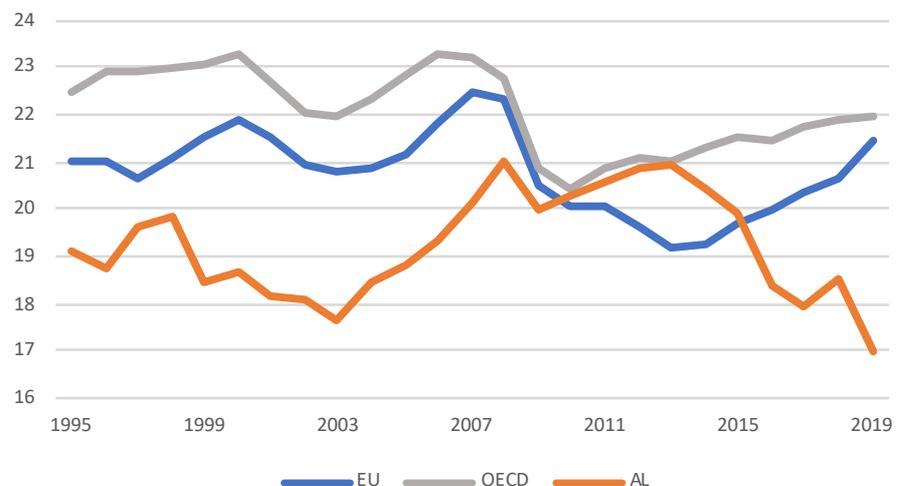
Source: Baker Ing with data from CEPAL

Low levels of investment as a challenge



The combination of an unstable macroeconomy, underdeveloped financial sector and volatile regulation, has resulted in a relatively low level of investment in Latin America. In the past 30 years, gross fixed capital formation averaged 19.2% of GDP, well below the average of 22.3% in OECD and the 20.8% of the EU. Investment in the region tends not only to be lower than in rich countries but, also more volatile, as both global and regional factors are relevant. Decisions for investment in the region follow global fundamentals, such as global financial conditions (macro and corporate) and growth. In this context, the global recession of 2007, for example, affected the capability of firms globally to invest, which impacted upon Latin America. However, decisions on investment are also explained by factors specific to the region. The peak in investment in the middle of the 1990s was explained by privatization programs in the region, mainly in utilities. The rapid increase in the first decade of the 21st century was driven by an increase in prices of commodities exported by the region. Similarly, the drop in prices of commodity in the last decade, in good part driven by the deceleration of the Chinese economy, substantially affected investment in the region in two ways; directly, as commodity exports decelerated, and indirectly as a result of reduction in income because of the drop in exports.

Chart 2.2 Gross fixed capital formation in Latin America, EU and OECD (% GDP)



Source: Baker Ing with data from CEPAL and OECD

Low levels of investment have led to a limited infrastructure. Latin America suffers from a deficit of infrastructure in the majority of key public goods that are relevant to increasing productivity and fostering economic growth. According to the World Economic Forum, the main countries of the region have worse infrastructure than European countries, such as the UK or Spain, in transport, utilities and Information & communication technologies (ICT). The lack of infrastructure reduces productivity. It impacts both the time required to perform activities, as well as the cost of doing them. Limited stock of capital has also impacted the potential of business creation. As a result, the region cannot fulfil its export potential, reducing the inflow of USD, and therefore increasing the chances of foreign exchange rate crises.

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Chart 2.3 - Index of quality for different type of infrastructure



Source: Baker Ing with data from World Economic Forum

Box 2.2 - Regional Demographics: a challenge for public goods

With an accumulated average growth rate of 1.7% in the past 50 years, the population of Latin America totalled 642 million in 2020. The increase in population has been driven by rapid urbanisation. The urban population was 57% in 1970 but had reached 82% by 2020. This trend has been present in all the LATAM countries, with Brazil being one of the most rapid in urbanising its population (from 53% in 1970 to a current 87%). The urbanisation process has been driven in several cases by expansion of the primary city. This has been the case, for example, of Sao Paulo in Brazil, Bogota in Colombia, Santiago in Chile, and Lima in Peru where the proportion of the population of the country living in those megacities increased. In the past 50 years the proportion of the population living in Sao Paulo increased 2pp, 5pp in Bogota and 8.5pp in both Lima and Santiago. This process of urbanisation has meant that Latin American cities are now hosting 365 million more inhabitants than half a century ago. Without a proper plan for urban development, the massive mobilisation of people to few cities has reinforced some of the problems which already existed, such as poor living conditions, restricted access to formal job markets, and restricted access to public goods.

The pattern of urbanisation in Latin America has created a double challenge for the provision of public goods. Firstly, the rapid process of agglomeration in few cities has created a problem in the provision of health, security, transport and telecommunications. Although the levels of density of some of the cities in the region are similar to some in the EU (for example Sao Paulo is similar to Brussels, and Lima to Paris), both the levels of income and the speed at which the process took place are substantially different. Less resources and faster changes have led to partial solutions.

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Secondly, urbanisation has meant that rural areas have decreased population density. As can be seen in Table 2.1, when the main city is excluded, the density of the country is considerably lower than European countries. Mexico, one of the big economies of the region, is the country with the highest density. However, it is still around half the density of France or Denmark. Countries like Argentina or Peru have extremely low population densities in territories that are not just vast but, also diverse and full of natural barriers for the extensive provision of public goods.

Table 2.1- GDP per capita and economic expansion of selected countries

Country/Main city	Main City			Country	
	Population		Density 2021	Surface	Density (excluding main city)
	(in M)	(% of country)	(p/km ²)	(in M per k ²)	(p/km ²)
Argentina/Buenos Aires	13	28.2	3,277	2.7	12.0
Brazil/Sao Paulo	22	10.1	8,000	8.4	22.7
Colombia/Bogota	11	21.1	3,485	1.1	36.5
Mexico/DF	20	15.8	6,200	1.9	57.2
Peru/Lima	10	29.4	3,572	1.2	19.4
France/Paris	12	19.1	3,800	0.6	96.2
Ireland/Dublin	2	38.8	4,811	0.1	31.3
Belgium/Brussels	1	4.3	7,400	0.03	370.0
Denmark/Copenhagen	2	34.5	1,200	0.04	90.5

Source: Baker Ing with data from CEPAL

Although the double problem of megalopolis/low rural density is shared for all the public goods that require fixed infrastructure, it is a particularly relevant issue for telecommunications. The technology required in cities to provide mobile services requires higher frequency bands, with a lot of base stations. However, to provide mobile services in rural areas, low frequency bands are required, without the need of many base stations; these bands have a limited capacity to carry large amounts of data.

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Effects of COVID on the macro and political spheres

The collapse of the global economy is estimated at around 3.5% in 2020. Latin America, just like the rest of the world, was hit heavily by the COVID crisis. However, the region was one of the worse affected parts of the world, collapsing by 7.4%. The recovery is expected to be slower than in the rest of the world for the next two years, increasing macroeconomic risk and business performance in the region.

A combination of structural factors has amplified the effects of the COVID crisis in the region and/or made it particularly difficult to manage the crisis. Firstly, the large size of the informal economy has meant that assistance packages (both to businesses and individuals) have not fully, or evenly, reached the population. The unequal coverage of public goods (in particular health and education) has also made it difficult to assist a good part of the population. Indeed, the risks of sanitary collapse, due to poor coverage of health facilities, has forced some governments to impose extended and harsh measures on movement and social distancing, artificially limiting economic activity. Secondly, the capabilities of states to react to rapid changes are limited. A considerable number of inefficiencies in the day-to-day management have reduced the ability to set agreed agendas, and a lack of experience in coordination between different areas and levels of governments has combined to result in slow and inefficient reaction. In addition, capabilities of some countries to use financial resources without accelerating inflation are more limited than in regions such as the EU or the US, due to harder conditions to access sovereign-debt markets.

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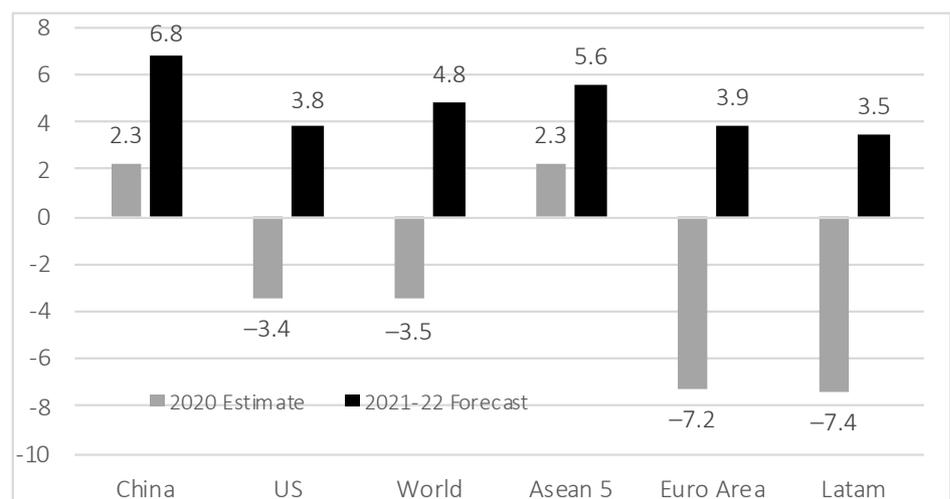
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Chart 2.4 - GDP growth of selected regions and countries (2020 and 2021-2)



Source: Baker Ing with data from IMF

Although the financial position of governments was fairly balanced at the beginning of the crisis, the outstanding fiscal efforts made by Latin American countries are leading to substantial deficits that may destroy the gains of recent decades in terms of fiscal discipline and provision of public goods. This crisis management has also substantially changed the political and economic agenda,



which used to focus on economic reforms (fiscal discipline, trade liberalisation, strengthening of the business environment, financial coverage expansion and inclusion of workers in formal markets), and is now placing emphasis on the COVID crisis management. How long the countries will need to return to a pre-crisis agenda, and what that agenda will look like in the future, remains unclear.

Although the macroeconomic performance of the region has been poor due to the COVID crisis, some differences can be seen between the most important countries. In terms of GDP, Brazil (-5.8%) and Chile (-6.0%) have managed to cope with the pandemic substantially better than the average of the region. At the other end of the spectrum, Argentina (-11.8%) and Peru (-13.9%) struggled to maintain economic activity, with two-digit collapses in both countries. Colombia (-8.2%) and Mexico (-9.0%) showed big drops, aligned with the average of the region. With the exception of Argentina, inflation has not been a problem and values in 2020 are similar to those experienced pre-COVID. On the contrary, unemployment has become a significant problem; in all the countries of the region, unemployment has increased substantially. Peru, Colombia and some countries of Central America were the most affected.

Table 2.2: Economic performance pre and post-COVID

	GDP			Inflation			Unemployment		
	Av 2018- 19	2020	2021	Av 2018- 19	2020	2021	Av 2018-19	2020	2021
Argentina	-2.3	-11.8	4.9	43.9	36.1	30.0	9.5	11.0	10.1
Brazil	1.2	-5.8	2.8	3.7	2.7	2.9	12.1	13.4	14.1
Chile	2.5	-6.0	4.5	2.3	2.9	2.7	7.3	11.4	10.2
Colombia	2.9	-8.2	4.0	3.4	2.4	2.1	10.1	17.3	15.8
México	0.9	-9.0	3.5	4.3	3.4	3.3	3.4	5.2	5.8
Perú	3.1	-13.9	7.3	1.7	1.8	1.9	6.7	12.5	8.8

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Looking ahead, overall economic activity is expected to recover slowly. According to IMF estimates, GDP by the end of 2022 will be just 99% of pre-COVID's in the region. The picture is again country-by-country specific. The Chilean economy is expected to finish 2021 reaching 98% of the value it had before the crisis started; for Peru, that number is just 92%. In general, the retraction of the economy will present a challenge in employment creation, with the unemployment rate staying high in the medium term. The combination of slow growth and high unemployment will present pressure on the fiscal front for some countries. However, in a best-case scenario, in which the rollout of vaccination gains momentum as global logistic problems are resolved, we do not expect major political disruptions.

