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Abstract

The appearance and spread of COVID-19 have accentuated the connectivity and digitization lag in Latin American and Caribbean countries. The lockdowns imposed to reduce the spread of the virus increased the demand for digital tools that would allow economic, educational, and social activities to continue remotely. Despite the significant increase in the coverage of broadband networks in the region, there are still few activities that can be carried out remotely. This may be due to a lack of connectivity for a significant number of people, or to the difficulty for various actors in accelerating their digital transformation. This paper intends to assist policymakers in determining what measure might best assist countries given their circumstances.

JEL Codes: L96, I18, L51, O18, L86

Keywords: COVID-19. digital infrastructure, public policy, regulation

Executive Summary

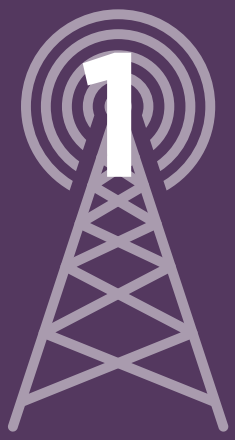
Expanding access to high-speed home broadband and mobile broadband in Latin American and Caribbean (LAC) countries can enhance gross domestic product (GDP), promote inclusiveness, and provide societal benefits. LAC countries differ substantially in their endowments of these resources, depending on their affluence, economic structure (including the size of the informal sector), and past investment decisions. This paper analyzes these differences by examining the interaction of a range of factors with the expected loss of GDP associated with the COVID-19 outbreak. The analysis will enable the countries to be classified according to their resilience to the effects of COVID-19.

Following the outbreak of COVID-19 and in the period of the strong countermeasures put in place to contain it, access to telecommunications (which differs across countries) enabled commercial and social services to continue to be produced and consumed at home, via telework and remotely provided education and healthcare. This analysis suggests that telework makes the greatest contribution in terms of reducing GDP loss, but schooling and healthcare bring important societal benefits that are harder to quantify in the short run. Telecommunications are estimated to have saved each country between 20 and 25 percent of GDP for the period of limited mobility. Thus, if this period were six months, the savings would be 10 to 12 percent of annual GDP. Better telecommunications could save even more.

The extent to which telework is possible depends on a number of factors including: (i) the availability of adequate broadband connectivity, (ii) the availability of suitable computing resources at home, (iii) whether workers have digital skills, and (iv) whether their role can be performed from home. These factors vary dramatically across the LAC region, where the presence of substantial informal work in some countries reduces the possibility of teleworking.

These conclusions add to the justification of more investment, particularly in lagging countries, in better telecoms infrastructure and digital skills. The (probability-weighted) value of the retention of workers' GDP, when they would otherwise be unable to work, must be added to the substantial private and social benefits of connectivity in normal times, before being set against the cost of providing home broadband. This is particularly true of fixed broadband, which allows for multiple users to connect simultaneously. Specifically, for many countries, the cost of providing broadband to a household where telework would be possible given broadband connectivity is likely to result in a fivefold increase in GDP (over the reduced level due to the pandemic) compared to the cost of deployment.

Actions that governments can take include removing barriers to deployment, making spectrum available, subsidizing uneconomic deployment areas, and targeting subsidies for connectivity and handsets to poorer households. Given the urgency of connectivity, governments may also wish to consider single shared networks and other approaches that can reduce deployment risks and costs. The approach adopted here, which involves substantial cross-country comparisons, is intended to assist policymakers in determining what measures might best assist countries given their circumstances.



The State of Connectivity and Information and Communications Technology in Latin America and the Caribbean and the Impact of COVID-19

CONNECTIVITY, ADOPTION, AND THE DIGITAL DIVIDE

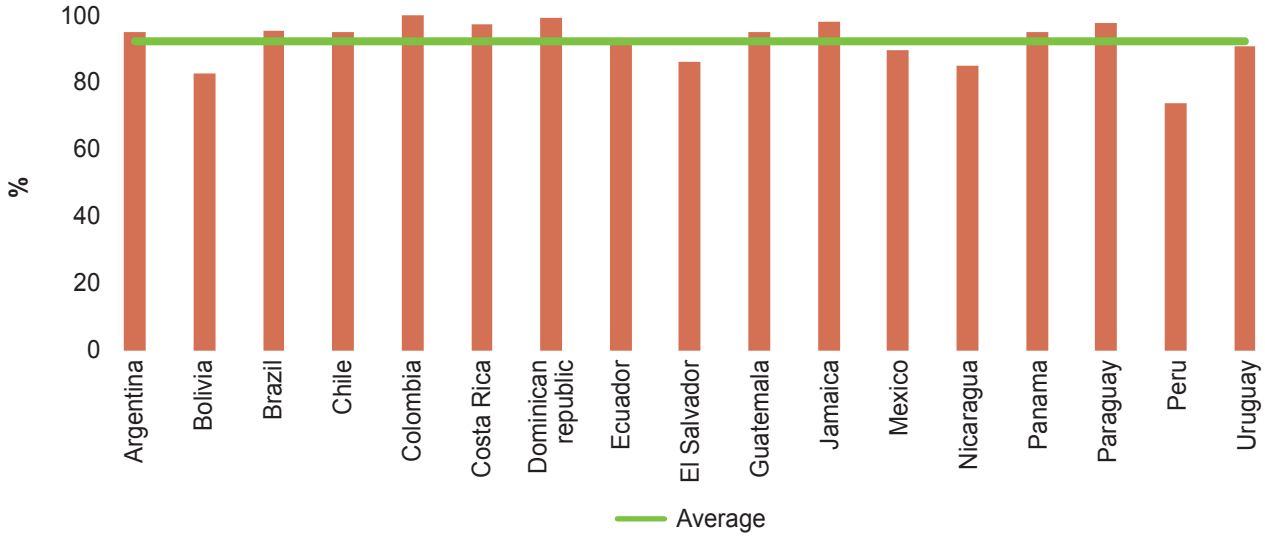
The appearance and spread of COVID-19 accentuated the connectivity and digitization lag in LAC countries. The lockdowns imposed to reduce the spread of the virus increased the demand for digital tools that would allow economic, educational, and social activities to continue remotely.

Despite the significant increase in the coverage of broadband networks in the region, there are still few activities that can be carried out remotely. This may be due to a lack of connectivity for a significant number of people, or the difficulty for various actors in accelerating their digital transformation.

Figure 1 depicts the percent of the population covered by at least 3G networks in LAC countries. The efforts of a number of agents allowed broadband network coverage to reach an average of 92 percent of the population in the region's countries. By contrast, Figure 2 shows that despite the wide coverage of broadband, fully one-third of the region's population do not use the internet. The percentage of internet users in LAC countries is lower than

Figure 1

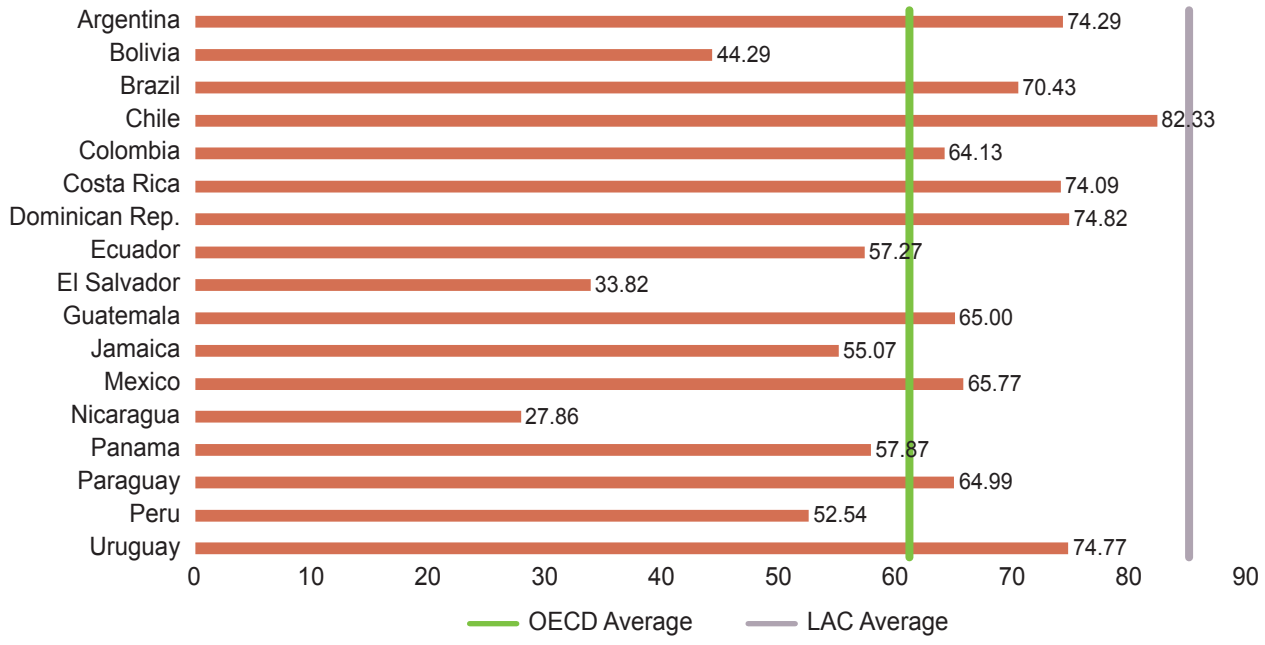
Population Covered by at Least 3G Networks, 2018 (percentage)



Source: Authors' elaboration based on digil@c (https://digilac.iadb.org/).

Figure 2

Internet Users, 2018 (percentage)



Source: Authors' elaboration based on digil@c (https://digilac.iadb.org/).

the average observed in Organisation of Economic Co-operation and Development (OECD) countries. Moreover, internet usage varies greatly among LAC countries.

The data above suggest that one of the priorities in LAC countries should be to connect those people who are not currently connected, since connectivity is a necessary although insufficient condition to obtain the benefits of digital technology. Connectivity can increase the effectiveness of actions carried out by governments to alleviate the economic crisis created by COVID-19. Indeed, as noted in a World Economic Forum (WEF) report, the lack of connectivity can make it difficult or impossible for the population to access support programs that arise during quarantine (WEF, 2020).

The difficulties that the region faces during the pandemic are closely related to the digital divide among and within LAC economies. In general, the digital divide is defined as the difficulty of a part of the population to access information, knowledge, and education through information and communication technologies (ICTs).[1] The digital divide also strongly affects socioeconomic factors such as lack of education and skills, which has long-term effects on growth.

There are several types of digital divides that prevent users from fully benefiting from the use of ICTs, each relating to supply and demand constraints. On the supply side, the lack of infrastructure and the quality of the connection are the main impediments to efficient connectivity. On the demand side, price and income or capacity factors are the main constraints.

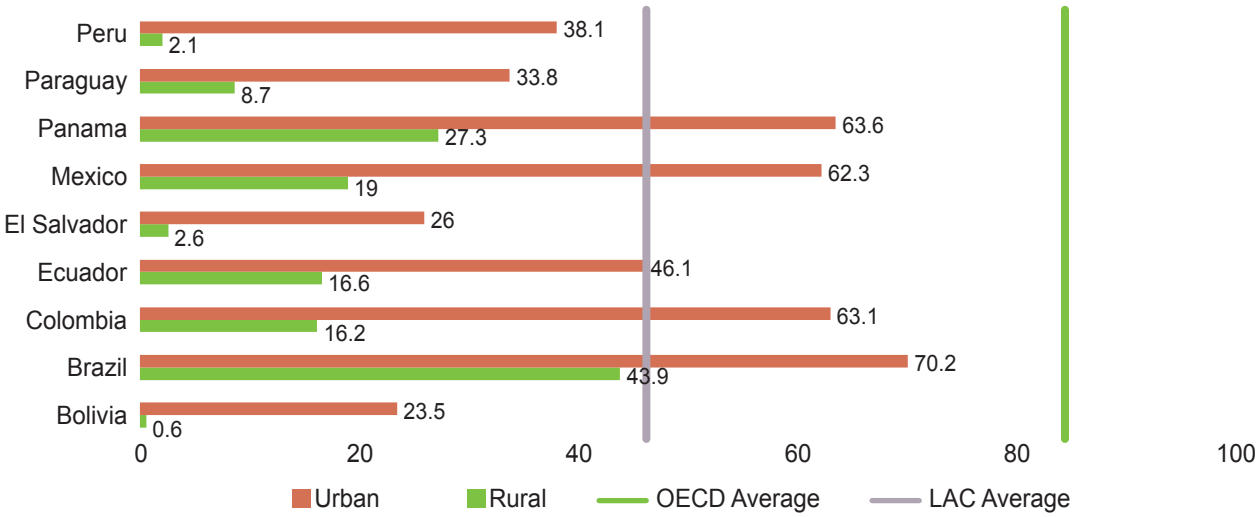
SUPPLY CONSTRAINTS

Although broadband networks cover a significant portion of the population, there are disparities within countries. Connectivity in rural areas is substantially lower than in urban locations, excluding Brazil, where rural connectivity is equivalent to 32 percent of the average urban connectivity in LAC and 18 percent of the OECD average.