Positively, and despite the economic crisis, the political environment has remained relatively stable. Governments in all the countries of the region, as has also been the case in good part of the OECD, came under a lot of pressure to manage the economic and health crisis. Reaching the balance between health and economic activity has been a difficult task as societies become more and more

divided about the optimal response. As new developments unfold (information about capability of health systems to cope, reactions in other regions and countries, new variants of the virus, developments in treatments, etc...), governments in several instances altered their plans, resulting in inconsistencies, mistakes and lack of clarity in the crisis management. Despite this generalised dynamic, no political crises spread across the region (Paraguay has been the main exception where an event of civil unrest unfolded in March 2021). However, it seems that, in the majority of the region's countries, society has become increasingly fragmented in political terms, making a smooth return to normality, once the COVID crisis is controlled, less likely.

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INFRASTRUCTURE, TECHNOLOGY & REGULATION



The proportion of people connected in Latin America, and of households with broadband and mobile broadband, has increased substantially in recent years. Internet penetration grew by 103% between 2010 and 2016, from 22.4 to 44.5. More specifically, in 2010, up to 6.5% households had a fixed broadband and the same number mobile broadband; In 2016, these figures rose to 11% for fixed broadband and 64% for mobile broadband. This is in line with trends in the rest of the world, although the levels of connectivity remain lower than in OECD countries. This trend is expected to continue in the coming years, although the preponderance of certain segments (broadband, fixed telephony, mobile) of the market will depend on various macroeconomic factors and general infrastructure deployment.

Levels of investment in general are indeed low for Latin America, and telecommunications is not an exception. ICT infrastructure is poor for rich countries' standards and this is reflected in the relatively poor-quality service and high prices in the region. There are a number of challenges for telecommunications infrastructure to reach higher levels, including overall macro-economic health, political environment and regulatory schemes. The combination of few huge metropolis (such as Sao Paulo or Mexico DF) and vast land with low density of population, such as Argentina, is an additional challenge for telecommunications infrastructure deployment.

Although most countries have regulation and competition agencies in place, as well as plans for a digital economy, capacity for implementing policies tends to be poor. This leads to slower than required responses from governments for the creation of a framework that encourages investment. The slow process of allocation of the radio electric spectrum needed for the development for 4G and 5G technologies (around 25% of international recommendations) impacts the actions of companies, as well as quality of service and prices paid by customers.

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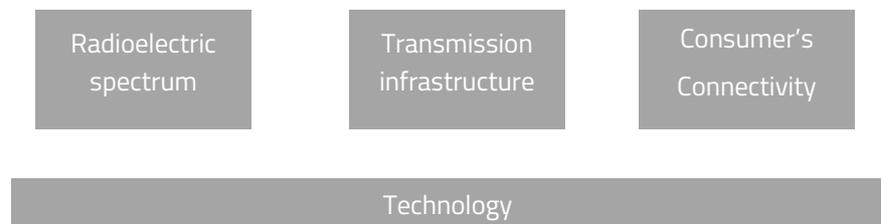
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Infrastructure for telecommunications

The telecommunications sector is a capital-intensive one, in which regulation by governments plays a crucial role in achieving the right amount of investment and coverage of the population at affordable prices. Both the physical and non-physical infrastructure required in the telecommunications sector creates a complex network of actors and companies. Constant technological innovation, sustained increase in the number of users with diverse needs, multiple applications of technology in almost all the industries, and the adaptation of regulation to new circumstances make telecommunications an extremely complex sector. In order to simplify, we can say that infrastructure in the telecommunications sector has three main pillars; the radioelectric spectrum, the physical infrastructure for information transmission, and the devices used by the final consumers.

Chart 3.1 - Main components of the infrastructure for the Telecommunications sector



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Radioelectric Spectrum

The first pillar is the radio spectrum. It is used to carry information wirelessly for a vast number of everyday services, ranging from television and radio broadcasting, mobile phones and Wi-Fi to communications systems for the emergency services, baby monitors, GPS and radar. Radio waves constitute just one portion of the entire electromagnetic spectrum which also includes a variety of other waves including X-ray waves, infrared waves and light waves. Radio spectrum is divided into frequency bands which are then allocated to certain services. For example, in Europe, the Middle East and Africa, the FM radio band is used for broadcast radio services and operates from 87.5 MHz-108 MHz. The band is subdivided into channels that are used for a particular transmission, so the individual channels in the FM band represent the separate broadcast radio stations.

In basic terms, lower frequency bands provide wider coverage because they can penetrate objects effectively and thus travel further, including inside buildings. However, they tend to have relatively poor capacity. Higher frequency bands don't provide as good coverage because the signals are weakened, or even stopped, by obstacles such as buildings. However, they tend to have greater capacity, which allows more information to be carried. As a consequence, low frequency bands allow mobile operators to provide very wide coverage, including in rural areas, without requiring many base stations. Operators use higher frequency bands in busy areas, such as cities and town centres, where lots of people use mobile



broadband services — although this means lots of base stations are needed because the signals don't travel far. With increased data usage, demand for frequency bands increases. Operators are looking to acquire both more sub-1 GHz spectrum to extend mobile broadband into rural areas (especially in emerging markets), and more higher frequency bands including spectrum band above 3 GHz, to accommodate busy urban areas.

Useable radio spectrum is a scarce resource and is regulated by national governments. There are two instances of government intervention in the market of radio spectrum. Firstly, governments from different countries work collectively through the International Telecommunication Union (ITU), a United Nations agency, to allocate specific bands to certain services on a global or regional basis. This helps limit international interference and reduces the cost of mobile phones because it encourages nations to adopt compatible approaches that drive economies of scale.

Secondly, at national level, governments manage the national spectrum. The telecommunications sector is regulated by the national regulator which controls access to this spectrum through a licensing framework, granting companies the exclusive rights to use a certain frequency band in certain areas and at certain times. Giving an entity the exclusive rights to use a certain band means it can guarantee a certain quality of service because it controls all aspects of the network operating on that specific frequency. These rights are protected so that if any other entity uses this licensed frequency band, or causes interference to it, it can be compelled to stop.

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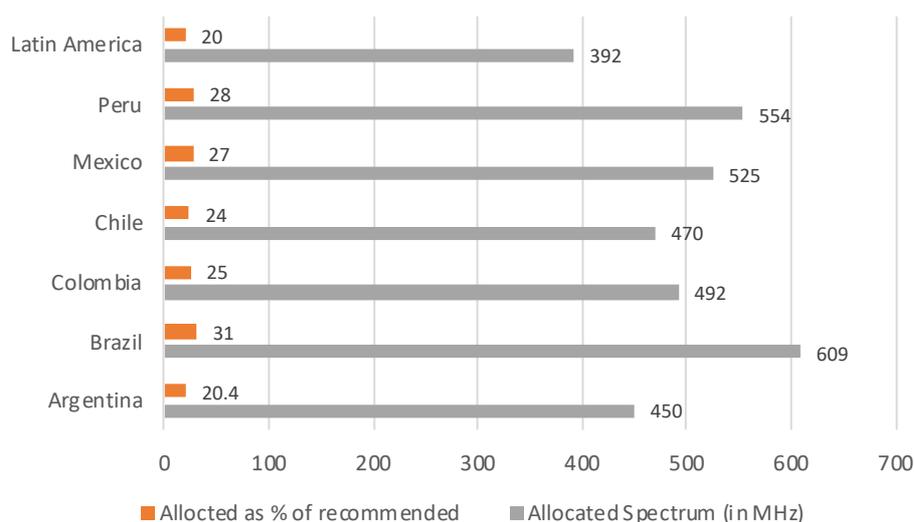
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Chart 3.2 - Allocation of Radioelectric Spectrum in Latin America



Source: Baker Ing with data from GSMA

Transmission Infrastructure

The second pillar is the infrastructure that is required for the transmission of information. The physical infrastructure includes a number of different hardware equipment, but the key ones can be summarised here.



Submarine cables:

As of early 2021, there are approximately 426 submarine cables in service around the world. The total number of cables is constantly changing as new cables enter service and older cables are decommissioned. As of 2021, we believe there are over 1.3 million kilometres of submarine cables in service globally. Some cables are quite short, like the 131 kilometres Celtix Connect cable between Ireland the United Kingdom. In contrast, others are incredibly long, such as the 20,000 km Asia America Gateway cable. Cables were traditionally owned by telecommunications carriers who would form a consortium of all parties interested in using the cable. In the late 1990s, an influx of entrepreneurial companies built lots of private cables and sold off the capacity to users. Both the consortium and private cable models still exist today, but one of the biggest changes in the past few years is the type of companies involved in building cables. Content providers such as Google, Facebook, Microsoft and Amazon are major investors in new cables. The amount of capacity these companies deploy has outpaced internet backbone operators in recent years. Faced with the prospect of on-going massive bandwidth growth, owning new submarine cables makes sense for these companies. Cable capacities vary a lot. Typically, newer cables are capable of carrying more data than cables laid 15 years ago. The new MAREA cable is capable of carrying 224 Tbps. Both Facebook and Google are continuing to build new submarine cables, such as the Havfrue cable in which they are both investors.

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Table 3.1 Main submarine cables in Latin America

Cable	Location	Length (km)	Owner	Inauguration
SAC	AO-CS-PO	20,000	Telecom Italia Sparkle, Lumen	2000
Atlantis-2	AO-Europe	8,500	Embratel, DT, Telecom Italia, Telecom Argentina, Telxius, Altice Portugal, Orange, AT&T, BICS, KT, Singtel, Verizon, BT, etc	2000
Seabras 1	BRA-US	10,800	Seaborn Networks, Telecom Italia Sparkle	2017
SAM 1	AO-CS-PO-US	25,000	Telxius	2001
Malbec	ARG-BRA	2,600	GlobeNet, Facebook	2021
Tannat	ARG-URU-BRA	2,000	Google, Antel Uruguay	2018
Monet	BRA-USA	10,556	Angola Cables, Google, Algar Telecom, Antel Uruguay	2017
AMX-1	BRA-CS-MEX-USA		América Móvil	2014
GlobeNet	BRA-CS- USA	23,500	GlobeNet	2000
BRUSA	BRA-CS-USA	11,000	Telxius	2018
Curie	CHI-PAN-USA	10,476	Google	2020
PAC	CS-MX-USA	10,000	Lumen	2000
EllaLink	BRA-Portugal	6,200	EllaLink	2021
Aurora	PO-CS-US	6,500	FP Telecommunications	2022

Note: Embratel, Deutsche Telekom, Telecom Italia Sparkle, Telecom Argentina, Telxius, Altice Portugal, Orange, Telefónica Larga Distancia de Puerto Rico, AT&T, BICS, KT, Singtel, Tata Communications, Verizon, BT, Orange Polska

Source: Baker Ing with data from TeleGeography

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Telecommunication towers:

There are around 4.7M of communication towers worldwide, including around 180,000 in Latin America. Around 52% of a telecommunications towers in the region are owned by independent tower companies, and around 80,000 are owned by network operators. Among the independent tower companies are included strategic players, such as American Towers (owning around 40,000) and SBA (with around 15,000), along with a host of other companies supported by the world's leading investment funds: Grupo Torresur with 7,000 (Providence Partners), ATP (Colony Capital), PTI (Blackstone), BTST (Cartesian), and others. These tower companies have established their business by purchasing existing tower portfolios from MNOs or by commissioning new towers and then making them profitable through efficient operation with a strong focus on the sale of excess capacity. Tower companies are expanding their value-added services offering to include energy management, the sale of fibre optic capacity, and the construction of other types of infrastructure. This includes the deployment of networks for the Internet of Things, distributed antenna systems (which allow us to be online in subways, stadiums and convention halls), or edge computing, which brings data storage closer to major consumption points. The next generation of mobile technology, demand for which will proliferate will technologies such as autonomous cars, will require an enormous densification of existing networks. This translates into thousands upon thousands of new sites to support what many believe will be the largest infrastructure investment program in history. This will require tower companies, governments, cities, and MNOs to work together to ensure efficient deployment.