[1] Several authors have expanded this definition, adding other factors that restrict the use of ICTs besides the purely technological ones.

Figure 3

Households with Internet by Location, 2018 (percentage)



Source: Authors' elaboration based on data of ITU, ICT indicators.

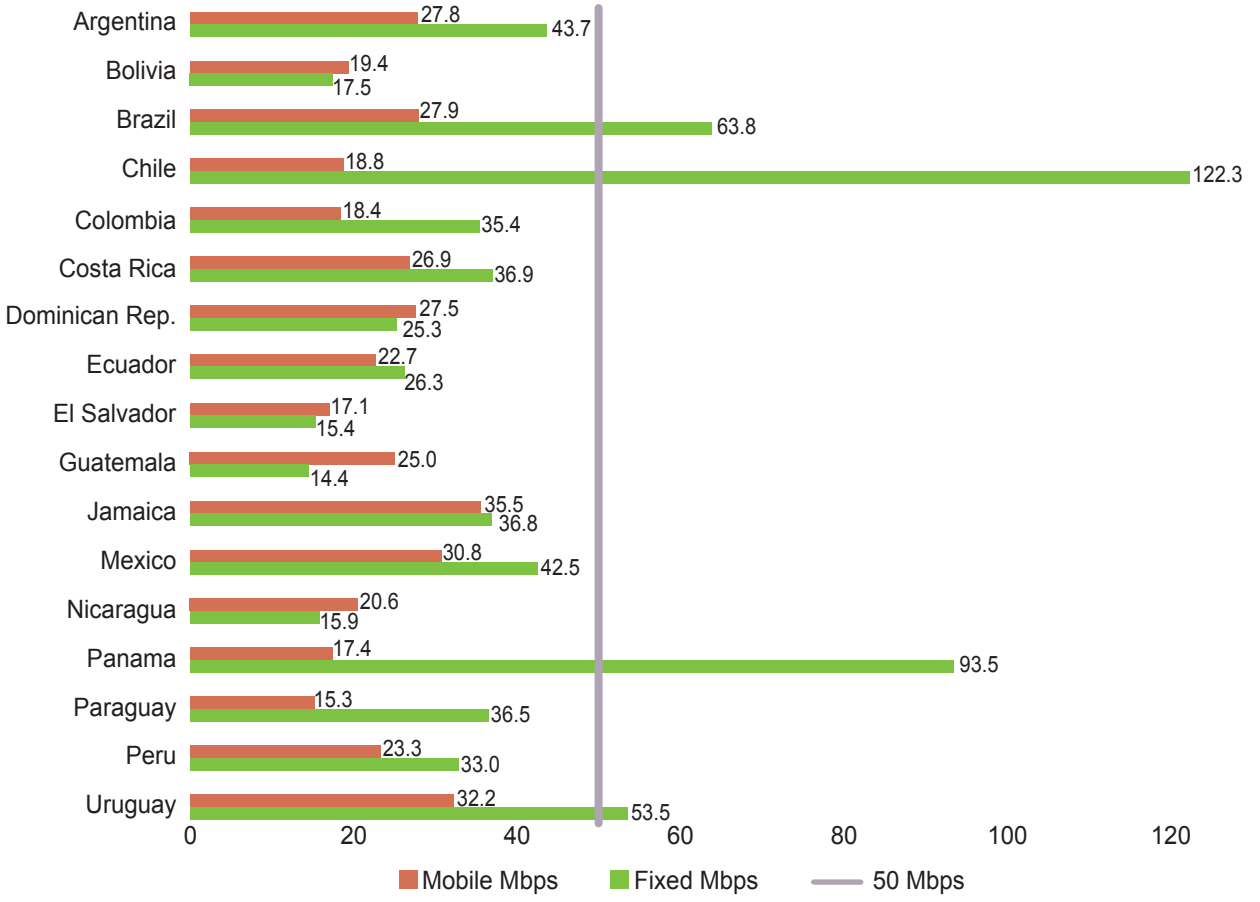
Although these data do not directly indicate whether broadband networks cover rural areas, the small proportion of households with internet access in these areas may be an indicator that they are still not being covered. Cave, Guerrero, and Mariscal (2018) estimate that in Mexico, rural localities had lower coverage of broadband networks regardless of the level of marginalization.[2] Rural localities with low levels of marginalization had barely 70 percent coverage of broadband networks, while their urban counterparts had 100 percent coverage. For localities with high levels of marginalization, broadband networks cover less than 10 percent of rural localities, compared to 90 percent of urban localities. This can be seen in Figure 3.

To carry out productive activities efficiently from remote locations, the speed of the service must be adequate. That is, the quality of connectivity is important. In the context of COVID-19, quality is crucial because, for example, several people within a household may

[2] The index of marginalization used to build the figure, constructed by the National Population Council, aggregates information on eight socioeconomic indicators. These indicators include the percentage of the illiterate population 15 years of age and older, the percentage of households without sewage or drainage facilities; the percentage of households without electricity; and the average number of people living in the household.

Figure 4

Broadband Speed (Mbps), July 2020



Source: Authors' elaboration based on data of Ookla speedtest.

need to connect simultaneously. Low connectivity speeds exacerbate exclusion since they disadvantage the most marginalized people in a household—Indigenous people, girls, and women, with respect to intrahousehold distribution of food and income amid economic crisis situations—through the use of digital solutions for telework and online education (ECLAC, 2020).

The increase in traffic was largely driven by the use of the internet for conferences, virtual meetings or classes, as well as online games and video streaming. Although all LAC countries experienced a decrease in transfer speeds in the weeks following the beginning of

social distancing measures, some managed to regain previous speeds in relatively short periods while others, such as Peru, were unable to return to previous levels.

According to the most recent data on the average broadband speed in LAC countries, broadband speed was sufficient to fully support multiple simultaneous users within a home in only four of them (Figure 10).[3] In other households, they may have had to decide, for example, whether to use the broadband service to telework or to attend classes remotely. In a simulation carried out by Nokia, the minimum bandwidth for working, learning, and playing comfortably during the closure of activities was estimated at 50 Mbps downstream.

DEMAND CONSTRAINTS

The demand gap refers to the number of people who do not use the internet despite the existence of the necessary infrastructure. With respect to income levels, access to broadband service is expensive in most LAC countries. In 2018, the Broadband Commission for Sustainable Development set as a target for 2025 that entry-level broadband services should be made affordable in developing countries, corresponding to less than 2 per cent of monthly per capita gross national income (GNI). Currently, only Brazil and Costa Rica have reached this goal, and several countries are close to reaching it. While mobile networks have covered this low-income demand to some degree by making them more affordable, their starter pack is limited to 1.5Gb/month consumption. Thus, their use for work or school is limited.

The relatively low levels of household income in LAC countries limit access to the internet and therefore the possibility that they can use it efficiently. This lack of access has medium- and long-term effects, as it prevents the formation of human capital, which creates a barrier to digitize other sectors in the economy. It also increases economic and social inequality in the region.

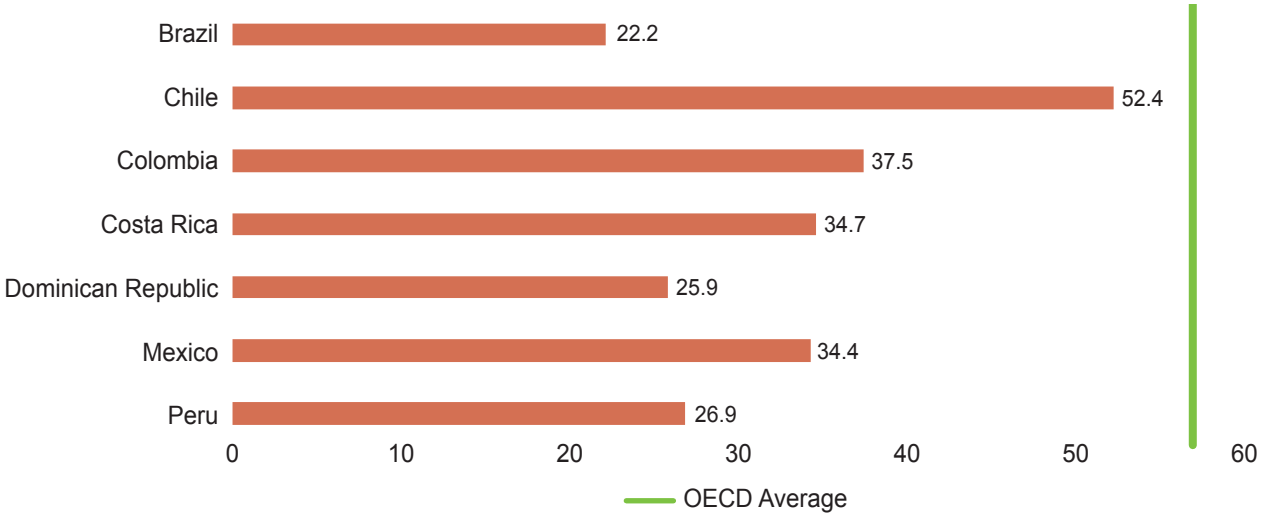
[3] Data correspond to July 2020 generated by Ookla speedtest. Available at: *https://www.speedtest.net/global-index*

The lack of skills in the use of the internet and ICTs in general may have exacerbated the effect of the pandemic in the LAC region by hindering the digitalization of various activities. Figures 5 and 6 present information on the skill levels of the population in different countries.

As can be observed, the proportion of the population that has basic and standard skills in the use of ICTs is substantially lower than the OECD average. Chile and Mexico are the exceptions. Their advanced skill levels are higher than those observed in the OECD. Less than half of the population has basic ICT management skills, which prevents them from satisfactorily accessing the labor market in activities that can be carried out from home. This is due to both inadequate digital training and lack of access to computers. The coefficient of students per computer is 42 in the LAC region, while in OECD countries it is 8 (ECLAC, 2020). The numbers are worrisome because no significant investment or changes are expected in the short term. In fact, the OECD and IDB (2016) estimates that more than half of the 15-year-olds in the LAC region have not acquired the basic skills necessary for insertion into the labor market.

Figure 5

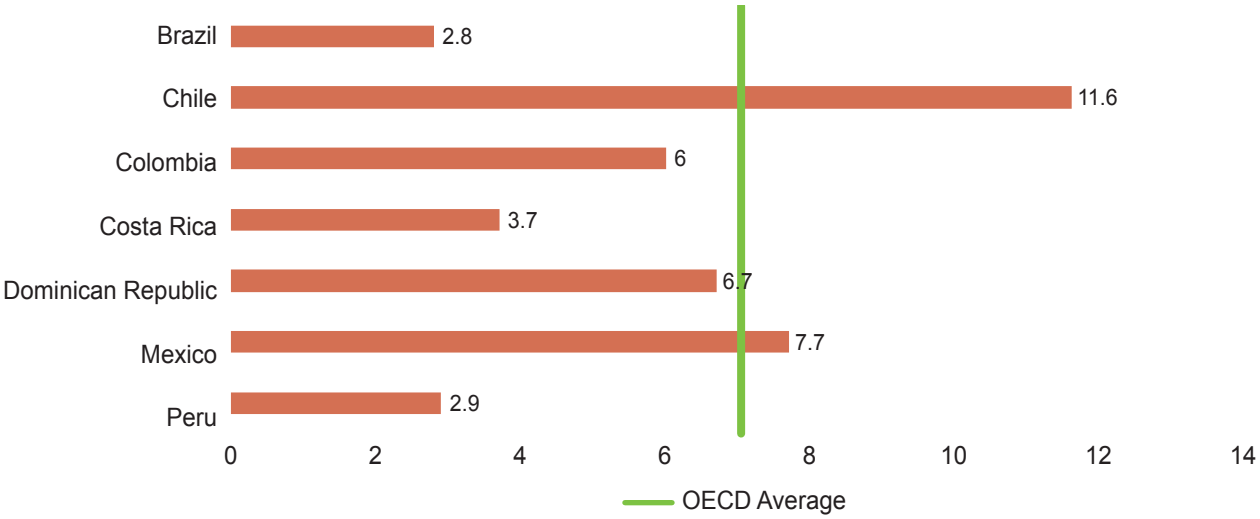
Population with Basic ICT Skills, 2018 (percentage)



Source: Authors' elaboration based on data of ITU, ICT Indicators.

Figure 6

Population with Advanced ICT Skills, 2018 (percentage)



Source: Authors' elaboration based on data of ITU, ICT Indicators.

In sum, the emergence of COVID-19 reaffirmed the importance of bridging the digital divide in the region. The acceleration of the digitization of economic and social activities in the developed world threatens to further widen the worldwide, regional, and intra-country gaps.