Internet Data Points (IXPs):

Traditionally, the IXPs that most of the region's telecommunications operators used for interconnection was located in Miami. This prompted the creation of points through which telecommunications operators connect with content delivery networks. The fact that the region's telecommunications operators exchanged traffic in Miami created delays in content traffic that affected the quality of services and generated additional costs to compensate international broad-band operators that delivered the data to and from Miami. In recent years, there has been a proliferation of IXP in the region. In the first quarter of 2021 Brazil has more than 130 IXPs, Argentina 27, Chile 4, Mexico 3 and, Peru and Colombia 2 each.

Connectivity

Latin America totalled around 430 million people with mobile subscriptions, representing the 78% of the population. This figure is high for the developing economies and a little low by OECD standards (North America is 88% and Western Europe 85%). In the region, there are around 510 million smartphones, with Samsung representing around the 45% of the data usage, Motorola 22% thanks to its big participation in Mexico, and Huawei with around 10%.

In terms of internet speed, the average in Latin America was 34.5 Mbps in 2020, almost twice the 14.7 Mbps of 2018. Despite this increase in speed, the region performs below areas like Asia Pacific or the US, where the figure reached 90



Mbps, or Western Europe at 72 Mbps. When desegregated into mobile and fixed, we can see that the region is well below the world average in both segments.

Chart 3.2 - Internet Broadband download speed (In Mbps)

Country	Mobile (Q4 2020)	Fixed (Q3 2019)
Argentina	27.9	44.5
Brazil	28.1	66.2
Colombia	18.2	36.8
Chile	19.5	129.1
Mexico	31.9	42.2
Peru	22.8	35.2
World Average	47.2	91.6

Source: Baker Ing with data from GSMA

Technology

Changes in technology have been a key factor shaping the telecommunications sector. Technology has evolved thanks to new companies, changes in consumption patterns, and the role of governments in supporting adoption. Nowadays mobile communication in Latin America is mainly done using the 4G and 3G technologies. In 2020, for the first time, 4G technology has concentrated more than 50% of the connections. It is expected that in the next five years 4G will become the dominant technology, with 5G technology to emerge as a growing alternative.

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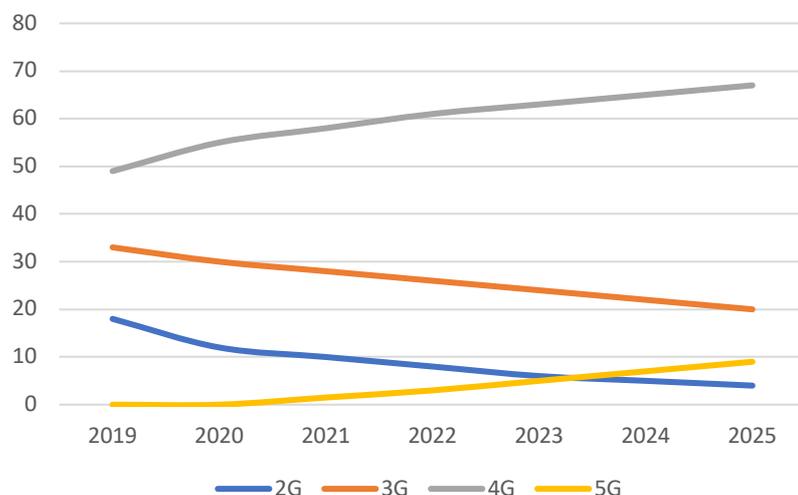
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Chart 3.3- Percentage of Connection by technology in Latin America



Source: Baker Ing with data from GSMA

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Since the invention of the concept of modern mobile communications, by Bell Labs in 1947, there have been a number of breakthroughs. Prior to the adoption of cellular networks, mobile communications systems used a single high-power base station to cover a wide area. The big technological breakthrough was cellular technology, based on the idea that the spectrum is re-used across a given area. This means several phones can use the same frequency channel as long as they are connected to different base stations or “cells” that are sufficiently far apart. It also means that when a user drops out of range of one base station, their call can be handed over to another allowing them to continue the conversation. In 1978 the first generation of cellular networks (named 1G networks) were launched. However, a variety of different and incompatible types of 1G mobile network technologies rapidly grew up around the world (AMPS, NMTS and TACS), reducing the chances of globalising the services, and maintaining expense by restricting economies of scale.

In the early 1990s, a new generation of digital-based mobile networks, Global System for Mobile communications (GSM) or 2G, appeared. The GSM could convert phone calls into binary digital code. It was possible to encrypt and compress the data, making the services more secure and spectrum efficient. This allowed the system to be able to support far more users, leading to mass adoption. At the same time, GSM technology allows a single frequency band to support several different users. As GSM was designed by the mobile community to be fully interoperable, the same devices and network equipment could be sold globally, helping to bring down prices and allowing consumers to roam on foreign networks for the first time. Although 2G networks were designed for voice communications, they started to support data services; initially with Short Message Services (SMS) then subsequently with a dedicated general-purpose data connection. Technologies such as General Packet Radio Service (GPRS or 2.5G) increased speed to 56–114 Kbps, and the Enhanced Data Rates Evolution (EDGE or 2.75G) could support speeds of over 200 Kbps. The growing use of 2G networks for data services led to the first smartphones and data cards that could connect laptops to the mobile network, enabling email and web access.

The rise of the internet in the 1990s, coupled with the first fixed broadband deployments, led to the mobile industry planning third generation mobile systems that were built from the outset to support highspeed data services. The new 3G networks, that went live early in the new century, used CDMA technology which enables more efficient spectrum use. The vast majority of networks globally used Wideband CDMA (WCDMA) technology, which was the natural evolution from 2G GSM systems. In order to improve the mobile data experience and accommodate increase connection speeds, a series of upgrades were made to 3G networks. In 2005, the first network was upgraded to support High Speed Packet Access (HSPA), which allowed download speeds of up to 14.4 Mbps and became known as 3.5G. Since then, further upgrades, including HSPA+, accelerated speeds up to 42 Mbps and beyond.

The growth in mobile data usage was so fast that the industry started planning a major new network upgrade based on the Internet Protocol (IP). The new technology, Long Term Evolution (LTE), known as 4G, enables data speeds of up



to 100 Mbps. The introduction of LTE-Advanced opened the door for even higher speeds. 4G uses OFDM technology which is far more spectrum efficient. The OFDM technology is also used for fixed broadband systems, Wi-Fi and digital TV. 5G is expected to support significantly faster mobile broadband speeds. The 5G technology will be able not only to preserve a rapid expansion of the most popular mobile applications, such as on-demand videos, but it will enable the full potential of the Internet of Things. From virtual reality and autonomous cars, to the industrial internet and smart cities, 5G will be at the heart of the future of communications.

Regulation and competition

The telecommunications sector has a number of challenges that require a regulation framework and competition policies. Limited amounts of infrastructure can create problems as consumers cannot receive services, or there is not enough competition. Since investment in broadband infrastructure deployment is recovered through final customers' subscriptions, private telecommunications operators have little economic incentive to offer services in areas of lower population density. Moreover, passive infrastructure represents a large part of the cost of building telecommunications networks. Civil works (enclosures, ditches, ducts, etc...) can account for more than half the cost of deployment for a fibre optic network, which could present a barrier to entry for new operators. Finally, a significant part of passive infrastructure in telecommunications is also needed by other sectors (e.g., gas, water and electricity).

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In this context, an effective public policy must achieve different goals simultaneously. In order to do so, countries need to develop a broad range of policies that can be grouped in four categories.

Legal and Institutional Framework:

Digital telecommunications are characterised by the convergence of services provided by companies from industries that were traditionally in sectors with different regulatory schemes (telephony, radio, television, internet, digital content, etc...). The legal and institutional framework for digital telecommunications must adapt both its organisation and allocation of the roles of actors responsible for executing public policy (including ministries and regulatory authorities), as well as their main laws and regulations (e.g., the telecommunications framework laws). The institutional architecture requires a high level of strategic direction and coordination among different agencies. In the current environment, legal frameworks tend to define the service more than the technology (technological neutrality), while regulatory and policy agencies tend to have more transversal roles that include all industries, companies, technologies, and interactions within the new digital ecosystem.

Regulation on Infrastructure Development and Access:

The expansion of new generation networks (like 4G and 5G) is the basis for the adoption of ICT by a broad segment of the population. Infrastructure regulation must address the dual objective of promoting private investment to the greatest extent possible whilst taking into consideration more disadvantaged segments or



areas with higher cost access. Efficiency in resource allocation (e.g., Radioelectric spectrum policies) and the use of available infrastructure (infrastructure sharing) must be combined with effective use of universal service and access in order to promote infrastructure in more disadvantaged areas.

Regulation of Competition and Consumer Protection:

The deployment of ICT infrastructure has strong economies of scale & reach, and network effects. This leads to a portion of telecommunications networks becoming essential inputs that must be regulated to avoid anti-competitive behaviours. At the same time, the highly dynamic environment has tended to increase the importance of regulations aimed at correcting behaviours which are disadvantageous to consumers or reduce the incentive for companies to invest and innovate. Within the digital convergence environment, competition regulation also has an economic impact on mergers and acquisitions among companies in sectors that have been traditionally different but, start providing the same services.

Public Policies for the Digital Economy – Digital Agendas:

The digital ecosystem touches all sectors of the economy. From a demand perspective, public policies should aim to increase the capacity of people and organisations within such sectors to adopt, and therefore take advantage of, the benefits offered by ICTs. These public policies have a transversal focus and encompass a wide variety of sectors, such as digital finance, agtech, education and healthcare, and digitization of the public sector. Given the transversal nature of these policy actions, it is essential they be structured as policy instruments, such as digital agendas and broadband plans. These instruments enable adequate prioritisation and improvement in coordination, encouraging synergies and strengthening supervision & monitoring mechanisms.

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Table 3.3 Assessment of Governance of the digital economy in Latin America

Country	Legal and Institutional Framework	Regulation of infrastructure development and access	Regulation of competition and consumer protection	Public policies for the digital economy	Authority	
					Regulation	Competition
Argentina	2.7	1.8	2.7	3.0	ENACOM	CNDC
Brazil	2.3	2.3	2.7	3.0	ANATEL	CADE
Chile	1.0	2.0	2.4	3.0	SUBTEL	TDCL
Colombia	3.0	2.3	2.0	1.7	CRC	SIC
Mexico	2.3	2.8	2.7	2.3		IFT
Peru	2.0	2.3	2.4	1.3	OSIPTEL	INDECOPI
Regional Average	2.2	2.2	2.5	2.2	-	-

Source: Baker Ing with data from Inter-American Development Bank

Note: The index showed represents for each of these pillars the level of compliance of each country in comparison with the OECD standards. A number 1 indicates Delayed in compliance, the 2 In the process of complying and the 3 Compliant or in advanced level of compliance.

As can be seen in Table 3.3, Latin American countries are below the OECD standards in terms of compliance with regulation. However, in general, countries have made progress in terms of designing plans and strategies for the digital economy. They have also made progress adapting a-priori the functioning of the state to cope with the new challenges of the digital economy. The greatest progress has been made in establishing regulatory frameworks to encourage competition and protect the consumer.

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COMMERCIALISATION OF DATA & NETWORK OPERATORS

The market of network operators is controlled by two main companies in the region: Spanish Telefónica and Mexican América Móvil. They operate in the major markets and in each of the three segments we have analysed (fixed telephony, mobile, broadband). In some of these markets, some local historical operators are present with strong market shares, such as Clarín in Argentina, Oi in Brazil or Entel in Chile. In contrast with Telefónica and América Móvil, they haven't managed to develop a regional footprint.

As Telefónica recently announced its withdrawal from the region (with the exception of Brazil), the market is redistributing. Existing players with a smaller remit may grow rapidly, and new ones could penetrate the market. This means the telecommunications landscape in the region is likely to be very different in the short-to-medium term. In Brazil, the bankruptcy of local leader Oi will also contribute to bringing significant changes to the country.

The commercialisation of telecommunications services depends as much on the level of competitiveness in each country as on the socio-economic behaviours of the users, who could skew the commercial offer towards their pattern of consumption (impacting, for example, pre-paid/post-paid or mobile broadband/fixed broadband ratios). Revenues, in general, are not as high as in other regions, making penetrating the market more prone to risk, in spite of enthusiastic adoption behaviour from Latin Americans.

Trends in data consumption

Countries in Latin America have massively embraced transformation of the telecommunications sector. Higher incomes have allowed for substantial improvements of devices used by consumers. Better connectivity has, in turn, encouraged a massive jump in data consumption in the majority of the countries and in good part of the population. Higher demand for services and data usage has occurred in each of the three segments in which the market can be divided: mobile, fixed line and fixed broadband. Around 90% of the income of the Latin American telecommunication sector consists of the six biggest economies: Brazil, Mexico, Argentina, Colombia, Chile and Peru. Brazil and Mexico, the two biggest economies of the region, account for around 66% of the market.

As described earlier in this paper, network operators are the main actors in the telecommunications sector because they have infrastructure, radio spectrum and can commercialise the data. With more than half million direct jobs, network operators are also key players in the economy of each of the countries in which

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they operate. As can be seen in the table 4.1, in the past years, the operators had an EBITDA of USD 33bn and invested (excluding the cost of spectrum) around USD20bn. In terms of taxes, the sector paid business taxes (mainly income tax) close to USD9bn and generated USD 27bn worth of VAT.

Table 4.1: Main indicators of Network operators by country (average 2015- 18 in USD M)

	EBITDA	CAPEX	Business Taxes	VAT	Import duties
Argentina	3,716	2,280	1,348	2,649	426
Brazil	11,650	6,991	3,726	16,016	1,356
Chile	1,569	1,196	554	1,212	35
Colombia	2,595	1,374	649	1,282	-
Mexico	9,758	4,503	1,536	4,049	-
Peru	1,350	866	393	727	-
Latin America	33,768	19,138	8,788	27,261	1,966

Source: Baker Ing with data from CETLA

Despite the trend of increasing new customers and connections (explained in the previous chapter), the financial performance of the sector measured in USD is shaped considerably by the macroeconomic performance of each of the countries. Firstly, reduced demand as consequence of slow economic activity coupled with aggressive competition between mobile operators led to changes in packages offered by companies and, therefore, to a reduction in prices paid by customers. Secondly, changes in the exchange rate have a direct impact on the revenue that is reported to headquarters. As a result, macroeconomic instability which ends in devaluation of local currencies tends to have a considerable effect on the performance of the sector.

Chart 4.1 shows the revenues in USD of the six main countries between 2014 and 2018 (last year with available and comparable data). As can be seen, the strong devaluation of the Brazilian Real (40%) and the Mexican Peso (20%) and other countries in 2015 contributed to the reduction in USD of the income of the sector. Since 2015, the sector has shown stable income of around USD 100Bn. With an environment characterised by a poor macroeconomic performance, we expect the market to continue showing limited revenue growth.

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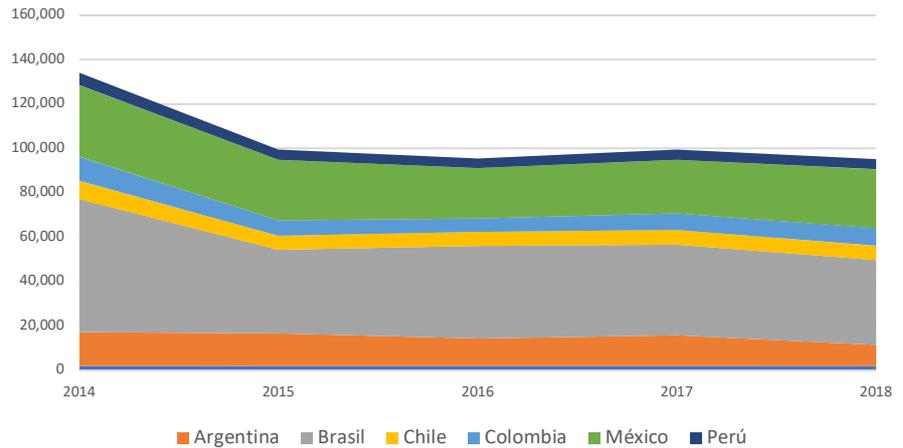
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Chart 4.1: Revenue of USD of the telecommunication sector by country



Source: Baker Ing with data from CETLA

The revenue of the mobile operators is split almost in equal parts between fixed and mobile technologies. In 2018 fixed technology explained 52% of sector revenue, up 7 percentage points from four years before. This type of move towards fixed technology occurred in countries like Argentina, Mexico and Colombia. In Mexico the change has been abrupt, as the figure jumped from 43% to 61% in the same period. Argentina has also shown a change, although more limited, as it moved from 44% to 53%. The increase in Colombia was limited and increased from 32% to 36%. In contrast, Brazil has kept the proportion unchanged of 50%.

The split between prepaid and post-paid commercial packages sold is generally skewed in favour of pre-paid options. In all countries except Chile, the majority of plans sold are prepaid (by an overwhelming majority of 90% in Argentina, for example). Consumers are attracted to prepaid as it offers the possibility to just pay as and when you can, without the risk of spending more than the anticipated budget. Users simply spend the units they have bought. With a population that has high levels of poverty, this way of controlling expenses is of particular appeal. In addition, prepaid plans are often cheaper and don't require contracts nor credit checks, as is sometimes the case for post-paid plans. The 'Control' plans in Peru offer an even further degree of control for users to choose how much data they want to use each month.

In terms of monthly ARPU, the fixed network operators continue to have the highest value, that could be up to around 3 times the figure for Mobile broadband, as is the case in Mexico or Peru. Among the Mobile segment, the ARPU for telephone is higher than for broadband.

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Table 4.2: Monthly ARPU by segment and country (average 2017-18 in USD)

	Fixed	Mobile	
		Broadband	Telephone
Argentina	22.3	7.9	11.5
Brazil	19.1	6.8	8.67
Chile	27.1	10.2	17.3
Colombia	13.4	6.3	10.5
México	21.5	7.0	9.9
Peru	18.4	6.2	8.9

Source: Baker Ing with data from CETLA

The market of network operators

The market of network operators in Latin America is characterized by high levels of firm concentration in each of the three segments (mobile, fixed line and fixed broadband). Although this tends to be a characteristic in several countries, in the case of Latin America it is particularly acute. Table 4.3 shows the level of market concentration measured by the HH index (adjusted in the 1-10 scale, with 10 being the highest value found in the region) by country and segment. The value for Spain is also included to be used as a benchmark of a country in the EU. There are three main facts:

- Mexico and Peru are the countries with the highest levels of market concentration; Colombia and Chile are the ones with the lowest indices.
- Fixed line is the segment with the highest levels of concentration, although countries like Chile and Colombia enjoy low levels of concentration. Mobile and fixed broadband tend to be more competitive, although Mexico and Peru show high concentration.
- Spain shows lower levels of concentration than the average Latin America country in the all the segments except fixed line.

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Table 4.3: Level of concentration of different segments by country

	Mobile	Fixed line	Fixed broadband
Argentina	6.2	6.8	5.1
Brazil	4.6	5.2	2.8
Colombia	5.8	4.5	4.5
Chile	4.7	4.4	5.0
Mexico	8.4	6.5	6.3
Peru	4.9	NA	10.0
Spain	4.3	6.5	4.9

Note: The index shown was built following the methodology of the Herfindahl-Hirschman Index (HHI) and adjusted in the 1-10 scale where 10 is the highest level found in the region. Source: Baker Ing based on Telesemana



As shown by the HHI, each segment of the market is controlled by few companies. Table 4.4 shows the main players in each of the segments for each of the countries. As in the previous case, there are a few key points: Firstly, in each of the countries, a few companies are dominant. If we consider companies with at least 15% market share in any of the three segments, the amount of companies is considerably low at 5 in Argentina and Brazil, 4 in Chile, Peru & Mexico, and 3 in Colombia. Secondly, companies that have a dominant position in a segment tend to have dominant positions in other segments as well. América Móvil, for example, is the biggest company in each of the four segments of Colombia and is the biggest in three segments of Mexico. Thirdly, companies tend to operate in several countries. The more evident cases are companies such as Telefónica and América Móvil that have operations in each of the five main markets of the region. Finally, some local companies have significant presence. This is the case of Grupo Clarín in Argentina, Oi in Brazil or Entel in Chile. However, relatively smaller sized companies, like Liberty Latin America, have also penetrated several markets. Finally, some local companies have significant presence.

Table 4.4: Main players in each segment by country

	Mobile	Fixed line	Fixed broadband
Argentina	AMOV (36.8%)	TELF (40.6%)	GClarín (46.9%)
	GClarín (33.6%)	TELC (41.1%)	TELF (15.6%)
Brazil	TELF (32.9%)	TELF (31.2%)	AMOV (29.4%)
	TIM (24%)	Oi (30.6%)	TELF (20.6%)
	AMOV (24%)	AMOV (29.2%)	
	Oi (16.2%)		
Colombia	AMOV (46.9%)	AMOV (36.7%)	AMOV (36.8%)
	TELF (24.3%)	UNE EPM - Millicom (22.8%)	UNE EPM - Millicom (20.4%)
Chile	Entel (31.1%)	TELF (39%)	LIBLA (38.8%)
	TELF (29.1%)	LIBLA 20.5%) Entel (17.2%)	TELEF (27.9%)
Mexico	AMOV (62.4%)	AMOV (53.2%)	AMOV (50.1%)
	TELF (20.6%)	Televisa (23.1%)	Televisa (24.3%)
Peru	TELF (33.4%)	AMOV	TELF (69.7%)
	AMOV (29.7%)	Entel	AMOV (23%)

Note: AMOV: América Móvil, TELF: Telefónica, GClarín: Grupo Clarín, TIM: Telecom Italia, LIBLA: Liberty Latin America. Source: Baker Ing based on Telesemana

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Box 4.1- The market of content

In 2020, it is estimated that the average internet user spends 6 hours and 43 minutes online per day, half of which is on a mobile device. The appetite of Latin Americans, in particular, for online content is huge. Brazilians and Colombian users are the most voracious in the world, spending 9 hours online per day, followed by Mexican users (8 hours per day), according to estimations by OECD.