Maintaining Economic Activity During the Pandemic through Telecommunications

FIRST STAGE: THE CRISIS

Telework

Telecommunications enables employees to telework for businesses where this is a viable option. This is possible because of widespread fixed broadband networks. In some cases, mobile networks can substitute fixed broadband networks, albeit with capacity limitations. There are two reasons why individuals may stay at home, or at least reduce their mobility. The first is government diktat—a lockdown—with requirements to avoid travel imposed from the center. The second is individual choice based on a perception of risk. Both are elements of the extent of reduced mobility. They are not separated here, as they both lead to the same effect—the need for work, business, schooling, and healthcare to be conducted remotely.

To estimate the beneficial effects of telecommunications, various researchers have identified the percentage of work in each country that could be performed from home. Clearly, tasks such as agriculture and manufacturing cannot, but managerial tasks and contact centers can. There is a correlation between GDP and the percentage of jobs that are tele-workable.[4] The

[4] This makes intuitive sense. As GDP improves, more of the population is engaged in more intellectual roles, which are more amenable to work from home.

best-fit line can be used to predict teleworking percentages given the GDP for each country of interest. These results align well with other reported values for telework in the region.

Telework requires home broadband and typically access to a computer. We anticipate that those who could telework are more likely to have access to broadband and home computers, since those in occupations amenable to telework tend to have higher salaries. Hence, while the national level of broadband and home computers is above that for telework, we do not adjust the percentage downward.[5]

The classes of workers are the following:

- Those that cannot telework so continue to work by traveling to their workplace.
- Those that cannot telework and stop all productive work during the crisis phase.
- Those that can telework and do so from home.
- Those that can telework but choose to travel to the office.
- Those who can telework, but whose role is not needed as a result of contracting economic activity and so are effectively redundant.

It is not possible to know for sure how many people fall into these categories. The data above suggest that 15 to 22 percent of the population can telework. A mobility analysis based on Google mobility data shows that during the crisis, travel to the workplace fell on average by 48 percent across the LAC region. Since only about 20 percent can telework, it is likely that the vast majority of those who can telework stayed home along with about 30 percent of the population that could not telework (and so were not productive). Anecdotal evidence suggests that most redundancies are in non-teleworkable jobs such as in hospitality, transportation, and tourism. Hence, we anticipate that the fraction of teleworker who are not needed during the crisis is relatively small.

[5] Specifically, we take the minimum of the teleworking percentage, the broadband penetration percentage, and the percentage of households with a computer.

We also assume that teleworkers are predominantly located in urban and sub-urban areas. This is because teleworkable jobs tend to be office-based, and offices are generally found in denser population areas. Hence, rural connectivity, while an important societal goal, is less relevant for teleworking.

By assuming that all those that can telework do so, we risk (i) overestimating the GDP contribution from teleworkers, some of who might go to the office anyway and (ii) underestimating the GDP contribution from non-teleworkers who stay at home but nevertheless might find some ways to be somewhat productive during this period. Finally, we can convert this to a financial measure by assuming that, for example, a 10 percent teleworking capability would deliver 10 percent of GDP (that would otherwise be lost without teleworking). This process is shown in Table 1.

Table 1

Telework Calculations

Countries	GDP $/person	Predicted teleworkable jobs (%)	Population (m)	Impact of teleworking $bn
Argentina	14,500	21	45.20	134.42
Brazil	16,700	22	212.50	772.20
Chile	15,000	21	19.10	59.57
Colombia	6,430	16	50.80	52.02
Costa Rica	11,570	19	4.95	10.79
Dominican Republic	7,220	16	10.90	12.89
Ecuador	6,220	16	17.60	17.30
Guatemala	4,470	15	17.90	11.85
Peru	15,000	21	31.50	98.25
Mexico	9,200	17	128.90	207.52
Paraguay	5,800	16	6.80	6.14
Uruguay	16,350	22	3.40	11.99
Venezuela	11,100	19	31.00	63.93

Note: This table assumes that teleworkers can work from home and are as productive in doing so as if they were in the office or working environment. Because some teleworkers will not have sufficient connectivity it is an upper bound on the contribution that teleworking can make. It also effectively assumes that if these workers were unable to work from home, they would not undertake productive work during the crisis phase.

Table 2

Results for e-Commerce

Countries	Household consumption US$	% of LatAM e-commerce	Actual e-commerce revenue $bn	Value of additional sales $bn
Argentina	11,884	22	10.6	31.65
Brazil	7,987	38	18.2	54.67
Chile	13,527	4.70	2.3	6.76
Colombia	8,612	4.40	2.1	6.33
Costa Rica	10,800	0.79	0.4	1.14
Dominican Republic	9,967	1.50	0.7	2.16
Ecuador	5,934	2.30	1.1	3.31
Guatemala	6,272	1.10	0.5	1.58
Peru	7,721	1.30	0.6	1.87
Mexico	10,064	19.60	9.4	28.20
Paraguay	7,400	0.54	0.3	0.78
Uruguay	13,170	0.77	0.4	1.10
Venezuela	9,260	1.90	0.9	2.73

E-Commerce

Telecommunications allows internet shopping, both by helping the population stay at home, and by providing some activity for stores that might otherwise be closed. E-commerce can be delivered via both fixed and mobile networks. It also largely depends on demand-side policies aimed at increasing the use of internet for e-commerce, e-banking, and government services in lieu of the use for entertainment only.

We start by estimating the size of the retail sector. We have used household consumption as a proxy, which we assume will be predominantly retail sales. We have used estimates of the distribution of e-commerce across the LAC region[6] to also estimate the current percent of business that is online, extrapolating for those countries not listed in this dataset.

[6] See *https://www.statista.com/statistics/256166/regional-distribution-of-b2c-e-commerce-in-latin-america/* for more information.

Table 3

Results for Home Schooling

Countries	% GDP spend on education	% home schooling	% GDP saved by home schooling	% GDP growth gained	Value $Bn
Argentina	5.50	32	0.22	0.20	1.31
Brazil	6.20	50	0.39	0.35	12.33
Chile	5.40	60	0.41	0.36	1.04
Colombia	4.50	42	0.24	0.21	0.69
Costa Rica	7.40	59	0.55	0.49	0.28
Dominican Republic	4.30	32	0.17	0.15	0.12
Ecuador	5	37	0.23	0.21	0.23
Guatemala	2.80	42	0.15	0.13	0.11
Peru	3.90	30	0.15	0.13	0.62
Mexico	4.90	45	0.28	0.25	2.94
Paraguay	3.40	23	0.10	0.09	0.03
Uruguay	4.90	54	0.33	0.30	0.17
Venezuela	3.60	45	0.20	0.18	0.63

E-commerce appears to vary between 1 and 2 percent (compared to the United Kingdom, where it is now reaching 20 percent). We have estimated that e-commerce might grow by a factor of three during the lockdown period. This is based on early data[7] and may need to be revised as more data become available.