In this context, network providers need content that will drive their users' data consumption. Media companies (traditional TV or radio, platforms such as Netflix, etc...), online giants such as Facebook, Amazon, Google (mostly, YouTube), video games and apps developers, and of course, music streaming platforms and social media giants, are all part of a content eco-system which encourages the use of data thus contributing to the model of network operators selling data packages or data-on-demand.

Network operators also often offer bundles that combine internet, telephony and TV offers. Traditionally quite silo-ed in terms of consumption, these three activities are now converging rapidly, especially as TV platforms are now available online through OTT (Over The Top) platforms (i.e., online streaming platforms). These OTT platforms can be watched from different devices, including mobile. Subscribers to Grupo Clarín (Cablevision/Telecom/Personal) in Argentina can for example get access to a paid-for OTT platform, Flow, in addition to phone services. Furthermore, the group regularly promotes content-driven options, such as, for example, free access to Disney + (Disney's new OTT platforms) for 3 months when subscribing to a bundle.

Main network operators in the region

The network operators market tends to be very concentrated across the globe, and Latin America is no exception. Three types of companies operate in the region. The first group is formed by key global players such as América Móvil and Telefónica. These two giants are present in most countries and boast significant market shares in the segments in which they operate. The second group is formed of local companies that have presence in their own market. This is the case of Grupo Clarín in Argentina, Oi in Brazil or Entel in Chile. In some cases, like Entel, they have managed to expand to other countries of the region. The third group of companies are other global operators. These companies tend not only to be smaller than the key global players but, they also tend to have their main area of operations outside Latin America and to have entered the region recently.

Key Global players

América Móvil: The Mexican group is one of the biggest operators in the world and the leader in Latin America, where it operates under the brands Claro, and in Mexico, Telcel and TelMex. The company is present in all Latin America's main

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countries (with the exception of Chile), as a significant player (29% market share or more) in one or more segment. In Colombia, Claro is the leader across all segments (mobile, fixed line, broadband). Its dominance is particularly overwhelming in Mexico where, in spite of a 2013 regulatory reform to boost competitiveness and break its monopoly, the company still covers more than half of the total market share in fixed line and mobile (53% in fixed line and 62% in mobile). The current political context of Mexico is unlikely to bring major changes in this non-competitive environment.

Telefónica: Attracted in the 1990s by the prospective growth of the region, and the liberalization of the telecommunications, Telefónica arrived and expanded rapidly in Latin America. Under the brands Movistar in Latin America, and Vivo in Brazil, it has become the second biggest telecom player in the region, both in terms of access and income. Although the region represents 20% of its global income (Brazil excluded), revenues have however been in decline for nine consecutive years and the company announced that it is looking to reduce its global debt to free up capital and invest in its 'core regions'. It has, therefore, started to proceed with the sale of its assets in all Latin American countries except Brazil with the objective being to withdraw from the entire region. In 2019, Telefónica sold its businesses in Guatemala and El Salvador to América Móvil, and sold its units in Panama and Nicaragua to Millicom. The following year, the Costa Rican unit was sold to Liberty Latin America. Both groups are still in talks for the sale of Telefónica's businesses in Ecuador and Colombia. Currently, the group is in confirmed talks with other players for the sale of its businesses in Colombia, Chile, Ecuador, Uruguay and Argentina. There are, as yet, no confirmed company negotiations for Peru, Venezuela and Mexico. Brazil is considered a 'core region' and Telefónica will continue operations there under the Vivo brand.

Main local players

Local players are also strong competitors in each country. Shaped by regulations and historical presence, their performance has remained very strong but remains local.

Grupo Clarín: In 2017, in Argentina, Telecom and Grupo Clarín merged to create the biggest telecom operator in the country. The group operates through its subsidiaries Telecom for fixed phone & mobile, and Cablevision for broadband.

Oi: It has the largest coverage in Brazil. A product of privatising the national telecom company in 1998, it benefits today from historical infrastructure. It is the second biggest provider of fixed line and the fourth biggest mobile provider. The company, however, has been accumulating a very high level of debt and filed, in 2016, for what was called the largest bankruptcy in Brazilian history (USD 19Bn). Talks are currently taking place for the sale of its assets.

Entel: Owned by the Chilean state until 1992, Entel is now a private company. It provides fixed telephony and is the leader in mobile, with 31.1% market share.

Entel also entered the Peruvian market in 2013, through the purchase of local assets from Nextel.

Other global players

The giants, América Móvil and Telefónica, tend to dwarf other operators' numbers. However, some telecommunications groups are of interest. In a market that is rapidly moving, and especially with the withdrawal of Telefónica from the region, particular attention should be drawn to these smaller players.

Liberty Latin America: Since its split from Liberty Global, the company has focused its strategy on Latin America and the Caribbean. Already present in the Caribbean, Central America and Chile, the company is in active talks for the purchase of Telefónica's activities in Ecuador and Colombia. Revenues totalled USD 3.9Bn for 2019, consisting of broadband (22% of total revenues), mobile (16%), video (19%), fixed voice (6%) and BtoB services such as cable provision, hosting and IT services (31%). The group's activities are currently mostly based in Central American and Caribbean countries. However, their evolving strategy could involve expansion to other Latin American countries.

Une EPM-Millicom: The company serves customers in nine Latin American markets, including Bolivia, Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama and Paraguay. It does so under its brand Tigo. Activities range from mobile services to TV channels (Tigo Sports). Just like Liberty Latin America, its focus is on Caribbean countries and Central America. In Colombia, Tigo is the second biggest provider of fixed line & broadband, and is the third biggest provider for mobile.

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Table 4.5: Main players in the region

Company	Core area of operations	Global operations (in USD bn)		Latin America's operations	
		Market capitalization	Revenue	Brands in the region	Countries with presence
 América Móvil	Latin America	48.3	47.5	Claro Telcel Telmex	Argentina Brazil Chile Colombia Mexico Peru
 Telefónica	Spain and UK	26.9	49.1	Movistar Vivo	Argentina Brazil Chile Colombia Mexico Peru
 TIM	Italy	11.7	17.9	TIM Brasil	Brazil
 Oi	Brazil	9.4	5.1	Oi	Brazil
 Liberty Latin America	Chile and Central America	2.6	3.7	VTR	Chile
 entel	Chile	1.4	2.1	Entel	Chile Peru
 Grupo Clarín	Argentina	1.0	0.4	Personal Cablevision Telecom	Argentina
 UNE-EPM / Millicom	Chile	N/A	0.75	Tigo	Colombia

Source: Baker ing based on Telesemana

Telecom Italia (TIM): With a presence in Brazil's mobile segment, it competes fiercely with both the giants, Telefónica and América Móvil. Telefónica has been looking to acquire the Telecom Italia group. However, the presence of both Telefónica (32.9% market share) and Telecom Italia (24%) meant that this couldn't proceed on anti-trust grounds.

MVNOs

Mobile Virtual Network Operators (MVNOs) are companies whose core business is to offer and manage commercial mobile packages to consumers. They don't own the infrastructure. Instead, they rent part of it from Mobile Virtual Network Enablers or MVNEs (usually from the network operators already operating in each country, such as América Móvil, Telefónica, etc...) through a system of licences. In Latin America, the market share of Mobile Virtual Network Operators (MVNOs) is generally low. The biggest market share is found in Colombia, where 7.2% of mobile subscriptions are through an MVNO. In other countries however, MVNOs' presence is much lower or almost non-existent (in Peru, for example, only 0.04% of mobile lines are MVNOs'). This small and relatively fragmented market includes players ranging from local companies or cooperatives wanting to make the offers more accessible, to consumers such as Nuestro in Argentina, or Incacel in Peru, to multinational

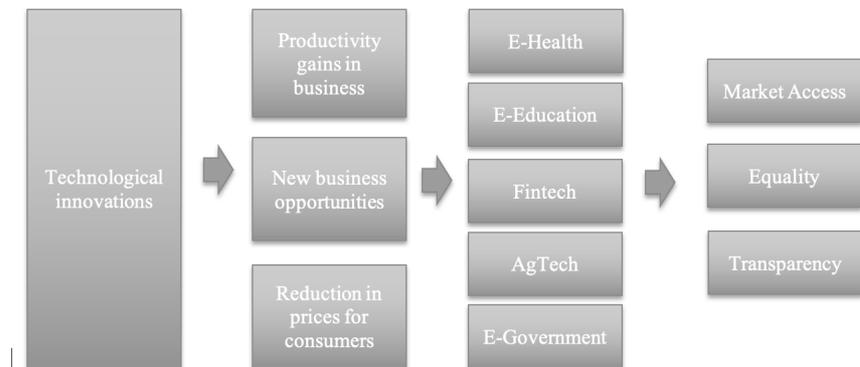


companies such as Virgin, whose presence varies according to each country (the company runs half the MVNO lines in Colombia on one hand, and on the other, hasn't started its commercial activities in Argentina yet in spite of being granted a licence in 2016).

Box 4.2 - Telecommunications and Development

Progress in telecommunications in recent decades has opened a new opportunity for developing countries, including the Latin America region, to increase the productivity of companies and consumers with access to goods and services at a lower price. In economies like the Latin American ones, where road infrastructure is poor, competition is limited and chances to access foreign firms (both as customers and suppliers) are limited. Modern telecommunications open up an exciting horizon. The rise of new firms, with the ability to identify new needs and opportunities, can generate modern and innovative projects which create highly productive jobs. Companies like MercadoLibre, Despegar or Rappi are examples of firms from the region that were born as a consequence of the telecommunication-driven economy. These firms have managed to expand to become global firms.

Chart 4.6 - Main components of infrastructure for the Telecommunications sector



New developments in telecommunications are not limited to firms; on the contrary, they can contribute to disadvantaged households that can access public goods which were not always within reach before (such as education, health and finance). This potentially reduces the inequality gap. Small reductions in prices of services can have a great impact in the expanding access to poorer portions of society. At the same time, modern telecommunications can help with digital transformation of governments. Digitalisation not only contributes to increasing transparency and accountability, but it can also reduce the time and cost involved in administrative processes. With extremely alarming indicators concerning how red tape can be a relevant barrier to doing business, adopting new technologies is key. Fortunately, there are a number of national and sub-national initiatives in the region which promote robust digitalisation. This is happening both for specific activities, such as trade facilitation, and for transversal activities related to the overall functioning of the government.

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COUNTRY PERSPECTIVES



The level of development of infrastructure, and of the telecommunications market, varies greatly from one Latin American country to another. Although commercialisation of data is dominated by two main players in the region (Telefónica and América Móvil), they have different levels of presence from one country to the other. The withdrawal of Telefónica from most countries is likely to re-shape the sector, at regional and at local level.

Table 5.1 Telecommunications: Snapshot of main Latin American countries

	Structural behaviour	Challenges
ARG	<ul style="list-style-type: none"> • High levels of connectivity for the region with decent levels of infrastructure • Good level of competition, and even split between Grupo Clarín, Telefónica and América Móvil 	<ul style="list-style-type: none"> • Poor macro-economic performance and unstable political environment points towards lower levels of investment, in particular in the sector • Slow regulatory actions have become a barrier for 4G and 5G development
BRA	<ul style="list-style-type: none"> • Good connectivity and infrastructure. Strong penetration of smartphones and mobile broadband • Good level of competition between Telefónica, América Móvil and Oi. 	<ul style="list-style-type: none"> • High levels of investment needed in the sector in an uncertain macro-economic environment • As Oi went bankrupt, the players' landscape will change in the near future
COL	<ul style="list-style-type: none"> • High level of mobile penetration and broadband subscriptions that is not supported by infrastructures (which are generally poor) • Levels of competitiveness are relatively good except for mobile, where América Móvil takes up nearly half the market share 	<ul style="list-style-type: none"> • Investment needed to improve infrastructure is high and the post-covid context does not create optimum conditions to achieve this. • The withdrawal of Telefónica from the market could create monopoly issues with an already dominant América Móvil
CHI	<ul style="list-style-type: none"> • Infrastructure for mobile is relatively poor, whereas fixed broadband and telephony is one of the highest in the region • The level of competition is balanced, and other players such as Entel and Liberty Latin America play an important part alongside the usual giants Telefónica and América Móvil 	<ul style="list-style-type: none"> • Economic and political instability are an obstacle to improvement needed in mobile infrastructure. • The withdrawal of Telefónica may affect the good competitive balance between players, affecting performance and prices
MEX	<ul style="list-style-type: none"> • Big discrepancies between mobile (high) and fixed (low) performance, reflected in the high adoption of mobile broadband vs very low adoption of fixed broadband 	<ul style="list-style-type: none"> • Telefónica leaving the country will make Mexico a market to watch, with América Móvil have more than half the market shares in all three segments (fixed line, mobile and broadband)

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Argentina



Country Performance		Telecommunications infrastructure	Network Operators
GDP (USD bn)	GDP per capita (USD)	Investment/GDP	Revenue (USD m)
383	8,433	17.3%	9,480
GDP growth		ICT Index	Internet Penetration
Pre Covid	2020		
-2.3	-11.8	58/100	74.3%
Inflation	Unemployment	% of spectrum allocated (ITU recommendation)	Market Concentration
36.1	11.0	20.4%	6/10

Macro overview

Argentina entered in 2020 in recession, with high inflation and open negotiations with both the IMF and private bondholders on the conditions of the sovereign debt restructuring. President Alberto Fernandez inaugurated his administration in December 2019, leading a left coalition with a broad ideological spectrum, including centre and radical left partners. In March 2020, the government established a rigorous lockdown, affecting almost all sectors. As it had not proved effective, it was extended until the end of the year. Some sectors only resumed activities in December. The lockdown of the economy has had a devastating effect on businesses. Registered businesses received benefits to maintain their payrolls. Legislation was passed to prohibit redundancies and bankruptcies. The subsidies received were limited and ineffective. The stimulus package was fuelled by expansion of the monetary base, increasing the risk of inflation and a depreciation of the Argentine Peso. Therefore, the government introduced price controls on essential goods and access limitations to foreign currency. However, these measures - effective in the short term - have created distortion in relative prices, paving the way for a higher inflation in 2021 and a likely devaluation of the Peso. The government has also pursued an interventionist agenda, including the nationalisation of the fifth-largest grain exporter and capping tariff increases for telecommunications & internet providers.

Telecommunication infrastructure and connectivity.

74.3% of Argentina's population use the internet. Active mobile broadband subscriptions are 97.4%, fixed mobile subscriptions reach 72.2%. Smartphone penetration is 65% of the population with smartphones. The quality of the service measured by download time for both mobile (27.9 Mbps) and fixed (44.5) is aligned with other countries of Latin America (24.7 and 59.0 Mbps, on average, respectively) but below the world figure (47.2 and 91.0, respectively). The infrastructure for telecommunications in Argentina is within the average range of the region, with an ICT index of 58/100, below the UK (73/100), Spain (78/100) and other countries of the region, such as Chile (63/100). In terms of radio spectrum allocation, Argentina is well below the recommendation of the United Nations agency ITU, with around 20%. The country has made good progress in

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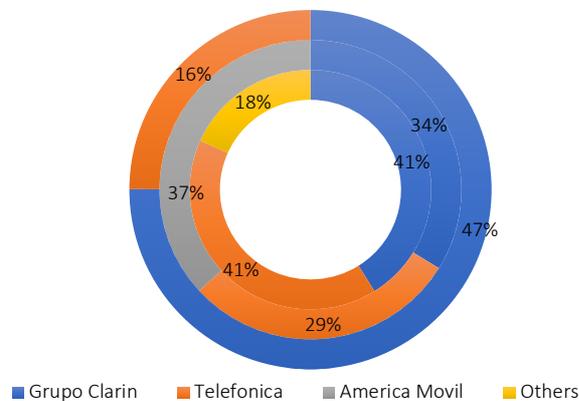
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terms of infrastructure for transmission, with 27 IXPs. At the same time, several submarine cables have been recently built to reach the Argentinean coast, such as Tannat, co-owned by Google or Malbec, property of Facebook and GlobeNet.

Chart 5.1 Argentina: Market share by segment



Note: Inner circle has information for fixed line, central one for mobile and external one for fixed broadband

Data commercialisation and network operators.

Three main companies lead the market for network operators: Argentinean Grupo Clarín, Spanish Telefónica and Mexican América Móvil. Grupo Clarín is present in the three segments (fixed lines, mobile and fixed broadband); the same with Telefónica, although its market share is slightly smaller. América Móvil leads the mobile segment. In recent years, the constant devaluation of the Argentinean peso has negatively affected sector revenue measured in USD: in 2018 (latest available data) the figure was around 30% lower than during the 2014-15 period. With around 90,000 people employed, network operators are key actors in the national economy. In recent years, they have generated on average around USD4Bn of taxes (including income and VAT) and their CAPEX reached the USD 2Bn. The market is relatively competitive with an adjusted HH Index of 6.0 (10 is monopoly and 0 is perfect competition), performing slightly worse than the average of Latin America (5.7). The most concentrated of the segments is fixed telephony, with a 6.8 index, well above the 5.5 average of the region. In terms of regulation, the country shows some delay in relation to other Latin American countries insofar as complying with the OECD practices.

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Brazil

Country Performance		Telecommunications infrastructure	Network operators
GDP (USD bn)	GDP per capita (USD)	Investment/GDP	Revenue (USD m)
1,363.8	6,450	14.7%	38,250
GDP growth		ICT Index	Internet penetration
Pre Covid	2020		
1.2	-5.8	58/100	67.5%
Inflation	Unemployment	% of spectrum allocated (ITU recommendation)	Market concentration
2.7	13.4	31.0%	4/10

Macro overview

Brazil is the biggest economy of Latin America with a GDP totalling USD1.4tr in 2020. With 211 million inhabitants and 8.5 million km², the country has a complex industrial sector (with highly competitive sectors such as aerospace) and is one of the biggest producers of food in the world (with some of the most competitive global firms in soya and cattle production). It has also developed a dynamic service sector with tourism, art and health as examples of high levels of competitiveness. High levels of inequality have led to a stratified society where the upper class follows a consumption pattern similar to the ones in the elites of rich countries, and a substantial proportion of the population follows basic consumption patterns. In recent years, the middle class increased by around 50 million thanks to a reduction in inflation combined with expansion of the economy. Despite these improvements, the economy continues to be fragile, as the fiscal framework is weak and lacks a robust protection mechanism against commodities shocks. Moreover, the political environment remains fragile with weak political parties and ad-hoc coalition building. Following the 2015/2016 recession, the Brazilian economy recovered slowly. However, the COVID crisis was a big test, not just for the economy but, also for the functioning of key public goods. The government, led by Jair Bolsonaro, chose to minimise the lockdown. Although the GDP contracted by just 8.2%, the health sector collapsed, dividing public opinion and reducing his chances of returning to the already divided pre-COVID political scene.

Telecommunication infrastructure and connectivity

Brazil's internet penetration is 67.5%. Mobile broadband is predominant, with 91 active subscriptions to mobile broadband out of 100 inhabitants, and fixed broadband active subscriptions amount to 51 active subscriptions per 100 inhabitants. Smartphone penetration is the highest in the region (85%). The quality of the service, measured by the time for download for both mobile (28.1 Mbps) and fixed (66.2), is slightly better than in other countries of Latin America (24.7 and 59.0 Mbps, on average, respectively) but still lagging behind the global average (47.2 and 91.0, respectively). The infrastructure for telecommunications in Brazil is within the average range of the region with an ICT index of 58/100,

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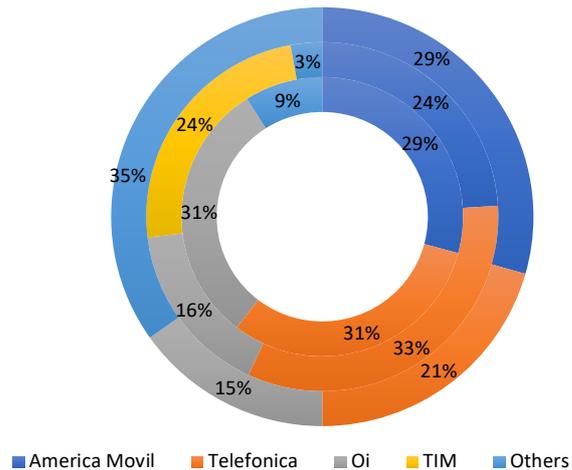
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remaining below the UK (73/100), Spain (78/100) and other countries of the region, such as Chile (63/100). In terms of spectrum allocation, Brazil is below the recommendation of the United Nations agency ITU (31% of recommended). The country however boasts the highest number of IXPs in the region, with 130 installed across the territory, and is served by numerous submarine cables, from Globenet to América Móvil, for example, connecting it to cables in the other Latin American countries, the US, Europe and Africa.

Chart 5.2 Brazil: Market share by segment



Note: Inner circle has information for fixed line, central one for mobile and external one for fixed broadband

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Data commercialization and network operators

Three main companies lead the market for network operators: Spanish Telefónica, Mexican América Móvil, and Brazilian Oi. All are present in the three segments (fixed line, mobile and fixed broadband). Telefónica recently announced its ambition to focus its investment on Brazil through its brand Vivo, while dropping activities in the rest of Latin America. On the other hand, local major company, Oi, has filed for bankruptcy and is being bought by its rivals Telefónica (33% share), TIM (23.2%) and América Móvil (24.4%). The players landscape is therefore going to change in Brazil, extending market shares for both the giants, Telefónica and América Móvil, and bringing TIM in to play a bigger role across the segments. In spite of revenues from the sector dropping significantly (40%) in 2015 following the devaluation of the Real, Brazil's telecommunications operators' revenues still reached a total of more than USD 37Bn, the highest in the region. The operators are responsible for more than 100,000 direct jobs in the country and generate around USD 20Bn worth of taxes (including income and VAT), with a CAPEX of nearly USD 7Bn. The market is very competitive, with an adjusted HH Index of 4.2 (10 is monopoly and 0 is perfect competition), performing better than the average of Latin America (5.7). In terms of regulation, the country shows some delay in relation to other Latin American countries in complying with the OECD practices.