Home Schooling

Telecommunications enables home schooling, which prevents education from suffering unduly by, for example, allowing pupils to access their teachers, or enabling massive on-line courses (MOOCs). It is mostly enabled by good fixed broadband networks, but good mobile networks can substitute.[8]

[7] See *https://ccinsight.org/* for more information.

[8] In addition, one of the issues that has largely been overlooked is the number of computers and/or hand-sets per household. One of the current discussions is that there are not enough computers per household (irrespective of the quality of connectivity) so that children cannot take classes while their parents are teleworking. There is also poor access to cloud resources so that recordings of classes can be viewed later.

An increase in education expenditure by 1 percent of GDP (e.g., from 4.5 to 5.5 percent) increases GDP growth by 0.9 percentage points (e.g., from 4.5 to 5.4 percent) (Carmignani, 2016). We have taken the current education expenditure for each country, and we have assumed that a quarter of a year's education is lost due to lockdown (this may need to be revised as experience builds) and that only 50 percent of parents actually impose home schooling. We have used the same criteria for access to home schooling as home telework, namely, access to broadband and a computer. We can then derive the percentage of education saved by home-schooling as a percentage of GDP and then use the correlation above to translate it to impact on GDP.

E-Healthcare

Telecommunications can help with healthcare, allowing video/audio consultations with physicians. This reduces the need for the vulnerable to travel and allows remote monitoring of those with potentially dangerous conditions such as diabetes. Based on empirical evidence from OECD countries, when the ratio of health spending to GDP is less than the optimal level of 7.55 percent, increases in health spending effectively lead to better economic performance. Otherwise, such spending does not cause improvements in care (Wang, 2015). This makes intuitive sense. Initially, healthcare helps keep productive workers healthy. After a certain point, additional healthcare is used to extend the life of those who have retired, which does not enhance GDP, and re-directs money from other purposes, reducing GDP.

Based on the actual data provided herein, between 5.5 and 7.5 percent of spending in the LAC region is on healthcare. Using this data, we have taken current healthcare spending per country as a percentage of GDP. We assume that those with any form of telecommunications (e.g., just a mobile phone, not necessarily broadband or a home computer) are able to access tele-health since in many cases a voice call is sufficient. Assuming a lockdown of three months (as above) the healthcare spending effectively saved by tele-health can be determined and then converted to GDP growth, as shown below.

Summary

Table 4 brings together the output from the previous sections. Clearly, telework provides the bulk of the benefit. On a per-country basis, savings in Mexico, for example, are around $200bn. Spending only a fraction of this on enhancing telecommunications might achieve significant dividends.

It is beyond the scope of this paper to perform a detailed analysis. However, Table 6 provides some indication of the rationale for intervention. In this table we assume it is possible to target those who are in a job where telework is possible but do not have broadband connectivity. We assume delivering this connectivity would cost $1,000 (e.g., to lay fiber/copper cable)—relatively low because most teleworkers are assumed to be in urban or suburban areas since most rural jobs are likely to be non-teleworkable. The gain for either a three-month or a six-month lockdown can then be calculated simply as the GDP contribution that person would make that is restored by telework, minus the cost of providing the connectivity. This is the gain per person. It makes no assumptions as to the number of

Table 4

Results for Healthcare

Countries	Per person US$	As % of GDP	% telecoms access	% saved by tele-health (GDP)	% GDP growth gained	Value $Bn
Argentina	998	6.9	81	1.39	0.77	5.02
Brazil	780	4.7	88	1.03	0.57	20.06
Chile	1100	7.3	82	1.50	0.83	2.37
Colombia	374	5.8	85	1.24	0.68	2.22
Costa Rica	929	8.0	85	1.71	0.94	0.54
Dominican Republic	397	5.5	85	1.17	0.64	0.51
Ecuador	530	8.5	54	1.15	0.63	0.69
Guatemala	224	5.0	65	0.81	0.45	0.36
Peru	370	2.5	81	0.50	0.27	1.30
Mexico	535	5.8	74	1.08	0.59	7.02
Paraguay	321	5.5	84	1.16	0.64	0.25
Uruguay	1281	7.8	77	1.51	0.83	0.46
Venezuela	920	8.3	74	1.53	0.84	2.90

Table 5

Contribution of the Different Areas to theTotal

Countries	Telework	E-Commerce	Home schooling	Healthcare
Argentina	134.42	31.65	2.53	5.02
Brazil	772.20	54.67	21.75	20.06
Chile	59.57	6.76	2.04	2.37
Colombia	52.02	6.33	1.56	2.22
Costa Rica	10.79	1.14	0.44	0.54
Dominican Republic	12.89	2.16	0.28	0.51
Ecuador	17.30	3.31	0.47	0.69
Guatemala	11.85	1.58	0.35	0.36
Peru	98.25	1.87	1.55	1.30
Mexico	207.52	28.20	6.18	7.02
Paraguay	6.14	0.78	0.10	0.25
Uruguay	11.99	1.10	0.35	0.46
Venezuela	63.93	2.73	1.68	2.90
Totals	1,458.88	142.30	39.27	43.69
Grand Total $bn				**1,684.15**

people who have a teleworkable job but insufficient connectivity to undertake it at home. It assumes that this person would be fully productive if they had broadband connectivity but fully unproductive without it. In practice, some level of productivity might be possible with limited or no connectivity.

The figures show values per household that are always positive and, in some cases, exceed $5,000 per household. This suggests large benefits from increasing broadband penetration purely in terms of their ability to improve telework. Of course, there are many other benefits as well. These results may overestimate the benefits, as they assume no productivity for teleworkers without connectivity. Nevertheless, the gains are often so much greater than the costs of installing broadband (e.g., gains of over $5,000 versus costs of about $1,000) that even if they overestimate the benefits, the conclusions about the merits of broadband deployment still hold.

Table 6

Impact of Increasing Home Broadband Connectivity

Country	GDP/person US$	Gain/3-month lockdown US$	Gain/6-month lockdown US$
Argentina	14,500	2,625	6,250
Brazil	16,700	3,175	7,350
Chile	15,000	2,750	6,500
Colombia	6,430	608	2,215
Costa Rica	11,570	1,893	4,785
Dominican Republic	7,220	805	2,610
Ecuador	6,220	555	2,110
Guatemala	4,470	118	1,235
Peru	15,000	2,750	6,500
Mexico	9,200	1,300	3,600
Paraguay	5,800	450	1,900
Uruguay	16,350	3,088	7,175
Venezuela	11,100	1,775	4,550

SECOND STAGE: RECOVERY

During the recovery stage, many of the activities described in the Crisis section may still apply. For example, many may be encouraged to telework, and there may still be restrictions on schooling. In addition, telecommunications may have a key role to play in monitoring and tracking the spread of the virus, which might prevent a resurgence or allow some measures to be lifted more quickly because data on the impact of the change will be more readily available, allowing it to be quickly reversed if needed.