Colombia

Country Performance		Telecommunications infrastructure	Network operators
GDP (USD bn)	GDP per capita (USD)	Investment/GDP	Revenue (USD m)
264.9	5,207	19.7%	7,840
GDP growth		ICT Index	Internet penetration
Pre Covid	2020		
2.9	-8.2	47/100	82.3%
Inflation	Unemployment	% of spectrum allocated (ITU recommendation)	Market concentration
2.4	17.3	25%	4.9/10

Macro overview

Colombia has a reputation for prudent fiscal policy and macroeconomic stability. The combination of an inflation-targeting regime, a flexible exchange rate, and a rule-based fiscal framework has helped the country achieve a long-lasting expansion of the economy. It trebled GDP per capita in the past 30 years. Uninterrupted growth for 20 years helped to halve the poverty rate. Despite these improvements, the Colombian economy continues to have low-productivity levels. With one of the biggest informal labour markets among Latin American countries, gains in work productivity are a complex task. The recent arrival of around 2 million migrants from Venezuela will be an extra difficulty for the formalisation of the labour market. Moreover, poor infrastructure and reduced trade integration, combined with high barriers to domestic competition, contribute to low overall productivity. Exports are highly concentrated in non-renewable commodities (mainly oil) and without an efficient mechanism to minimise external shocks, the economy is highly exposed to abrupt price changes. After a couple of years of slow growth, economy expansion accelerated 3.3% in 2019, driven by strong consumption and investment. The economy was well placed to continue with the rapid expansion but the COVID crisis was a major blow to that growth. The economy decreased by 8.2%. The drop in the oil prices also affected the economy. The government introduced an ambitious fiscal expansion at almost 10 points of GDP. In a scenario in which lockdown comes back into force, a strong recovery is expected in 2021-22, thanks to a policy of low interest rate managed by the central bank.

Telecommunication infrastructure and connectivity

82.3% of Colombia's population is using the internet and the country has a relatively high rate of subscription to mobile broadband. compared with the rest of the region (more than 93%). Active subscriptions to fixed broadband reach 51 per 100 inhabitants. Smartphone penetration is quite low for the region (59%). The quality of the service, measured by the time for download for both mobile (18.2 Mbps) and fixed (38.6), is poor compared with other countries of Latin America (24.7 and 59.0 Mbps, on average respectively) and well below the world figure (47.2 and 91.0, respectively). The infrastructure for telecommunications is

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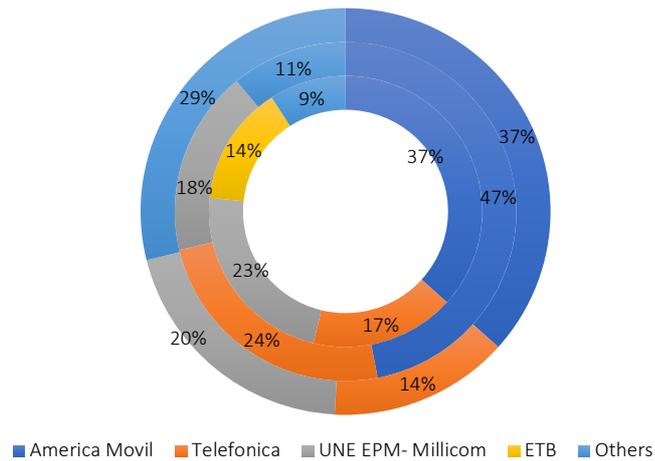
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one of the worst in the region with an ICT index of 47/100 (Peru being the lowest with an ICT index of 46). In terms of spectrum allocation, at around 25%, Colombia is below the recommendation of the United Nations agency ITU., The country only counts 2 IXPs, the lowest in the region per country, on par with Peru. The only landing point in the country for submarine cables installed on the Pacific coast is in Buenaventura, serving one cable, the South American Crossing (SAC).

Chart 5.3 Colombia: Market share by segment



Note: Inner circle has information for fixed line, central one for mobile and external one for fixed broadband

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Data commercialization and network operators

Three main companies lead the market for network operators: Spanish Telefónica (Movistar), Mexican América Móvil (Claro), and UNE-Millicom (a merger of local operator UNE and Luxembourg-based group Millicom (operating under the brand Tigo)). All three companies are present across all segments (fixed line, mobile and fixed broadband). América Móvil is the clear leader in all segments, especially mobile, where its market share reaches 47%. Total income of the sector is USD 7.8Bn. The network operators generate nearly 20,000 direct jobs in the country, nearly USD 2Bn of taxes (including income and VAT), and their CAPEX reaches USD 1.2Bn. The market is quite competitive, with an adjusted HH Index of 4.9 (10 is monopoly and 0 is perfect competition), performing better than the average of Latin America (5.7). The more concentrated of the segments is the mobile one, with a 5.8 index, above the 4.3 average of the region. In terms of regulation, the country shows some delay in relation to other Latin American countries in complying with the OECD practices.



Chile

Country Performance		Telecommunications infrastructure	Network operators
GDP (USD bn)	GDP per capita (USD)	Investment/GDP	Revenue (USD m)
245.4	12,612	22.1%	6,473
GDP growth		ICT Index	Internet penetration
Pre Covid	2020		
2.5	-6.0	63/100	62.3%
Inflation	Unemployment	% of spectrum allocated (ITU recommendation)	Market concentration
2.9	7.3	24%	4.7/10

Macro overview

Chile has shown impressive rates of growth in the past decades, due to a macroeconomic framework that is able to absorb the volatility of commodity prices. The expansion of the economy has helped reduce the poverty rate from 30% in 2000 to below 4% in 2017. However, inequality continues to be high, and the new middle classes feel that - with reduced access to public goods and hard conditions for workers with low-to-mid qualifications - the distribution of benefits has been captured by the upper class. Although this has been a topic since the return to democracy in 1991, it only emerged as a critical issue in 2018. In fact, the country has seen for decades a smooth political environment with power sharing between left and right coalitions. In 2018 the social discontent became evident and social unrest emerged, continuing well into 2019. The country was paralyzed for months, leading to a reduction in GDP growth from 3.9% in 2018 to 1.1% in 2019. As a result of social unrest, unemployment increased, public spending changed from a pro-investment agenda towards a higher social expenditure, and constitutional reform was added. Despite fiscal and monetary stimuli, the economy contracted by 6.0% in 2020 due to the lockdown and the reduction in export prices. In the mid-term, the political environment will be dominated by constitutional reform and changes in social expenditure, reducing the focus on the pro-business agenda.

Telecommunication infrastructure and connectivity

Internet penetration in Chile is 62.3%, on par with the region's average. Mobile broadband active subscriptions amount to 75 out of 100 inhabitants, and fixed broadband 50%. These figures are relatively low compared with the rest of Latin America, and smartphone penetration is one of the lowest in the region (59%). The quality of the service, measured by the time for download, shows huge discrepancies between mobile (19.5 Mbps, below the average of 24.7Mps of Latin American countries) and fixed (129.1, way above the average of 59Mps in Latin America). Chile's mobile performance falls below the world average (47.2), whilst fixed performance is above the world's average (91.0). The infrastructure for telecommunications in Chile is the strongest in the region, with an ICT index of 63/100, although it is still below the UK (73/100) and Spain (78/100). In terms of spectrum allocation, with around 24%, Chile is well below the recommendation of

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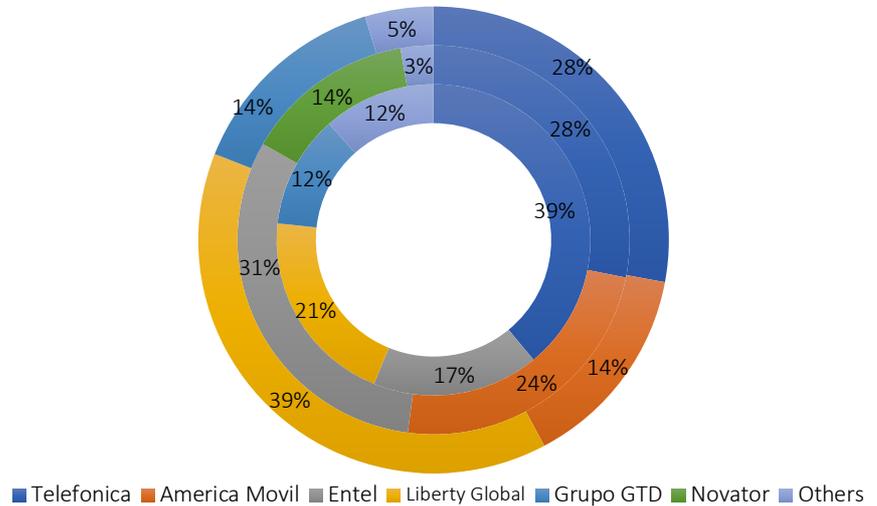
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the United Nations agency ITU. The country has only 4 IXPs, but Valparaiso is an important port of reception for submarine cables, from Pan-south American ones such as Sam-1 or SAC, to Google’s own cable in the Pacific, Curie.

Chart 5.4 Chile: Market share by segment



Note: Inner circle has information for fixed line, central one for mobile and external one for fixed broadband

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Data commercialization and network operators

The market for telephony is split between a few companies. América Móvil and Telefónica are present, with significant market shares. They compete with local company, Entel, for fixed line and mobile. They compete with regional group, Liberty Latin America (formerly part of Liberty Global), for fixed line and broadband. Liberty Latin America is also the leader in the fixed broadband segment, Entel in mobile, and Telefónica in fixed line. The withdrawal of Telefónica from all segments, as announced recently, will change this landscape in the mid-term. Revenues generated by the sector are the lowest of the region, far below the region’s average (USD6.5Bn revenue generated in Chile vs USD 15.5 average in the region). The operators employ nearly 24,000 people and have generated taxes worth more than USD 17 million. Their CAPEX reaches USD 1,196 M, the second to last amongst the countries we have studied in this report. The market is competitive, with an adjusted HH index of 4.7 (10 is monopoly and 0 is perfect competition), performing better than the average of Latin America (5.7). This level of competitiveness is the same across all three segments (fixed telephony, broadband and mobile). In terms of regulation, the country shows some delay in relation to other Latin American countries in complying with the OECD practices.



Mexico

Country Performance		Telecommunications infrastructure	Network operators
GDP (USD bn)	GDP per capita (USD)	Investment/GDP	Revenue (USD m)
1,258	8,069	19.3%	26,648
GDP growth		ICT Index	Internet penetration
Pre Covid.	2020		
0.9	-9.0	55/100	65.8%
Inflation	Unemployment	% of spectrum Allocated (ITU recommendation)	Market concentration
3.4	5.2	27%	7.1/10

Macro overview

Mexico is the fifteenth biggest economy of the world and the second largest in Latin America, just behind Brazil. The country is extremely dependant on the USA, which buys 80% of its exports. The Mexican economy is diversified with production of coffee, sugar, corn and oranges. It is also a key exporter of mining products. Moreover, it has developed some high-tech industries, such as aerospace. A marked division exists between the more productive and modern economy in the north and centre of the country, and a more traditional economy in the south. Economic growth has been relatively moderate by Latin American standards in recent decades. This has been a consequence of low productivity, the result of a combination of several problems, such as poor educational outcomes, obstacles to competition and widespread informality. However, in recent years the integration into the global value chains has driven robust export growth, mainly to the US. Moreover, the reduction of inflation increased real wages, which, combined with strong remittances and credit growth, have supported consumption. Declining oil production continues to be a drag on the economy and fiscal revenues. Investment remains low due to policy uncertainty. In 2019 the economy expanded just by 0.1%, reflecting high uncertainty due to the election of President Lopez Obrador, a politician with populist credentials. In 2020 the economy contracted by 9.0% as consequence of the COVID crisis.

Telecommunication infrastructure and connectivity

Mexico has one of the lowest penetration rates of the region, with only 65.8% of Mexico's population using the internet. However, active subscriptions to mobile broadband are the second highest in the region (95%). There are 65.6 fixed broadband subscriptions per 100 inhabitants, and the penetration of smartphones is 65, in line with the region's average. The quality of service, measured by the time for download, is for mobile the best in the region (31.9 Mbps vs 24.7Mps on average) and for fixed, one of the worst (42.2 vs 59Mps average in the region). Both mobile and fixed time for download is below the world's average (47.2 and 91.0, respectively). The infrastructure for telecommunications in Mexico is within the average range of the region with an ICT index of 55/100, below the UK (73/100), Spain (78/100) and other countries

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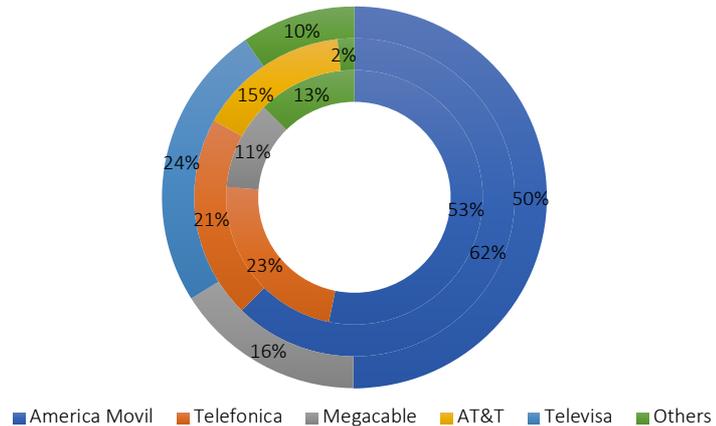
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of the region, such as Chile (63/100). In terms of spectrum allocation, Mexico is well below the recommendation of the United Nations agency ITU, with around 27%. The country has only 3 IXPs and has only one main submarine cable connected to its coast, the Pan American Crossing (PAC), which links the US with Mexico, Costa Rica and Panama.

Chart 5.5 Mexico: Market share by segment



Note: Inner circle has information for fixed line, central one for mobile and external one for fixed broadband

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Data commercialization and network operators

The main characteristic of the Mexican telecommunications market is the dominance of Mexican company América Móvil across all three segments (fixed line, fixed broadband and mobile). Mexico’s average HH index across three segments is 7 (10 is monopoly and 0 is perfect competition), one of the worst in the region, ranging from 6.3 for fixed broadband to 6.5 for mobile, and up to 8.4 for fixed line. The market share chart shows the clear dominance of the company, with a 50% or more market share in each segment. Recent regulatory attempts to break the quasi-monopoly of América Móvil haven’t proved very successful so far. Telefónica, who has announced it would withdraw its operations in the region, is second for fixed line and mobile with 23% and 21% market share respectively. Televisa is a relatively strong local challenger in the broadband segment. The sector generated USD 26.6Bn worth of revenues in 2018, and USD 5.5Bn worth of taxes (including income and VAT). The companies in telecommunications are responsible for more than 210,000 jobs in the country, making them key actors in the national economy. Their CAPEX reaches 4.5Bn, one of the highest in the region. In terms of regulation, the country shows some delay in relation to other Latin American countries in complying with the OECD practices.



Peru

Country Performance		Telecommunications infrastructure	Network operators
GDP (USD bn)	GDP per capita (USD)	Investment/GDP	Revenue (USD m)
195.8	5,845	19.2%	4,490
GDP growth		ICT Index	Internet penetration
Pre Covid.	2020		
3.1	-13.9	46/100	52.5%
Inflation	Unemployment	% of spectrum allocated (ITU recommendation)	Market concentration
1.8	12.5	28%	7.5/10

Macro overview

The Peruvian economy showed an impressive expansion rate (6.1% annually on average) between 2002 and 2013. The combination of prudent macroeconomic policies, ambitious structural reforms and favourable external conditions contributed to this rapid growth and low inflation. As a result, serious progress was made in terms of poverty reduction. The proportion of poor people halved from 52% to 26%; essentially, about 6.5 million moved from poverty to middle class. After 2014, expansion slowed as a consequence of the drop in commodity prices, mainly copper, which is Peru's main export commodity. Between 2014 and 2019, GDP expansion averaged 3.1 annually. This slowdown led to a reduction in private investment and consumption. However, a robust fiscal position allowed the government to maintain public spending, reducing a pro-cyclical policy. Moreover, some of the investments in the mining sector started to be operative, offsetting the decline in export prices. Peru has been severely affected by COVID. A strict, generalized quarantine, led to a GDP decline of 17.4% in the first half of 2020 and 13.9% overall. The government developed a comprehensive economic relief and aid program to protect the vulnerable population and to support companies. This included cash transfers, tax payments deferrals and credit guarantees for the private sector. However, the slowdown in economic activity will lead to a substantial increase in monetary poverty, which is projected to reach pre-2012 levels.

Telecommunication infrastructure and connectivity

The telecommunications sector in Peru is lagging behind other countries in the region. Internet penetration is 52.5%, the lowest in the region. The number of active subscriptions to mobile broadband, and to fixed broadband, are also the worst with 26.7 and 32.7 per 100 inhabitants respectively, which is far below the region's average. The penetration of smartphones is 37, the lowest of the countries we are studying in this report. The quality of service, measured by the time for download, for both mobile (22.8 Mbps) and fixed (35.2 Mbps) is also poorer than in other countries of Latin America (24.7 and 59.0 Mbps, on average respectively). The infrastructure for telecommunications in Peru is lower than the average range of the region with an ICT index of 46/100. In terms of spectrum allocation, with around 27%, Peru is below the recommendation of the United

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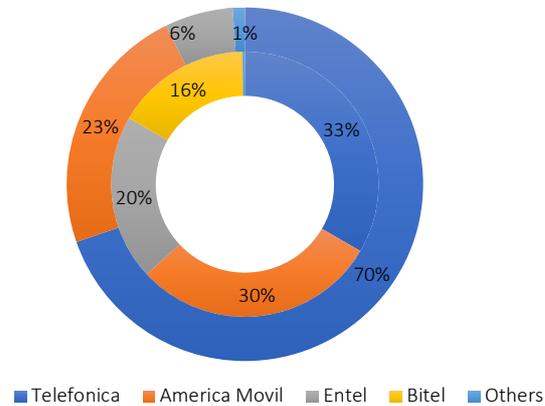
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Nations agency ITU, although it is doing better than most countries of the region. The country has only 2 IXPs, however most of the submarine cables installed along the pacific coast reach the country, with the exception of Google’s cable Curie.

Chart 5.6 Peru: Market share by segment



Note: Inner circle has information for mobile and external one for fixed broadband

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Data commercialization and network operators

Telefónica and América Móvil are the main players in the country’s fixed broadband and mobile. The level of competitiveness is extremely low in broadband, where Telefónica acts as a monopoly (70% market share), bringing the segment to an HH index of 10 (10 is monopoly and 0 is perfect competition). The rest of the broadband market is mostly taken by América Móvil (23% market share). Together, the companies therefore account for almost the totality of the market. On the other hand, the HH index for the mobile segment, at 4.9, is better than the average of 5.7 for the region, and the market is split relatively evenly between Telefónica, América Móvil, and Chilean Entel, with 33%, 30% and 20% market shares respectively. The sector generates revenues of 4.5Bn, the lowest in the region, and taxes from network operators (including business taxes and VAT) amount to USD 1Bn. Their CAPEX is the lowest in the region with USD 866M. In terms of regulation, the country shows some delay in relation to other Latin American countries in complying with the OECD practices.

KEY INFORMATION



	ARG	BRA	COL	CHIL	MEX	PER
Macroeconomic indicators						
GDP, 2020 (bn USDs)	382.8	1,363.8	264.9	245.4	1258.2	195.8
GDP per capita, 2020 (USDs)	8,433	6,450	5,207	12,612	8,069	5,845
GDP expansion, av. 2018-19 (% change)	-2.3	1.2	2.9	2.5	0.9	3.1
GDP expansion, 2020 (% change)	-11.8	-5.8	-8.2	-6.0	-9.0	-13.9
Inflation, 2020	36.1	2.7	2.4	2.9	3.4	1.8
Unemployment rate, 2020	11.0	13.4	17.3	7.3	5.2	12.5
Degree of openness, 2019	32.6	29.0	37.7	56.8	77.9	47.1
Exports, 2019 (USD bn)	65.1	225.4	39.5	69.7	460.7	46.1
Investment, 2020 (% of GDP)	17.3	14.7	19.7	22.1	19.3	19.2
Sovereign credit rating	CCC+	BB-	BBB-	A+	BBB	BBB+
Overall Business performance						
Doing Business Index	59.0	59.1	70.1	72.6	72.4	68.7
Transparency	42.0	38.0	39.0	67.0	31.0	38.0

Infrastructure and connectivity						
Internet users (% of population)	74.3	67.5	82.3	62.3	65.8	52.5
Active subscriptions mobile broadband (per 100 inhabitants)	97.4	90.9	92.9	75.0	95.2	26.7
Active subscriptions fixed broadband (per 100 households)	72.2	51.4	67.7	50.3	65.1	32.7
4G Share (2019)	56	76	41	62	31	37
5G share (2025)	7	18	6	8	12	6
Penetration of Smartphones (2019)	65	85	59	67	65	57
Penetration of Smartphones (2025)	77	89	82	81	74	70
Download speed Mobile broadband (Mbps)	27.9	28.1	18.2	19.5	31.9	22.8
Download speed Fixed broadband (Mbps)	44.5	66.2	36.8	129.1	42.4	35.2

Network operator's performance						
Total Revenues (USD m)	9,480	38,250	6,473	7,840	26,648	4,490
Revenue for fixed services (USD m)	5,058	19,070	3,002	3,255	16,360	1,604
Revenues for mobile services (USD m)	4,422	19,180	3,471	4,585	10,288	2,885
Direct jobs	88,731	107,683	18,549	23,814	210,194	15,339
CAPEX (USD m)	1,639	6,755	1,253	1,214	4,759	856

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EXTRA RESOURCES & METHODOLOGY



Official sources of information

National statistics offices

<https://www.inegi.org.mx>

<https://www.dane.gov.co>

<https://ogeiee.produce.gob.pe>

<https://www.indec.gob.ar>

<https://www.ine.cl>

<https://www.ibge.gov.br>

International sources of information

<https://www.imf.org/en/Home>

<https://unctad.org>

<https://www.cepal.org/en>

<https://www.weforum.org>

<https://www.worldbank.org/en/home>

<https://www.gsma.com>

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Methodological notes

Through the report the following abbreviations for country names are used: ARG (Argentina), BOL (Bolivia), BRA (Brazil), CA (Central America), (DOM) Dominican Republic, ECU (Ecuador), ELS (El Salvador), COL (Colombia), CHI (Chile), GUA (Guatemala), HON (Honduras), MEX (Mexico), NIC (Nicaragua), PAR (Paraguay), PER (Peru) and URU (Uruguay).

The concept Pre-COVID that is used frequently in the report refers to the 2015-19 period, except that other definition is given.