Telecommunications is the primary mechanism to quickly reach citizens, informing them of the introduction of measures such as to stay at home. This allows measures to be rapidly implemented (and removed), to be tailored daily to the best insight available, and even to be tailored regionally or based on demographics. It can use a mix of fixed, mobile, and broadcast networks, but it tends to be primarily delivered via broadcast and mobile. Mobile networks can be used

to track overall population movement, enabling conformity with restrictions to be measured, and to provide data for modelling. This can then allow more tailored restrictions or actions.

Mobile networks can be used to contact trace individuals so that those in contact with infected individuals can be informed and suitably isolated. Many countries consider this to be an essential component of the recovery stage, helping to avoid a "second peak" of infections. Although highly interventionist, and potentially in breach of civil rights, mobile location data can also be used to restrict movement of individuals.

THIRD STAGE: THE NEW NORMAL

The new normal is likely to involve a rebuilding of economies while reducing the risk of a new pandemic (or a resurgence of the current one). Telecommunications can play a vital role during a pandemic, increasing its societal value to a country even more than was previously thought. Broadly, this implies that governments, regulators, and other actors should be even further incentivized to encourage the rapid deployment of fixed and mobile networks.

Policies to Enhance the Impact of Telecommunications

LAC countries should consider adopting regulatory, governmental and investment approaches to position themselves better during the periods of crisis, recovery, and the new normal. In the new normal, single national or rural mobile networks enabled with government grants might be appropriate.

FIRST STAGE: THE CRISIS

This stage is relatively short for governments and others to be able to make material changes. Table 7 shows different policy recommendations.

SECOND STAGE: RECOVERY

We assume that the recovery phase may last about a year, although it may last longer, especially if there are additional outbreaks of COVID-19. During this time, network traffic patterns are likely to remain disrupted, with city center use relatively low but suburban use much higher than normal. Home broadband use, including Wi-Fi, will remain higher than normal. Even a year is too short a period for governments to bring about changes and for telecommunications companies to enact them. Temporary measures, especially temporary availability of radio spectrum, are more plausible than during the crisis (Table 8).

Table 7

Policy Recommendations during the Crisis

Spectrum	In a few countries around the world, more radio spectrum has been made available on a temporary basis. However, it can be difficult to rapidly bring this into use unless already-deployed mobile base stations have spare transceivers or similar capability to bring the spectrum into service through remote activation. We do not have data on the extent that rapid remote activation is possible, but we suspect that it is limited. Temporary spectrum provision also raises questions about how long the licenses might last and the costs of withdrawing them to the operator (and the potential impact on consumers who have grown used to the additional capacity). Hence, we do not see strong reasons for making spectrum temporarily available, although if it can be done quickly in bands where multinational organizations (MNOs) already have licenses, there may be minor benefits.
Crowd-sourced data	During the crisis period, crowd-sourced data are useful for monitoring compliance with movement restrictions. For example, they can show changes in road traffic levels, occupancy of parks, and others. Google appears to be making this available to governments that want it, which may be sufficient, but governments may want to consider whether they need stronger authority to collect these data from MNOs or others. Any increased data collection leads to potential privacy concerns, and governments should clearly set out their thinking on how privacy might be maintained and when any temporary measures will be revoked. Privacy issues will likely be of great importance but are beyond the scope of this paper.
Management network congestion	Governments could also aim to restrict traffic bandwidth in the case of network congestion, for example, by aiming to restrict all video feeds to standard definition (rather than high definition). This can be problematic since much of the video may originate from outside the country (e.g., from Netflix). Governments can work with the major sources of video (Netflix, YouTube, national broadcasters, Amazon) to secure their agreement to temporary bandwidth restrictions. Many have already volunteered such bandwidth reductions globally.

Table 8

Policy Recommendations during Recovery

Temporary measures that might enable rapid broadband deployment	• Open up mmWave bands to unlicensed access with limited restrictions. • Remove any planning restrictions on temporary masts. • Consider limited monopoly licenses in specific geographic areas with appropriate conditions attached.
Mobile coverage enhancement	• Temporary lifting of limits on mobile mast heights. • Rapid availability of sub-1GHz spectrum. • Encouraging innovative approaches such as the use of drones to provide rural coverage, perhaps by providing spectrum and mandatory roaming from MNO networks.
Subsidy on new phones	Government subsidies on new phones can enhance smartphone penetration, especially if an older phone is traded in, coupled with consumer education as to the benefits of a newer phone. This policy might improve mobile coverage and encourage the purchase of smartphones for those with older devices that can help increase the adoption of apps to monitor and supress the virus.

THIRD STAGE: THE NEW NORMAL

In the new normal stage, telecommunications are even more important than they were in the past. Their societal value is increased through the ability to increase GDP during crisis periods. Specifically, the need for widespread, ideally ubiquitous, availability is stronger, both to prevent the widening of digital divides and because any response to a pandemic will be much more effective if it can be implemented nationally, rather than requiring, for example, isolation of certain communities that do not have a sufficiently widespread ability to download an app. Much of the value during the crisis is generated by fixed networks (and Wi-Fi), while mobile networks are especially important in the recovery phase. Delivering widespread home broadband and widespread mobile coverage is therefore even more important than ever.

Mobile Networks

A previous report (Webbsearch, 2019) sets out recommendations for government, regulatory, and local authority actions which could enhance the deployment of mobile networks in the LAC region. These recommendations are included in Table 9.

Broadband Networks

Many countries have encouraged enhanced broadband access such as fiber-to-the-home (FTTH). Table 10 summarizes the experience with various approaches.

Table 9

Policy Recommendations for Mobile Networks during the New Normal

Government	
Improve access to sites, giving operators more control over landlords	• Where appropriate, provide national regulations to be applied at the regional and local levels, with legal and political incentives to encourage implementation including standardized fees for access to public facilities, one-stop shop provision of all necessary regulatory processes, and maximum time limits for permits to be granted. • Consider publishing regulations such as the United Kingdom's new code. • Establish a barrier-busting team to act as a gateway for input, a resource to address issues, and a permanent centre of expertise in best practice.
Access to government land and buildings for site deployment	• Provide a center for data on government buildings, pricing policy, and inquiries about availability. • Regularly publish metrics such as requests received versus requests approved. • Conduct an annual review of the effectiveness of the approach.
Access to government networks.	Tender for in-building cellular coverage in key government buildings.
Encouragement for fiber deployment, which also facilitates mobile networks	Publish a policy on fiber deployment covering government aspirations, preferred competitive framework, etc. Discuss how fiber-to-street furniture and other base station locations might best be provided.
Regulator	
Spectrum and masts in rural areas	• Improve the range of existing sites by allowing higher masts in rural areas, higher transmission power, and making available 700MHz spectrum. • Flexible access to spectrum, including enabling spectrum sharing, leasing, and allowing new business models. Maximizing supply and sharing of spectrum.
Facilitate fibre availability, especially for backhaul	• Enable duct-and-pole access. • Provide a clear competition policy for regulating fibre networks.
Service extension	Considering service extension commitments to reduce payments.
Removing barriers to neutral host networks and other innovations	• Consult on neutral host, self-deployment, and other new approaches to understand any barriers to deployment or facilitation needed. • Establish team to address emerging issues.
Local authority	
Construction permits	Implement efficient processes for handling construction permits for mobile network antenna sites, consistent with the national framework.
Access to street furniture on a simple and low-cost basis	• Publish a list of all street furniture owned, including location, facilities available, etc. • Publish an access policy which specifically lists costs and restrictions. • Provide a single point of contact for requests for access with obligations to respond within fixed timeframes. • Where access is constrained and multiple MNOs cannot deploy, facilitate the establishment of a neutral host with rights to the assets.
Reduced bureaucracy in areas such as planning permission.	• Publish planning permission guidelines. • Consider where a de minimis approaches can apply such as with small base stations. • Reduce licensing burdens and costs for infrastructure deployments. • To define local regulations aligned with national laws.

Table 10

Policy Recommendations for Broadband Networks during the New Normal

Passive infrastructure access (PIA)	Operators other than the incumbent (often known as "altnets") can access ducts and poles owned by the incumbent and typically used for the existing copper network. While such access can, in principle, reduce deployment costs by as much as 90 percent, in practice ducts are often not in the right place, already full, not well mapped, or have other problems. As a result, PIA has not, to date, lived up to the hopes of its proponents.
Vouchers and similar	Households are given vouchers that they can use to pay for the installation costs of home broadband. This can incentivize altnets and incumbents to roll out broadband, knowing that they can charge a connection cost that might offset much of their deployment costs. Voucher schemes have worked relatively well, especially where there is a vibrant, competitive altnet environment and where other restrictions have been removed.
Easing regulation to perform street works	Street works, typically involving digging trenches, are eased by reducing the red tape needed to gain permits and reconsidering regulations on aspects such as the depth and width of trenches that are required.
Easing building access	Building access is needed in multi-tenant buildings to gain access to the area where the building telecommunications network is located, and space is needed to locate any necessary terminating equipment.

Conclusions and Recommendations for Action

It is well known that broad access to telecommunications in the form of high-speed home broadband and mobile broadband can increase GDP, promote inclusiveness, and provide societal benefits. LAC countries differ substantially in their endowments of these resources, depending on their affluence, the structure of each economy (including the size of its informal sector), and past investment decisions. These factors generate different levels of vulnerability to a pandemic.

This policy brief analyzes these differences by examining the interaction of a range of factors with the expected loss of GDP associated with the outbreak. In this way, countries can be classified by their resilience to COVID-19.

Chief among these factors is access to connectivity. During the spread of the disease and the period of strong countermeasures to a pandemic, access to telecommunications is even more important, as it enables commercial and social services to continue to be produced and consumed at home, via such means as telework and remotely provided education and health care. Our analysis suggests that telework makes the greatest contribution in terms of reducing GDP loss, but schooling and healthcare bring important societal benefits that are harder to quantify in the short run.

The extent to which telework is possible depends on a number of factors, including: (i) whether there is suitable broadband connectivity, (ii) whether the household has suitable computing resources, (iii) whether workers have digital skills, and (iv) whether their role can be performed from home. These factors vary dramatically across the LAC region, where the presence of substantial informal work in some countries reduces the possibility of working from home.

These conclusions justify further investment, particularly in lagging countries, in better telecommunications infrastructure and digital skills. The (probability-weighted) value of the retention of workers' GDP, when they would otherwise be unable to work, must be added to the very substantial private and social benefits of connectivity in normal times, before being set against the cost of providing home broadband, particularly fixed broadband, which allows multiple users to connect simultaneously.

Governments can take actions such as removing barriers to deployment, making spectrum available, subsidizing uneconomic deployment areas, and targeting subsidies for connectivity and handsets to poorer households. Given the urgency of better connectivity, governments may also wish to consider single shared networks and other approaches that can reduce deployment risks and costs. The approach adopted in this paper, which involves substantial cross-country comparisons, is intended to assist policymakers in assessing what measures might best assist countries given their circumstances.

References

Carmignani, F. 2016. Does Government Spending on Education Promote Economic Growth? The Conversation. Available at: *https://theconversation.com/does-government-spending-on-education-promote-economic-growth-60229.*

Cave, M., R. Guerrero, and E. Mariscal. 2018. Bridging Mexico's Digital Divide: an Inside-out/Outside-in View of Competition and Regulation. Available at: *https://ceeg.mx/publicaciones/ESTUDIO_2_2018-Bridging_Mexicos_digital_divide_Final_2018_12_20.pdf*.

ECLAC (Economic Commission for Latin America and the Caribbean). 2020. Universalizar el acceso a las tecnologías digitales para enfrentar los efectos del COVID-19 Informe Especial COVID-19 No. 7. Santiago, Chile: ECLAC.

OECD ((Organisation for Economic Co-operation and Development) and IDB (Inter-American Development Bank). 2016. Políticas de banda ancha para América Latina y el Caribe: un manual para la economía digital. Paris, France: OECD Publishing.

Ookla Speedtest. Speedtest Global Index. Available at: *https://www.speedtest.net/global-index*

Wang, F. 2015. More Health Expenditure, Better Economic Performance? Empirical Evidence from OECD Countries. *Inquiry,* 52: 1–5.

Webbsearch. 2019. Obstacles of Deploying a Denser Network with a Focus on the Americas. Available at: *http://www.webbsearch.co.uk/wp-content/uploads/2019/06/Obstacles-to-deploying-a-dense-network-Americas-version-FINAL.pdf*

WEF (World Economic Forum). 2020. ¿Podría el bloqueo del coronavirus ayudar a cerrar la breca digital de América Latina? Cologny, Switzerland: WEF. Available at: *https://es.weforum.org/agenda/2020/05/podria-el-bloqueo-del-coronavirus-ayudar-a-cerrar-la-brecha-digital-de-america-latina/*.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